Offshoring and Firm Characteristics: Some Evidence from the Analysis of Spanish Firm-Level Data*

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Abstract

This paper examines firm characteristics associated with the probability of relocating activities in a foreign country. Micro-level data for manufacturing firms for the period 1999–2005 shows that cost-cutting is the main determinant of offshoring production. The analysis reveals that firms with a higher research and development activity, larger firms and firms with greater labour intensity tend to be more involved in offshoring. We observe the prominence of foreign firms among those engaging in offshoring; our findings show that self-selection of the ‘best’ firms is much more significant in the case of foreign firms. For national firms, international experience is a key factor in the moving of production abroad.

JEL Classification code: F21, F23.

Key words: Offshoring determinants, ‘best’ firms, firm characteristics, foreign firms

1. Introduction

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

The sourcing of intermediate goods and services provides business firms with a decision making challenge (Helpman, 2006; Grossman and Rossi-Hansberg, 2008; Olsen, 2006).

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The firm has to consider two dimensions. The first is ownership: the producer must decide whether to undertake the activity in-house or purchase the input or service from outside, through the market (at arm's length). The second is geography: that is, whether 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 or outsource abroad. Following Olsen (2006), offshoring refers to the relocation of jobs and processes to any foreign country; it includes international outsourcing when the provider is external to the firm and international insourcing when the provider is an affiliated firm, with captive and outsource offshoring being the most frequently used offshoring governance modes (Manning, Massini and Lewin, 2008).

In Spain, two main waves of intense manufacturing offshoring are observed (Myro and Fernandez-Otheo, 2004, 2008). The first took place in the early 1990s, when most of the offshoring involved the movement of a part of the production chain by firms in traditional and high technology-intensive activities, and when only a small portion of offshoring could be attributed to medium technology-intensive activities. The firms in traditional sectors, especially textiles, moved part of their production to low cost countries such as Morocco, Portugal and China, while the firms in high technology-intensive sectors moved mainly to European Union countries. Finally, in this first wave, 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 observed by Myro and Fernandez-Otheo (2008), most of the offshoring is undertaken by foreign firms in the high and medium technology-intensive sectors, which look to the countries of Eastern Europe as location substitutes for Spain.

During recent decades Spain has been an important host country for affiliates of multinational companies (Pelegrín, 2002). Venables *et al.* (2000) show that from the late 1970s to the late 1990s Spain's share of all EU manufacturing stood at 6.5%. A large proportion of foreign firms that entered Spain in the 1980s are now offshoring, which suggests that this country is losing its traditional cost advantage as a host country for offshoring activities (Pelegrín and Balance, 2006, 2008).

This study focuses on firms that relocated their production process to a foreign country through FDI between 1999 and 2005. Using the Olsen (2006) terminology, we call this 'international insourcing' (offshore insourcing and also vertical integration). As the scale of this phenomenon is increasing, our main objective is to identify the factors that determine international insourcing, given the importance of prior foreign direct investment and the actual prominence of multinationals in offshore insourcing, for which Spain constitutes a good laboratory case study. This paper contributes to the current empirical literature in the following aspects: First, with regard to firm heterogeneity, we try to determine which firm characteristics are directly related to a company's strategic decision to restructure and transfer production to a foreign country, paying particular attention to cost-cutting motives on the one hand and to productivity, technology intensity and international experience on the other. As Görg, Greenaway and Kneller (2008) point one of the principles of the relocation of activity are costs. Cost motives are often considered to be one of the most important drivers behind offshoring. Transaction cost economics (Williamson, 1975) has shown how entrepreneurs can distribute activities in a way that minimizes internal and external transaction costs. Internalization appears when the degree of asset specificity and uncertainty is high while

subcontracting offers greater flexibility and, in general, lowers both management costs and labour costs (Williamson, 2005). In each case, the advantages of internalizing a market must be compared to its costs. Grossman and Helpman (2002) emphasize the technology as one of the industrial conditions that support vertical integration. The empirical literature shows that firms with a higher level of productivity and R&D activity tend to be more involved in offshoring (Görg and Hanley, 2005; Görg, Hanley and Strobl, 2008; Tomiura, 2005). Even some recent papers address the issue of which factors have impact on firms' offshoring foreign integration, empirical literature is still very scarce. In this paper we document the relevance of costs and the paper that productivity, technology intensity and international experience play in offshore insourcing.

