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OFFSHORING AND COMPANY CHARACTERISTICS: SOME EVIDENCE FROM THE ANALYSIS OF SPANISH FIRM DATA *

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ABSTRACT: This article investigates firm characteristics associated with the probability of relocating activities in a foreign country. Using manufacturing firms' micro data for the 1999-2005 period, we find evidence that cost-cutting objectives are the main determinants for offshoring production. The analysis reveals that firms that are larger and have higher productivity, more research and development activity and greater human capital intensity are more likely to relocate activity abroad. Thus, 'the best' firms self-select to offshoring activities. We note the special prominence of foreign firms among those that engage in offshoring. Our results show that self-selection of 'the best' firms are much more significant in foreign firms.

JEL Codes: F21, F23

Keywords: Offshoring determinants, best firms, firm characteristics, foreign firms

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1. Introduction

Globalization and the easy access to information and communication technologies allow firms to organize their activity and decide their production strategies in a global framework (UNCTAD, 2004). Whether purchasing intermediate goods and services from foreign suppliers or locating some parts of the production process in other countries through foreign direct investment (FDI), the objective pursued is to maximize production value (Kedia, Lahiri, & Lovvorn, 2005). The relocation of the activity in a foreign country is a part of the firm's strategy that allows the externalization of relatively inefficient production processes. For firms that operate in very competitive industries and/or those that are performing poorly, the international fragmentation of production may be a very effective strategy for cost reduction.

The sourcing of intermediate goods and services is considered as a decision problem of business firms (Helpman, 2006; Grossman & Rossi-Hansberg, 2008; Olsen, 2006). The firm has to consider two dimensions. The first is ownership: the producer must decide whether to undertake the activity in-house or whether to purchase the input or service from outside through the market (at arm's length). The second is geography: that is, whether the production can be performed domestically or in a foreign country. The interaction of these two dimensions allows the firm to choose between four possibilities: insource at home, outsource at home, insource abroad and outsource abroad. Thus, following Olsen (2006) offshoring refers to the relocation of jobs and processes to any foreign country, which includes international outsourcing when the provider is external to the firm and international insourcing when the provider is an affiliated firm, captive and outsource offshoring in the most often used offshoring governance modes (Manning, Massini & Lewin, 2008).

In Spain, two main waves of intense manufacturing offshoring are observed (Myro & Fernandez-Otheo, 2004, 2008). The first took place in the early 1990s; most of the offshoring involved the movement of a part of the production chain by firms in traditional and high technology-intensive activities; only a few were in medium technology-intensive activities. The firms in traditional sectors, textile firms especially, moved part of their production to low cost countries such as Morocco, Portugal and China. The firms in high technology-intensive sectors moved mainly to European Union countries; more than 90% of these electric and electronic firms were foreign. The second wave, which began in 2000 and continues today, is rather different: as Myro & Fernandez-Otheo (2008) point out, most of the offshoring is undertaken by foreign firms in the high and medium technology-intensive sectors, which look to the countries of Eastern European as location substitutes for Spain.

During the last few decades Spain has been an important host country for affiliates of multinational companies (Pelegrín, 2002). Venables *et al.* (2000) shows that from late 1970s to the late 1990s the share of all EU manufacturing located in Spain was 6.5%. A large proportion of foreign firms that entered Spain in the 1980s are now offshoring suggesting that the country is losing its traditional cost advantage as host country for offshoring activities (Pelegrín & Bolance, 2006, 2008).

This study focuses on firms that relocated production process to a foreign country through FDI between 1999 and 2005. Using the Olsen (2006) terminology, we call this international insourcing (or offshore insourcing). As the scale of this phenomenon is increasing, our main objective is to identify the factors that determine international insource, given the importance of prior foreign direct investment and the actual prominence of multinationals in offshore

insourcing, Spain constitutes a good laboratory case study. Bearing in mind firm heterogeneity, we try to determine which firm characteristics are directly related to the strategic decision to restructure the company and to transfer production to a foreign country, paying particular attention on the one hand to cost-cutting motives and on the other hand to productivity, technology intensity and international experience. The analysis uses a unique micro database for Spanish manufacturing firms, a data base specially constructed to investigate offshore insourcing in Spain. Given that most empirical studies of firm or industry characteristics and offshoring centre on outsourcing, as far as we know, our study is the first on the determinants and firm characteristics of offshore insourcing in Spain and adds empirical evidence to the limited data on international insourcing that are currently available. We present empirical evidence on the role of firms' characteristics in the decision to move production abroad.

Following on from this introduction, section two presents a review of the main theoretical approaches and the empirical literature. Section three describes the data base and introduces the econometric methodology. The fourth section reports the estimation results and discussion, and we end with a summary and conclusions.

2. Offshoring determinants

Foreign direct investment may be associated directly with offshoring in the form of international insourcing. For this to be the case, the FDI must be accompanied by domestic employment reductions following the close-down of production processes carried out by the foreign affiliate (Olsen, 2006).

In the literature on the determinants of multinational activity, Dunning's "Eclectic Paradigm" suggests that an enterprise's FDI is determined by three types of potential advantages: ownership-location-internalisation (OLI) advantages (Dunning, 1981). In other words, FDI is determined, first, by the extent to which the enterprise possesses net ownership advantages (Hymer, 1960); second, the extent to which it is able to internalise these advantages or, on the contrary, must leave them for other enterprises to exploit (Buckley & Casson, 1976); and, third, the profitability of locating its production units either at home or abroad (Vernon, 1966).

An alternative view suggests that a recent change in the reasons underlying FDI is the growth in strategic asset-seeking FDI, aimed at protecting or increasing the ownership advantage of the investing firm, rather than at exploiting this advantage as is the case of traditional FDI (Dunning, 1998). Thus, the location preferences of firms have shifted from traditional requirements, such as access to markets and natural resources, to the need to have access to knowledge-intensive assets, confined mainly to developed countries, and which are characterized by a greater geographical concentration than other kinds of activity (Chung & Alcácer, 2002; Kuemmerle, 1999).

Based on Dunning's "Eclectic Paradigm", Kedia & Mukherjee (2009) offered a theoretical framework for offshoring decisions of firms. The authors suggest that firms go offshore when they perceive three types of interrelated advantages: first, advantages derived from the disintegration of value chain activities; second, location-specific resourcing advantages, which are specific to a country and external to the firm; and third, externalization-related advantages, involving externalization to independent foreign providers *versus* internalization via FDI.

Offshoring would appear to reaffirm and to challenge the OLI framework. Location, an important variable for market-seeking, resourse-seeking and cost minimization strategies, is prominent in the apparent motivations for offshoring, but the relevance of ownership and internalization advantages are less evident (Doh, 2005). Offshoring implies relocating activities to execute international strategies; it is a new variation of FDI (Lewin, Massini & Peeters, 2009).

2.1 The role of costs

Much of the offshoring literature follows well-established trends in business internationalisation. International outsourcing can be understood from a standard international trade perspective, while international insourcing can be understood from the literature on multinational activity, but in both cases the basic principle is the relocation of activity on the basis of cost (Görg, Greenaway & Kneller, 2008).

The new theories that try to explain the qualitative and quantitative changes in foreign trade and FDI focus on the different organizational strategies of firms. According to the seminal work of Coase (1937), when firms grow, the cost of organizing additional transactions increases and the entrepreneur may not allocate production factors efficiently; in this case, it is possible that the loss in resources will be greater than the cost of the transaction through the market.

Most of the literature on the decision to relocate activity, internalizing the process through FDI, or through subcontracting, revolves around transaction costs (Williamson, 1975).

Transaction cost economics has shown how to distribute activities over market and firm in a way to minimize internal and external transaction costs. Internalization appears when the degree of asset specificity and uncertainty is so high that the different parts need a high level of cooperation and adaptation. On the other hand, subcontracting capitalizes on supplier specialization and scale economies; it offers greater flexibility in the case of market fluctuations and, in general, lowers both management costs and labour costs (Williamson, 2005). Firms consider externalization as opposed to internalization when incentives in the form of co-specialization and organizational learning are reaped and transaction costs are reduced (Kedia & Mukherjee, 2009). In every case the advantages of internalising a market must be compared to the costs. Where costs exceed benefits, markets will not be internalised and market solutions (external licensing, outsourcing) will be sought (Buckley, 2009).

Cost motives are often considered to be the most important driver for offshoring. In the past, cost advantages were used to maintain and increase competitiveness in comparison to local suppliers, but nowadays confronted with increasing competition from overseas firms, European and US firms increasingly offshore their operations to countries that offer significant labor cost advantages (Farrell, 2004). Stratman (2008) points that although wage rates in the leading offshoring locations are rising, it will be a long time before wage parity is reached. In the past few years, companies have become aware that they can reduce costs by moving jobs to lower-wage locations and by reorganizing their production processes and supply chains globally (Farrell, 2004). Optimizing global production will lead to lower costs, which in turn will lead to substantially lower prices for consumers, expanding the market for goods, and creating new business opportunities (Farrell, 2005).

Most of the empirical literature on offshoring determinants investigates the characteristics of firms that perform these activities; some of these studies have confirmed the importance of costs in the decision to offshore. Marin (2006) conducted an empirical study related to outsourcing and offshoring determinants for 2,200 FDI projects from 660 German and Austrian firms in Eastern Europe.[1] The results show that German firms want to offshore to low wage countries when labour costs are high. Tomiura (2005) investigated the characteristics of firms that outsource part of their production across national borders, using micro data from 118,300 companies. The empirical results prove that firms whose products are more labour-intensive show a higher probability of outsourcing, revealing the pressure to cut high labour costs. In addition, firms with higher size, human skills and experience with FDI are more likely to offshore, revealing the existence of entry costs.

Using a different approach, Feenstra & Hanson (2001) examine how firms respond to import competition and how these responses are transmitted to the labour market. In their view, an increase in imports from low-wage countries prompts the offshoring of non-skill-intensive activities. The empirical analysis also shows a high correlation between industries with large imports of final goods and industries with large imports of intermediate inputs, which is consistent with the idea that outsourcing is a response to import competition from low-wage countries.

Initially developed in the manufacturing sector, this trend is gradually permeating the service sector. Lewin & Peeters (2006b) found that reduce costs was the most important strategic driver for offshoring of administrative and technical work to low-cost countries and in 75 per cent of cases companies achieved or exceed their expectations. At the same time the growing

[1] Such as vertical integration or internalization.

pressure to reduce labour costs and improve efficiency induces many organizations to undertake shared services organization (Aksin & Masini, 2008). Roza *et al.* (2011) show that costs drivers, especially labour costs, are the most important determinants in the decision to offshore.

Firms consider offshoring as a strategy that moves beyond gaining cost advantages. We formulate the following hypotheses:

H1- Cost-cutting objectives are important drivers to relocate activity abroad.

H1.1- Operating performance is worse in international insourcing firms, what increases the pressure to reduce costs through offshoring.

H1.2- Firms with labour-intensive activities will be more likely to relocate activity abroad to cut high labour costs.

H1.3- Firms in those industries with more imports from low-wage countries to be more likely to relocate activity abroad.

2.2 'The best' firms offshore

There is evidence that offshoring firms differ from non-offshoring firms. For example, Görg, Greenaway & Kneller (2008) investigating the type of enterprises that engage in offshoring activities, expected that only a certain group, 'the best' firms, were capable of offshoring. The main reason for this assumption is sunk costs, which are costs related to the search for a foreign partner, market research and contractual arrangements etc.. The same argument applies to any form of foreign market entry, whether exporting, direct investment or

offshoring. Consequently, only efficient firms and high-performing enterprises will be able to overcome these sunk costs and successfully start offshore activities.