Secon, the analysis uses a unique micro-level database for Spanish manufacturing firms, designed to investigate offshore insourcing in Spain. Given that most empirical studies of firm or industry characteristics and offshoring focus on outsourcing, as far as we know our study is the first of its kind on the determinants and firm characteristics of offshore insourcing in Spain and it adds empirical evidence to the limited data currently available on international insourcing. Our dataset provides the opportunity to conduct the analysis at the firm level, while most of the empirical research has been conducted with data aggregated at industry and country level (Antràs, 2003; Nunn and Treffer, 2008, 2011; Marin, 2006). Antràs and Helpman (2004) assume that capital/labour intensity is determinate by industry factors but as Tomiura et al. (2011) show there exist big differences in capital intensity between firms in the same industry, for example Japanese firms at high quartile in apparel industry are nearly as capital intensity as firms at low quartiles in general machinery. Firm level analysis seems very appropriate to study offshoring make or buy decisions as the variance of some key firm variables, as capital intensity and skill intensity is very high (Corcos et al., 2009).¹⁾ We present empirical evidence on the role of firms' characteristics in the decision to move production abroad.

The rest of the paper proceeds as follows. Section 2 reviews the main theoretical approaches and the empirical literature, Section 3 describes the database and outlines the econometric methodology and Section 4 reports the estimation results and discussion. The paper ends 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

1) There are a large number of studies on determinants of FDI which can be offshore insourcing (Pelegrín and Bolancé, 2008). In Spain there are two sources available statistics: balance of payments of the Banc of Spain, and Foreign Investments Registry of the Spanish Ministry of Industry. Leaving aside considerations such as the difficulty in some cases to distinguish between productive investment and brokerage investment through Special Purpose Entities, the main drawbacks of these FDI data are twofold: first, the information is disaggregated at industry level but not at the firm level making impossible the analysis by considering the heterogeneity of firms, which is one of the main contributions of the article, and secondly the data do not distinguish between Horizontal FDI and Vertical FDI, and Vertical FDI is the date needed to analyze offshore insourcing.

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 advantage: ownership, location and internalization (otherwise referred to as the OLI-Framework) (Dunning, 1981). In other words, FDI is determined first by the extent to which an enterprise possesses net ownership advantages (Hymer, 1960), second by how far it can either internalize these advantages or must leave them for other enterprises to exploit (Buckley and Casson, 1976) and third, by the perceived 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, which aims to protect or increase the ownership advantage of the investing firm rather than exploit this advantage as traditional FDI does (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, which are confined mainly to developed countries and which are characterized by a greater geographical concentration than other kinds of activity (Chung and Alcácer, 2002; Kuemmerle, 1999).

Based on Dunning's Eclectic Paradigm, Kedia and Mukherjee (2009) offer a theoretical framework for offshoring decisions of firms. The authors suggest that firms go offshore when they perceive three types of related advantage: 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 both reaffirm and challenge the OLI-Framework. Location, an important variable for market-seeking, resource-seeking and cost minimization strategies, is prominent in the apparent motivations for offshoring, but the relevance of ownership and internalization advantages is less evident (Doh, 2005). Offshoring means relocating activities to execute international strategies and is a new variation of FDI (Lewin, Massini and Peeters, 2009).

2.1 The role of costs

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

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

Most of the literature on a firm's decision to relocate activity by internalizing the pro-

cess through FDI or through subcontracting revolves around transaction costs (Williamson, 1975). Transaction cost economics has shown how entrepreneurs can distribute activities over market and firm in a way that minimizes 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 choose externalization over internalization when incentives in the form of co-specialization and organizational learning are reaped and transaction costs are reduced (Kedia and Mukherjee, 2009). In each case, the advantages of internalizing a market must be compared to its costs. Where costs exceed benefits, markets will not be internalized and market solutions (external licensing, outsourcing) will be sought (Buckley, 2009).

Cost motives are often considered to be the most important drivers behind offshoring. In the past, cost advantages were used to maintain and increase competitiveness in comparison to local suppliers; nowadays, however, because they are confronted by growing competition from overseas firms, European and U.S. firms increasingly offshore their operations to countries that offer significant labour cost advantages (Farrell, 2004). Stratman (2008) points out that although wage rates in leading offshoring locations are rising, it will be a long time before wage parity is reached. In recent 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 the firms that perform these activities and some studies have confirmed the importance of costs in the decision to offshore. Marin (2006) conducts an empirical study on outsourcing and offshoring determinants for 2,200 FDI projects led by 660 German and Austrian firms in Eastern Europe.²⁾ The results show that German firms want to offshore to low wage countries when labour costs are high. Tomiura (2005) investigates the characteristics of firms that outsource part of their production across national borders, using micro-level data on 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, larger firms with more human skills and experience with FDI are more likely to offshore, revealing the existence of entry costs.