Grossman & Helpman (2002), Antràs & Helpman (2004) and Helpman (2006) focus their interest on the relationship between trade and firm productivity. They consider that transaction costs, asset specificity and incomplete contracts play an important role in the "make or buy decision". In deciding on one industrial structure – vertical integration or outsourcing – the firm has to choose between having a large, less specialized organization, with higher production and control costs, or looking for a suitable partner and negotiating the incentives. One central result from their models is that firms with low productivity source in the domestic market, and firms with high productivity source in foreign markets. The main reason for this outcome is that the fixed costs of integrating or outsourcing abroad are higher than the costs of integrating or outsourcing at home (Antràs & Helpman, 2004).

Empirical literature show that firms whose productivity is higher and firms more active in R+D tend to be more involved in offshoring (Görg & Hanley, 2004; Görg, Hanley & Strobl, 2008; Tomiura, 2005). In later work, Tomiura (2007) studies the productivity variation with globalization modes (export, international outsourcing and/or FDI), finding that firms offshoring a part of their activities are more productive than foreign outsourcers and exporters, which in turn are more productive than domestic firms.

Related to size Roza *et al.* (2011) use multi-country data to study firm size impact on a firm's offshoring strategy. Although larger companies may benefit of their scale advantages, offshoring is a strategy offering advantages to small and medium enterprises (SMEs), as setup costs are relatively low and their suppliers also create scale advantages for them. This

makes it possible to produce their specialist products at competitive levels. However, this will not fully compensate their limited material advantages compared to large firms, for example financial and technological resources, for this reason larger firms are likely more able to gain cost advantages from offshoring (Roza *et al.* 2011, p.3). Wagner (2010) also shows that offshoring firms are larger.

Head & Ries (2002) used a large panel set of Japanese manufacturing firms to investigate the effects of offshore employment on skill composition in Japan. Their empirical results provide evidence consistent with vertical specialization. FDI in low-income countries appear to raise skill intensity at home but this effect falls as investment shifts towards high-income countries. This is consistent with low-skill activities being transferred to low-income countries and high-skill activities to high income countries. Feenstra & Hanson (1996) argue that outsourcing has contributed to an increase in the relative demand for skilled labour in the United States. In their view, an increase in imports from low-wage countries prompts the offshoring of non-skill-intensive activities shifting employment toward skilled workers within industries (Feenstra & Hanson, 2001). Wagner (2010) also found a positive link between human capital intensity and offshoring, and Díaz-Mora (2008) proved that outsourcing is closely related to skill requirements.

Empirical works such as Görg & Hanley (2004) and Görg, Handley & Strobl (2008) introduce export propensity pointing that exports may have a positive effect on offshoring due to the international experience. Wagner (2010) results' show that offshoring firms have a higher share of exports in total sales than non-relocating firms and in Díaz-Mora (2008) export propensity shows a positive and significant coefficient. We formulate the following hypotheses:

H2- ‘The best’ firms self-select to offshoring.

H2.1- Firms with higher productivity are more likely to engage in international insourcing.

H2.2- Firms more active in R+D are more involved in offshore insourcing.

H2.3- Larger firms are more likely to relocate activity abroad.

H2.4- Firms with greater human capital intensity are more prone to international insourcing.

H2.5- Export firms are more likely to engage in international insourcing.

2.3 Multinational companies and offshoring

Traditionally, internationalization has been a stepwise process in which firms first export products and services, then transfer parts of their production to serve foreign markets, and finally re-import products back to the home country (Hutzschenreuter, Lewin & Dresel, 2011).

As mentioned earlier in 2.1, in the decision to relocate company activities boundaries are determined by the interaction between ‘production’ costs and ‘governance’ costs (Williamson, 1985; Buckley, 2009). Firms with higher multinational experience may be expected to prefer investment modes of entry (Agarwal & Ramaswami, 1992). The multinational companies attain advantages through both vertical and horizontal integration. They are able to segment their activities and to seek the optimal location for each activity. At the same time multinational enterprises are also able to coordinate these activities by means of a wide variety of mechanisms from wholly owned FDI through licensing and subcontracting (Buckley & Ghauri, 2004).

Supply chain management has emerged as an important factor in the competitive success of multinational enterprises. Multinational firms are able to combine technologies from multiple locations in order to create customer solutions (Teece, 2006). Foreign firms, which are assumed to be part of a larger multinational company, can be expected to use higher levels of technology than domestic firms, due to easy access to the parent firm's specific assets (Tomiura, 2005). At the same time, these firms' relationships with the parent firm and other subsidiaries abroad facilitate the disintegration of production structures (Girma & Görg, 2004). We formulate the following hypothesis:

H3- Foreign firms are more likely to relocate activity to a foreign country than domestic firms are.

Are these hypotheses applicable to Spain? In Spain there are few empirical studies of the offshoring determinants of manufacturing industries and, to our knowledge, all those that do exist focus on outsourcing determinants, Gandoy & Díaz-Mora (2007) provide a review for Spanish empirical literature. Díaz-Mora (2008) showed the high degree of persistence in outsourcing strategy and the positive link between outsourcing, unit labour cost and firms' orientation to external markets. Holl (2008) results show that firms that pay high wages and are larger and older, are more likely to engage in outsourcing activities. In addition, firms in industry agglomerations are more likely to subcontract. Fariñas & Martín-Marcos (2010) conclude that high-productivity firms source intermediate inputs in international markets, whereas low-productivity firms acquire them at home. The authors report evidence for self-selection, i.e. that high-productivity firms are more likely to engage in global production strategies.

3. Data and Model

We aim to analyse international insourcing determinants using a data base of firms that offshore production activity to foreign countries and firms that do not offshore. For data base design we dispose of two types of data, one containing offshoring information and the other containing information on annual accounts (for up to 10 years, consolidated and unconsolidated), financial ratios, activities and ownership for approximately 1,201,000 companies throughout Spain. The latter is called "Sistema de Análisis de Balances Ibéricos (SABI)", managed by Bureau Van Dijk.[2]

The offshoring information was obtained from the research group "Foreign Capital, Location and Delocation" at the University Complutense of Madrid. We dispose information from 141 firms that have taken one of the following three actions: announce a redundancy plan (Spanish acronym ERE), close down, close a plant, or close a product line in Spain, in order to transfer production to a foreign country, between 1999 and 2005.[3] To these 141 firms we add a sample of firms that do not offshore, to analyse some differences between the former and the latter.

With the selection of the sample of non-offshoring firms we want to guarantee that both groups (offshoring and non-offshoring firms) represent the same industry structure and they are similar size firms. Both groups of firms are similar, but some offshore and others do not.

[2] SABI is a part of the European Amadeus data base, but has information only for Spanish and Portuguese companies.

[3] In an ERE the firm or the workers' representatives ask the employment authorities to suspend or terminate the working relationship between the firm and its employees, without jeopardizing the workers' rights.

One main trait of the offshore insourcing firms is that they have the highest employment levels. We analyse the variable number of workers in each industry and we see that offshore firms have a number of workers located in the upper quartile of this variable. Therefore, for the sample selection of non-offshore firms, first, we select in SABI all non-offshore firms in each sector in which our 141 international insourcing firms operate (corresponding to the 4-digit level of NACE, National Activities Classification Economics). Second, we eliminate the non-offshore firms with a number of workers lower than the third quartile of this variable in each industry. Finally, we select 25% non-offshore firms from the total, using stratified random sampling, where each stratus corresponds to a sector.

The SABI data base does not contains information about offshore, but we can deduce this information, if a firm remains in the SABI data base throughout the period analysed and its number of workers does not change significantly, we can conclude that it is a non-offshore firm.

3.1 The variables

Table 1 describes the variables used in the data model. The individual information for firms is obtained from the SABI data base and is measured in different ways, depending on whether they offshore or not. For non-offshoring firms, we calculate the mean of individual information for the period 1999-2005.[4] For offshore insourcing firms, to maintain the exogeneity of the explicative variables, we calculate the mean for the available years until the year "before" the announcement of international insourcing in the media, when the company

[4] The SABI data base does not always have information for all the years in the period; in these cases we calculate the average for the years available.

had already decided to move all or part of its production to a third country. The variable OFF, which differentiates firms that offshore or firms that do not, is equal to 1 if the firm moves productive activity to a foreign country (international insourcing) and 0 if it does not.

To test cost-cutting determinants of offshoring three variables are calculated. First the Profit variable as a proxy for operating performance. We would expect a worse operating performance in international insourcing firms. Paul & Wooster (2010) found that firms that outsource in foreign countries had worse operating performance, higher administrative costs and greater labour intensity. Second, the KvsL variable measures the capital-labour ratio (Tomiura, 2005); here, we would expect that firms with labour-intensive activities are more likely to relocate activity abroad than other firms. Finally, as we have no information about imports at a company level (Feenstra & Hanson, 2001) for all firms, offshoring and non-offshoring, we calculate an industry-level proxy for imports, measured as the sector imports with origin in East European countries, the Maghreb, Turkey and Asia, which represent 78% of all offshore insourcing destinations, divided by total sector imports, for the period 1999-2005.

To ascertain 'the best' firms, we use five determinants: Productivity, R+D intensity, Export, Size and Human Capital. Productivity is measured as sales amount divided by number of workers. The effect of firms' R+D intensity is represented through three binary variables f1, f2 and f3. Binary variable f1 takes value 1 if the activity of the firm is considered low technology-intensive, f2 takes value 1 if the activity of the firm is considered medium-high technology-intensive and 0 if not; and f3 takes value 1 if the activity of the firm is considered high technology-intensive and 0 if not. To define exports we obtain a dummy variable

(Export) which takes on value 1 if the firm exports and 0 if the firm does not. The last, Human Capital, is measured as personal expenses per worker.

The Foreign variable is an ownership dummy equal to 1 if the firm is considered foreign and 0 if it is considered domestic, it is obtained to test if foreign firms are more likely to relocate activity to a foreign country than domestic firms. The Firm Age variable is used to represent the effect of learning over time.

3.2 Descriptive statistics

Table 2 shows the descriptive statistics of the variables in the data base (presented in Table 1). For all variables the median is lower than the mean, indicating the positive skewness of all variables, i.e. more firms below than above the mean.

In Table 3 we present the frequencies of firms' international insourcing following the classification of R+D intensity industries provided by the OECD, which would mainly consider the industries used as follows: electronic equipment – high technology; transport equipment, chemicals, machinery and electrical equipment – medium-high technology, and finally textile, clothing, leather and footwear, food and beverages, metal, paper, printing and publishing – low technology. The chi-square statistic to test if to offshore or not is independent of R+D intensity is significant at 1%, indicating the existence of a relationship between the category of both variables. We observe that the propensity to offshore insourcing increases with technological intensity, given that for low technology only 1.24% of firms relocate, for the medium-high technology 4.24% offshore insource and for high technology industries the percentage increases to 9.05%.

Table 4 contains the descriptive statistics for non-offshoring firms (OFF=0) and for offshore insourcing firms (OFF= 1). We also test if there are significant differences between the means of variables in offshoring and non-offshoring firms; for this we use the Student t statistic to compare groups with different variances. This descriptive indicates that firms that offshore are older, are larger, have more human capital and profit. Moreover, most of the firms are exporters and foreign-owned.