Using a different approach, Feenstra and 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.

2) Such as vertical integration or internalization.

Initially developed in the manufacturing sector, this trend is gradually permeating the service sector. Lewin and Peeters (2006b) found that reducing costs was the most important strategic driver for the offshoring of administrative and technical work to low-cost countries and in 75 per cent of cases companies achieved or exceeded their expectations. At the same time, the growing pressure to reduce labour costs and improve efficiency prompts many organizations to undertake shared services organization (Aksin and 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 for firms engaging in international insourcing.

H1.1- Firms with labour-intensive activities are more likely to engage in international insourcing to cut high labour costs.

H1.2- Firms in those industries with more imports from low-wage countries are more likely to engage in international insourcing.

2.2 The ‘best’ firms offshore

There is evidence that offshoring firms differ from non-offshoring firms. For example, investigating the type of enterprises that engage in offshoring activities, Görg, Greenaway and Kneller (2008) considered that only a certain group – namely, the ‘best’ firms – would be capable of offshoring. The main reason for this assumption is sunk costs, which are costs incurred from such activities as searching for a foreign partner, conducting market research or establishing contractual arrangements. 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 would be able to overcome these sunk costs and successfully start offshore activities.

Grossman and Helpman (2002), Antràs and Helpman (2004) and Helpman (2006) focus 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 of the main results is that firms with low productivity source in the domestic market, while 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 and Helpman, 2004).

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

On the subject of 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 from their scale advantages, offshoring is a strategy that offers advantages to SMEs, as setup costs are relatively low and SME suppliers also create scale advantages for the firms in question, enabling them to provide their specialist products at competitive levels. However, this cannot fully compensate their more limited material advantages in areas such as financial and technological resources, and for this reason larger firms are probably more able to gain cost advantages from offshoring (Roza *et al.*, 2011, p. 3). Wagner (2010) also shows that offshoring firms are larger.

Head and 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 appears to raise skill intensity at home but this effect becomes far less pronounced 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 and 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, thus shifting employment towards skilled workers within industries (Feenstra and Hanson, 2001). Wagner (2010) also finds a clear link between human capital intensity and offshoring, and Díaz-Mora (2008) proves that outsourcing is closely related to skill requirements.

Empirical works such as Görg and Hanley (2005) and Görg, Handley and Strobl (2008) introduce export propensity to propose that exports may have a positive effect on offshoring due to the international experience. The findings in Wagner (2010) 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 offshore insourcing.

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

H2.2- R&D-intensive firms are more actively involved in offshore insourcing.

H2.3- Larger firms are more likely to engage in international insourcing.

H2.4- Firms with greater human capital intensity are more prone to offshore 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 and Dresel, 2011).

As mentioned above in 2.1, when companies decide to relocate their activities, the boundaries are determined by the interaction between 'production' costs and 'governance' costs (Williamson, 1985; Buckley, 2009). Firms with more multinational experience may be expected to prefer investment modes of entry (Agarwal and Ramaswami, 1992). The multinational companies obtain 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 using a wide variety of mechanisms from wholly owned FDI through licensing and subcontracting (Buckley and 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 larger multinational companies, can be expected to use higher levels of technology than domestic firms because they have easier 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 and Görg, 2004). We formulate the following hypothesis:

H3- Foreign firms are more likely to engage in international insourcing than domestic firms.

Are these hypotheses applicable to Spain? In Spain there are few empirical studies of the offshoring determinants of manufacturing industries and, to our knowledge, those that are available focus on outsourcing determinants. Gandoy and Díaz-Mora (2007) provide a review for Spanish empirical literature. Díaz-Mora (2008) shows the high degree of persistence in outsourcing strategy and the positive link between outsourcing, unit labour cost and firms' orientation to external markets. Findings in Holl (2008) show that larger, older firms that pay high wages are more likely to engage in outsourcing activities. In addition, firms in industry agglomerations are more likely to subcontract. Fariñas and Martín-Marcos (2010) conclude that high-productivity firms source intermediate inputs in international markets, whereas low-productivity firms acquire these at home. The authors report evidence for self-selection, i.e. that high-productivity firms are more likely to engage in global production strategies. Kohler and Smolka (2011) provide empirical evidence on the sourcing strategies for Spanish firms, distinguishing between outsourcing and integration at home and abroad. The paper finds that productivity levels are generally largest (lowest) for firms pursuing foreign integration (domestic outsourcing).³⁾