The inference shows that the productivity, import intensity and capital-labour ratio are not different between offshoring and non-offshoring firms. After, we see that when we consider the combined effect of all variables and some interactions these variables explain the differences between firms. For this, we specify a logit model for analyzing the determinants of propensity to offshore.

$$P(OFF=1) = F(R+D, \text{Firm Age}, \text{Size}, \text{Human Capital}, \\ \text{Profit}, \text{KvsL}, \text{Productivity}, \text{Imports}, \text{Export}, \text{Foreign}).$$

Where $F(\cdot)$ is the logistic cumulative distribution function:

$$F(t) = \frac{\exp(t)}{1+\exp(t)}.$$

4. Results and discussion

With the data base described above, we estimate 4 logit models. In all cases the dependent variable is OFF, which is equal to 1 if the firm moves productive activity to a foreign country (international insourcing) and 0 if it does not. The results are shown in Table 5.

Model 1 in Table 5 includes all the variables described in Table 1. As the variable, human capital (Human Capital), shows a correlation with capital-labour intensity (KvsL) bigger than 0.8 and with the variable profits (Profit) bigger than 0.5, we eliminate human capital explanatory variable in models 2 and 4, to avoid the multi-colinearity problems.

In Table 5, Model 1 shows that the significant parameters, at least at 5%, are those associated with R+D intensity (f2 and f3), firm size variables (Size, $Size^2$), Profit, Imports and Foreign. The parameter associated with the variable capital/labour intensity (KvsL) is significant at 10%.

In Model 2, on elimination of the human capital variable, the parameter associated with the productivity variable becomes significant at 10%. In Model 3, when we drop the R+D effect (f2 and f3), the parameter associated with human capital is now significant at 10%. Finally, in Model 4, on elimination of the effect of R+D and human capital variables, productivity is again significant at 10%. For all significant parameters, the signs are as expected in the hypotheses we formulated.

Using the results obtained in Table 5, we analyse the support for the hypotheses formulated in section two.

The hypothesis H1 points to cost-cutting determinants to relocate activity abroad. We observe that firms with worse operating performance (H1.1) and high labour intensity (H1.2) are more likely to carry out international insourcing; cost-saving through offshoring constitutes a decisive strategy for all the firms in the sample. Industries with higher imports from low-wage countries (H1.3) also show a higher propensity to relocate in these countries proving

that for most firms international insourcing is a response to import competition from countries with locational advantages, such as labour costs, for example firms in textiles, clothing, leather and footwear, and food and beverages, which face strong competition from Asian and north African products in the domestic market.

In relation to H2 are these firms the 'the best' ones"? First of all and corroborating the theoretical models of Antràs & Helpman (2004) and Helpman (2006), firms with higher productivity are more likely to relocate activity abroad (H2.1). Second, firms more active in R+D tend to be involved in more extensive international insourcing (H2.2).

Related to size (H2.3) the larger the size of the firm, the greater the probability of vertical integration abroad. However, the negative parameter associated with the variable, $Size^2$, shows that the effect is non-linear, as the effect decreases as size increases. Larger firms have a greater capacity to establish and manage offshoring activities. Higher human capital intensity (H2.4) is positively associated with firms that insourse internationally, especially by the investment in production facilities in low income countries, vertical specialization to low income countries appears to raise skill intensity at home. However, firm age and export experience (H2.5) have no statistical significance.

Foreign firms (H3) are more likely to relocate activity to a foreign country. Their multinational experiences allow them to fragment their activities and to seek the optimal location for each activity. Finally business experience, which makes it easier for longer-established firms to find suitable locations, suppliers and partners when necessary, has no statistical significance.

To delve deeper into Table 5 results, we studied the determinants and firm characteristics for the two groups separately: foreign and national firms. Table 6 gives the frequencies of firms' international insourcing following the classification of foreign and national. In the columns we can see that 73.76% of firms that offshore are foreign, along the rows we can see that only the 0.64% of national firms offshore while 18.98% of foreign firms engage in offshore insourcing. Given that offshoring rates are higher for foreign firms, in Table 7 we calculated the same four models as in Table 5, but now only for foreign firms. In general terms, all parameters appear significant at least at 5%, except f2 (medium-high technology-intensive firms), firm age and exports. Thus, though the results in Table 7 are roughly the same as in Table 5, their level of significance is much higher.

The relationship of foreign firms with the parent company and other subsidiaries abroad facilitates the disintegration of production structures, as shown by the fact that nearly 74% of the insource offshoring firms from the sample are foreign firms. Some studies already mentioned, such as Girma & Görg (2004) and Tomiura (2005), also obtained empirical evidence on the offshoring activities of multinationals. The estimations of Tomiura (2005) show that firms with own affiliates overseas are four times more likely to choose foreign offshoring than firms without experience in FDI. Our results prove that self-selection of 'the best' firms and cost-cutting determinants are much more significant in foreign firms, and this significance is especially more pronounced in productivity.

However, when we calculated the same four models only for national firms, in Table 8, some parameters that appeared significant in the calculation for all firms (Table 5) and for foreign firms (Table 7) have no statistical significance, i.e. human capital, capital-labour intensity and productivity. On the other hand, the parameter associated with variable exports appears

significant and positive (Table 8). As national firms oriented to international markets face more pressure to improve efficiency and competitiveness, their international experience seems to be advantageous when moving production abroad.

All the same, although results are not as sound as for foreign firms, national firms with lower profits and more imports from low-wage countries are more prone to relocate activity to foreign countries, which mean that costs remain an important determinant. In addition, these are the 'the best' firms (larger, more technology-intensive and exporters), as against national firms that do not offshore.

Finally, Table 9 shows the firm traits hypothesis and the results in tables 7 and 8, for foreign firms, for national firms and for all firms. As the Table 9 illustrates, our estimation results prove that most of the firms fulfil the established hypotheses.

5. Concluding Remarks

This study analyzes firm characteristics associated with the probability of relocate activities in a foreign country, using Spanish manufacturing firms' micro data for the 1999-2005 period. This paper contributes to a major knowledge of the determinants of offshore insourcing (captive offshoring) and provides empirical evidence from firm level data, by using unique data for Spanish manufacturing firms. Given the strong link between foreign direct investment in manufacturing industries during the eighties and the subsequent role of multinationals in offshore insourcing, Spain constitutes a good laboratory case study.

The results of our paper provide immediate answers for a number of the questions raised at the beginning. First, we show that international insourcing practices by manufacturing firms in Spain are much more likely to be cost driven. Firms with high labor intensity, worse operating performance and imports from low-wage countries are more likely to carry out international insourcing.

Second, we found that firms with higher productivity, that are more active in R+D, that are larger and that have greater human capital intensity are more likely to relocate activity abroad, i.e. 'the best' firms self-select to offshore insourcing activities.

Third, we noted the special prominence of foreign firms among those that engage in international insourcing. Our results prove that self-selection of 'the best' firms are much more significant in foreign firms, in particular related to productivity. For national firms we observed a self-selection of exporters into international insourcing, confirming that international experience is a key factor in the moving of production abroad.

Our results suggest that firms need to be financially viable in an increasingly competitive global environment. In this context, the relocation of production as a form of corporate restructuring will increase in near future.

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Table 1: Variables in the data base

Variable	Description
OFF	Equal to 1 if the firm offshore and 0 otherwise
Firm Age	Number of years between year of creation and 2005
Size	Number of workers/1,000
Human Capital	Personal expenses per worker
KvsL	Tangible fixed assets divided by number of workers
Profit	Profit before tax
Productivity	Sales divided by number of workers
Export	Equal to 1 if the firm exports and 0 otherwise
Foreign	Equal to 1 if the firm is foreign and 0 if it is domestic. We consider a firm as foreign when its capital participation is at least 10%
Imports	Share of industry imports from East European countries, Maghrib, Turkey and Asia[a] (*Datacomex*, foreign trade statistics)
f1	Equal to 1 if the firm activity is considered traditional and 0 otherwise
f2	Equal to 1 if the firm activity is considered medium-high technology-intensive and 0 otherwise
f3	Equal to 1 if the firm activity is considered high technology-intensive and 0 otherwise

[a]Industry imports with origin in India, Vietnam, China, Czech Republic, Slovakia, Hungary, Romania, Croatia, Slovenia, Poland, Turkey, Tunisia and Morocco

Table 2: Descriptive statistics for all firms, sample size N=6335

VARIABLE	Mean	STD	Median
Firm Age	20.1972	13.9137	18
Size	0.1019	0.4798	0.0311
Human Capital	26.1556	78.6493	21.9300
Profit	0.9228	7.9549	0.0547
KvsL	39.4138	206.1219	17.1935
Productivity	160.9491	1321.4850	91.4259
Imports	5.3417	5.1260	3.7060
Export	0.3943	0.4887	0
Foreign	0.0865	0.2811	0

Table 3: Cross frequencies between RD activity and offshore insourcing

	OFF		
Frequencies % total % row % column	OFF=0	OFF=1	Total
Low Technology Level Industries	4546 71.76 98.76 73.39	57 0.9 1.24 40.43	4603 72.66
Medium-High Technology Level Industries	1447 22.84 95.76 23.36	64 1.01 4.24 45.39	1511 23.85
High Technology Level Industries	201 3.17 90.95 3.25	20 0.32 9.05 14.18	221 3.49
Total	6194 97.77	141 2.23	6335 100

χ^2= 95.96*** to test independence between variables.

Significance levels: * 10%, **5% and ***1%

Table 4: Descriptive statistics for OFF=0 (sample size N=6194) and for OFF=1 (sample size N=141)

	OFF=0			OFF=1		
VARIABLE	Mean	STD	Median	Mean	STD	Median
Firm Age ***	20.0179	13.6836	18	28.0709	20.2991	23
Size***	0.0793	0.3207	0.0306	1.0938	2.2028	0.3563
Human Capital***	25.9557	79.4669	21.7410	34.9357	20.7892	30.5000
Profit**	0.8014	6.4029	0.0540	6.2562	31.9393	0.62639
KvsL	39.3725	208.3402	16.9765	41.2280	46.0077	28.2201
Productivity	142.4317	350.7107	90.3250	974.4018	8537.3373	153.7230
Imports	5.3282	5.1054	3.7060	5.9357	5.9538	3.7300
Export***	0.3863	0.4869	0	0.7447	0.4376	1
Foreign***	0.07168	0.2580	0	0.7376	0.4415	1

Significance levels: * 10%, **5% and ***1%

Table 5: Estimation results for all firms

Coefficients	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Intercept	-6.7054***	-6.6555***	-6.3643***	-6.2618***
f2	0.5095*	0.5205*		
f3	1.5069***	1.5628***		
Firm Age	-0.0021	-0.0017	-0.0015	-0.0008
Size	2.4903***	2.4799***	2.5252***	2.5139***
$Size^2$	-0.1557***	-0.1554***	-0.1580***	-0.1579***
Human Capital	0.0037		0.0057*	
Profit	-0.0346***	-0.0341***	-0.0356***	-0.0351***
KvsL	-0.0035*	-0.0029	-0.0043*	-0.0035*
Productivity	0.0003	0.0004*	0.0003	0.0004*
Imports	0.1225***	0.1225***	0.0965***	0.0954***
Export	0.2557	0.2550	0.3163	0.3167
Foreign	3.4657***	3.4840***	3.5790***	3.6066***
N=6335	χ^2=569.6592***	χ^2=568.7791***	χ^2=554.9322***	χ^2=552.6893***