3. Data and Model

We aim to analyse international insourcing determinants by using a database of firms that offshore production activity to foreign countries and firms that do not. With regard to design, we will use two types of database, one containing offshoring information and the other containing information on consolidated and unconsolidated annual accounts (for up to 10 years), financial ratios, activities and ownership for approximately 1,201,000 companies throughout Spain. This second database is the *Sistema de Análisis de Balances Ibéricos*

3) There are some remarkable differences between the article of Kohler and Smolka and this paper. First, to Kohler and Smolka productivity is the dependent variable and therefore the authors focus on how different sourcing strategies affect that variable, ie the Productivity Premium. Second, Kohler and Smolka analyzed 2006–2008 period, the dataset they use is the Survey on Business Strategies (*Encuesta Sobre Estrategias Empresariales*, henceforth ESEE). From 2006 the ESEE survey incorporates information related to the organization dimension and to the location. The questionnaire allows them to distinguish between foreign outsourcing and foreign integration at home and abroad. In this paper the period studied is 1996–2005 and there is still no database available at the firm level in the ESEE, which is one characteristic of the uniqueness of the dataset used in this paper.

(SABI), compiled by Bureau van Dijk Electronic Publishing.⁴⁾

The offshore insourcing database was obtained from the research group “Foreign Capital, Location and Delocation” at the Complutense University of Madrid. The sample includes companies that have been involved in any part of the following process of relocation: first, companies that close business, product lines or whole production plants in the country opening a plant in the exterior at the same time; then, companies involved in contracting or outsourcing through international activity involving the replacement of intermediate parts of the production value chain from third party companies’ countries; and finally, plant closures and the reduction of the business or production activity of foreign multinationals. Our selection of the last group is intended to reflect the idea that if a company closes an establishment of a production that is not abandoned this is because it has been decided that the international supply comes from manufacturing plants located in other country.

Few official sources are available for this period, and for this reason the information was difficult to collect. The following sources and institutions were used: first, the media and Internet; second, reports from the industrial sector, particularly from the trade unions; third, the Catalan government agency the Centre for Innovation and Business Development (CIDEM) (observe that Catalan offshoring accounts for 48% of the data retrieved); fourth, business organizations; and fifth, the EU’s European Restructuring Monitor (ERM), which lists all cases of announced or effected restructuring that involve one or more than one EU country and that reduce or increase personnel by at least 100 jobs.

The database contains information identifying the companies and establishments, ownership, the year in which the relocation activity is announced, the relocation strategy type, the sector activity (as described by the NACE National Classification of Economic Activities), the geographic location of the company or plant that moves the activity, the relocation destination, the employment levels affected and, in some cases, the motivation for offshoring (in this last area, note that there may often be several reasons for offshoring rather than just one, an example of which would be the motivation to reduce costs combined with the motivation to capture markets).

One limitation of this database is that it only includes those cases of relocation that have received media coverage, which in turn is largely determined by how such cases affect employment or by their national or local impact. The result is that certain cases have not been collated, and these would include agreements between companies and trade unions, changes in the location of worker’s activity (e.g., from productive to commercial tasks) and cases involving smaller establishments (e.g., micro and small workshops). The database therefore covers a wide range of medium-sized and large enterprises but does not contain grades for micro establishments.

As we focus only on international firm-level insourcing, our information comes from 141 firms that took one of the following actions in the period between 1999 and 2005: they announced a redundancy plan (in Spanish, an *expediente de regulación de empleo* or ERE⁵⁾), closed down, closed a plant or closed a product line in Spain, in order to transfer production to a foreign country. As Table 1 shows, the sectors showing the highest number of offshore

4) SABI is a part of the European Amadeus database but only offers information for Spanish and Portuguese companies.

Table 1 Descriptive statistics for insource offshoring firms

NACE Sector	Frequency	Percent	Cumulative Frequency	Cumulative Percent	Job Losses Company average
Food & Beverages	3	2.13	3	2.13	211.0
Textile	10	7.09	13	9.22	140.0
Clothing	8	5.67	21	14.89	158.0
Leather & Footwear	8	5.67	29	20.57	112.9
Paper	3	2.13	32	22.70	147.3
Publishing & Printing	1	0.71	33	23.40	53.0
Chemistry	10	7.09	43	30.50	152.2
Rubber & Plastic	12	8.51	55	39.01	154.0
Metal & Metal Products	4	2.83	59	41.84	110.0
Machinery & Equipment	12	8.51	71	50.35	444.0
Office Machinery & Computers	1	0.71	72	51.06	140.0
Electrical Machinery	18	12.77	90	63.83	398.1
Electronic Equipment	13	9.22	103	73.05	1953.4
Medical & Surgical Instruments	1	0.71	104	73.76	230.0
Motor Vehicles & Trailers	29	20.57	133	94.33	255.7
Other Transport Equipment	1	0.71	134	95.04	150.0
Furniture & Other Industries	7	4.96	141	100.00	254.3
Total Company Average					389.7

insourcing activities are: Motor Vehicles & Trailers; Textiles; Clothing; Leather & Footwear; Electrical Machinery; and Electronic Equipment.