Significance levels: * 10%, **5% and ***1%

Table 6: Cross frequencies between national or foreign and offshore insourcing

	OFF		
Frequencies % total % row % column	OFF=0	OFF=1	Total
National	5750 90.77 99.36 92.83	37 0.58 0.64 26.24	5787 91.35
Foreign	444 7.01 81.02 7.17	104 1.64 18.98 73.76	548 8.65
Total	6194 97.77	141 2.23	6335 100

Table 7: Estimation results for foreign firms

Coefficients	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Intercept	-3.4901***	-3.3186***	-3.1169***	-2.8045***
f2	0.3299	0.3565		
f3	1.3206**	1.4950**		
Firm Age	-0.0044	-0.0034	-0.0049	-0.0034
Size	6.4655***	6.3747***	6.4178***	6.2778***
$Size^2$	-0.4092***	-0.4049***	-0.4060***	-0.3989***
Human Capital	0.0092*		0.0125**	
Profit	-0.0943***	-0.0909***	-0.0934***	-0.0886**
KvsL	-0.0100**	-0.0077**	-0.0115**	-0.0089**
Productivity	0.0006**	0.0007**	0.0005**	0.0006**
Imports	0.1274***	0.1285***	0.1052***	0.1034***
Export	-0.3209	-0.3227	-0.3093	-0.3077
N=548	χ^2=196.2040***	χ^2=193.4282***	χ^2=190.0533***	χ^2=185.2060***

Significance levels: * 10%, **5% and ***1%

Table 8: Estimation results for national firms

Coefficients	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Intercept	-7.1699***	-7.1774***	-6.5452***	-6.5230***
f2	1.3456**	1.3437**		
f3	1.8892**	1.8877**		
Firm Age	-0.0031	-0.0032	0.0009	0.0009
Size	2.3277***	2.3268***	2.5001***	2.5027***
$Size^2$	-0.2256***	-0.2254***	-0.2496***	-0.2500***
Human Capital	-0.0006		0.0014	
Profit	-0.0551**	-0.0552**	-0.0598**	-0.0596**
KvsL	0.0004	0.0005	0.0006	0.0006
Productivity	0.0001	0.0000	-0.0000	0.0001
Imports	0.1439***	0.1440***	0.0926***	0.0921***
Export	0.7144*	0.7157*	0.9534**	0.9511**
N=548	χ^2=67.5353***	χ^2=67.5325***	χ^2=57.6058***	χ^2=57.5800***

Significance levels: * 10%, **5% and ***1%

Table 9: Firm traits and hypotheses

Hypothesis	Foreign Firms	National Firms	All Firms
H1.1- Worse operating performance	Yes	Yes	
H1.2- Higher labour-intensity	Yes	No	
H1.3- Imports from low-wage countries	Yes	Yes	
H2.1- Higher productivity	Yes	No	
H2.2- Higher R+D intensity	Yes	Yes	
H2.3- Larger firms	Yes	Yes	
H2.4- Greater human capital intensity	Yes	No	
H2.5- Export firms	No	Yes	
H3- Foreign firms			Yes

2009

2009/1. Rork, J.C.; Wagner, G.A.: "Reciprocity and competition: is there a connection?"
2009/2. Mork, E.; Sjögren, A.; Svaleryd, H.: "Cheaper child care, more children"
2009/3. Rodden, J.: "Federalism and inter-regional redistribution"
2009/4. Ruggeri, G.C.: "Regional fiscal flows: measurement tools"
2009/5. Wrede, M.: "Agglomeration, tax competition, and fiscal equalization"
2009/6. Jametti, M.; von Ungern-Sternberg, T.: "Risk selection in natural disaster insurance"
2009/7. Solé-Ollé, A; Sorribas-Navarro, P.: "The dynamic adjustment of local government budgets: does Spain behave differently?"
2009/8. Sanromá, E.; Ramos, R.; Simón, H.: "Immigration wages in the Spanish Labour Market: Does the origin of human capital matter?"
2009/9. Mohnen, P.; Lokshin, B.: "What does it take for and R&D incentive policy to be effective?"
2009/10. Solé-Ollé, A.; Salinas, P..: "Evaluating the effects of decentralization on educational outcomes in Spain"
2009/11. Libman, A.; Feld, L.P.: "Strategic Tax Collection and Fiscal Decentralization: The case of Russia"
2009/12. Falck, O.; Fritsch, M.; Heblich, S.: "Bohemians, human capital, and regional economic growth"
2009/13. Barrio-Castro, T.; García-Quevedo, J.: "The determinants of university patenting: do incentives matter?"
2009/14. Schmidheiny, K.; Brülhart, M.: "On the equivalence of location choice models: conditional logit, nested logit and poisson"
2009/15. Itaya, J., Okamuraz, M., Yamaguchix, C.: "Partial tax coordination in a repeated game setting"
2009/16. Ens, P.: "Tax competition and equalization: the impact of voluntary cooperation on the efficiency goal"
2009/17. Geys, B., Revelli, F.: "Decentralization, competition and the local tax mix: evidence from Flanders"
2009/18. Konrad, K., Kovenock, D.: "Competition for fdi with vintage investment and agglomeration advantages"
2009/19. Loretz, S., Moorey, P.: "Corporate tax competition between firms"
2009/20. Akai, N., Sato, M.: "Soft budgets and local borrowing regulation in a dynamic decentralized leadership model with saving and free mobility"
2009/21. Buzzacchi, L., Turati, G.: "Collective risks in local administrations: can a private insurer be better than a public mutual fund?"
2009/22. Jarkko, H.: "Voluntary pension savings: the effects of the finnish tax reform on savers' behaviour"
2009/23. Fehr, H.; Kindermann, F.: "Pension funding and individual accounts in economies with life-cyclers and myopes"
2009/24. Esteller-Moré, A.; Rizzo, L.: "(Uncontrolled) Aggregate shocks or vertical tax interdependence? Evidence from gasoline and cigarettes"
2009/25. Goodspeed, T.; Haughwout, A.: "On the optimal design of disaster insurance in a federation"
2009/26. Porto, E.; Revelli, F.: "Central command, local hazard and the race to the top"
2009/27. Piolatto, A.: "Plurality versus proportional electoral rule: study of voters' representativeness"
2009/28. Roeder, K.: "Optimal taxes and pensions in a society with myopic agents"
2009/29, Porcelli, F.: "Effects of fiscal decentralisation and electoral accountability on government efficiency evidence from the Italian health care sector"
2009/30, Troumpounis, O.: "Suggesting an alternative electoral proportional system. Blank votes count"
2009/31, Mejer, M., Pottelsberghe de la Potterie, B.: "Economic incongruities in the European patent system"
2009/32, Solé-Ollé, A.: "Inter-regional redistribution through infrastructure investment: tactical or programmatic?"
2009/33, Joanis, M.: "Sharing the blame? Local electoral accountability and centralized school finance in California"
2009/34, Parcero, O.J.: "Optimal country's policy towards multinationals when local regions can choose between firm-specific and non-firm-specific policies"
2009/35, Cordero, J,M.; Pedraja, F.; Salinas, J.: "Efficiency measurement in the Spanish cadastral units through DEA"
2009/36, Fiva, J.; Natvik, G.J.: "Do re-election probabilities influence public investment?"
2009/37, Haupt, A.; Krieger, T.: "The role of mobility in tax and subsidy competition"
2009/38, Viladecans-Marsal, E; Arauzo-Carod, J.M.: "Can a knowledge-based cluster be created? The case of the Barcelona 22@district"

2010

2010/1, De Borger, B., Pauwels, W.: "A Nash bargaining solution to models of tax and investment competition: tolls and investment in serial transport corridors"
2010/2, Chirinko, R.; Wilson, D.: "Can Lower Tax Rates Be Bought? Business Rent-Seeking And Tax Competition Among U.S. States"
2010/3, Esteller-Moré, A.; Rizzo, L.: "Politics or mobility? Evidence from us excise taxation"
2010/4, Roehrs, S.; Stadelmann, D.: "Mobility and local income redistribution"

2010/5, Fernández Llera, R.; García Valiñas, M.A.: "Efficiency and elusion: both sides of public enterprises in Spain"
2010/6, González Alegre, J.: "Fiscal decentralization and intergovernmental grants: the European regional policy and Spanish autonomous regions"
2010/7, Jametti, M.; Joanis, M.: "Determinants of fiscal decentralization: political economy aspects"
2010/8, Esteller-Moré, A.; Galmarini, U.; Rizzo, L.: "Should tax bases overlap in a federation with lobbying?"
2010/9, Cubel, M.: "Fiscal equalization and political conflict"
2010/10, Di Paolo, A.; Raymond, J.L.; Calero, J.: "Exploring educational mobility in Europe"
2010/11, Aidt, T.S.; Dutta, J.: "Fiscal federalism and electoral accountability"
2010/12, Arqué Castells, P.: "Venture capital and innovation at the firm level"
2010/13, García-Quevedo, J.; Mas-Verdú, F.; Polo-Otero, J.: "Which firms want PhDS? The effect of the university-industry relationship on the PhD labour market"
2010/14, Calabrese, S.; Epple, D.: "On the political economy of tax limits"
2010/15, Jofre-Monseny, J.: "Is agglomeration taxable?"
2010/16, Dragu, T.; Rodden, J.: "Representation and regional redistribution in federations"
2010/17, Borck, R; Wimbersky, M.: "Political economics of higher education finance"
2010/18, Dohse, D; Walter, S.G.: "The role of entrepreneurship education and regional context in forming entrepreneurial intentions"
2010/19, Åslund, O.; Edin, P-A.; Fredriksson, P.; Grönqvist, H.: "Peers, neighborhoods and immigrant student achievement - Evidence from a placement policy"
2010/20, Pelegrín, A.; Bolance, C.: "International industry migration and firm characteristics: some evidence from the analysis of firm data"
2010/21, Koh, H.; Riedel, N.: "Do governments tax agglomeration rents?"
2010/22, Curto-Grau, M.; Herranz-Loncán, A.; Solé-Ollé, A.: "The political economy of infraestructure construction: The Spanish "Parliamentary Roads" (1880-1914)"
2010/23, Bosch, N.; Espasa, M.; Mora, T.: "Citizens' control and the efficiency of local public services"
2010/24, Ahamdanech-Zarco, I.; García-Pérez, C.; Simón, H.: "Wage inequality in Spain: A regional perspective"
2010/25, Folke, O.: "Shades of brown and green: Party effects in proportional election systems"
2010/26, Falck, O.; Heblich, H.; Lameli, A.; Südekum, J.: "Dialects, cultural identity and economic exchange"
2010/27, Baum-Snow, N.; Pavan, R.: "Understanding the city size wage gap"
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2010/29, Koethenbuerger, M.: "How do local governments decide on public policy in fiscal federalism? Tax vs. expenditure optimization"
2010/30, Abel, J.; Dey, I.; Gabe, T.: "Productivity and the density of human capital"
2010/31, Gerritse, M.: "Policy competition and agglomeration: a local government view"
2010/32, Hilber, C.; Lyytikäinen, T.; Vermeulen, W.: "Capitalization of central government grants into local house prices: panel data evidence from England"
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2010/38, Ahlfeldt, G.; Feddersen, A.: "From periphery to core: economic adjustments to high speed rail"
2010/39, González-Val, R.; Pueyo, F.: "First nature vs. second nature causes: industry location and growth in the presence of an open-access renewable resource"
2010/40, Billings, S.; Johnson, E.: "A nonparametric test for industrial specialization"
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