For the purposes of comparative analysis, to these 141 firms we have added a sample of firms that do not offshore insourcing. The sample of non-offshore insourcing firms is selected to guarantee that both groups (offshore insourcing and non-offshore insourcing firms) represent the same industry structure and are similarly sized. The two groups are similar, but some offshore while others do not.

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

The SABI database does not contain information about offshoring. What we have done is to select a sample of companies from SABI showing no symptoms of offshoring as their employment does not decrease (or even increases) during the period analysed.

5) In an ERE, the firm or the workers' representatives ask management to suspend or terminate the working relationship between the firm and its employees without jeopardizing the workers' rights.

In the case of our 141 international insource firms, all showed a decrease in worker numbers (see Table 1), leading us to assume that, during this period, firms conducting international insource activities experienced a decrease in employment. This assumption is coherent if firms consider offshoring as a strategy that moves beyond gaining cost advantages, as formulated in the hypotheses. As Table 1 shows, these jobs losses are especially relevant in the sectors Electronic Equipment (13 cases with 1,953.4 job losses on average for each case totalling 25,394 job losses), in Electrical Machinery and in the sectors covering transport industries.⁶⁾

At the same time, during this period there is a clear increase in employment throughout the Spanish economy, from 15.1 million people employed in 2000 to 19.3 million at the end of 2005, which represents a cumulative annual growth rate of 5%. However, most of this growth is concentrated in the construction sector (registering an increase of 8.01%) and services (5.86%), while the manufacturing industry records an increase of 1.82%. If we look more closely at the changes in wage employment in the manufacturing industry, we note that decreases in employment occur most notably in Textiles and in Clothing (−4.43%), in Leather & Footwear (−2.98%), in Electrical Machinery, in Electronic Equipment and in the optical sector (−1.30%), and in the manufacture of transport equipment (−0.13%) – all industries which, as our descriptive information shows, record the highest intensity in insource activities.⁷⁾ Given the above, we apply the following criteria: if a firm remains in the SABI database throughout the period analysed and its number of workers does not change, we will consider that it is a non-offshore insourcing firm.⁸⁾

3.1 The variables

Table 2 describes the variables used in the data model. The individual information for firms is obtained from the SABI database and is variously measured, depending on whether the firms offshore. For non-offshore insourcing firms, we calculate the mean of individual information for the period 1999–2005.⁹⁾ For offshore insourcing firms and 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 had already decided to move all or part of its production to a third country. The variable OFF, which differentiates between firms that offshore insource and firms that do not, is equal to 1 if the firm moves productive activity to a foreign country (international insourcing) and to 0 if it does not.

Two variables are calculated to test cost-cutting determinants of offshoring. First, the KvsL variable measures the capital-labour ratio (Tomiura, 2005) and here, we would expect that firms with labour-intensive activities are more likely to relocate activity abroad than other firms. Second, as we have no information about imports at a company level (Feens-

6) The case of electronic machinery shows an average decrease of 1,953 jobs by firm, which is largely due to the relocation of activities in two very big companies: Phillips and Alcatel.

7) Statistics from the Spanish National Institute of Statistics (INE)

8) In most cases the number of jobs of the firm increases and if it decreases this reduction is small, less than one per cent per year.

9) 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.

Table 2 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
Pos_Ch_Or	Positive changes in operating results. Positive increase in the average during the period.
Neg_Ch_Or	Negative changes in operating results. Negative increase in the average during the period.
Product	Sales divided by personal expenses per worker
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 industrial imports of final goods from East European countries, Maghreb, Turkey and Asia ^a (<i>Datacomex</i> , 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

^aIndustry imports with origin in India, Vietnam, China, Czech Republic, Slovakia, Hungary, Romania, Croatia, Slovenia, Poland, Turkey, Tunisia and Morocco

tra and Hanson, 2001), for both insource offshoring and non-offshore insourcing firms we calculate an industry-level proxy for imports. This is measured as the industry imports of final goods originating in East European countries, the Maghreb, Turkey and Asia (78% of all offshore insourcing destinations), divided by total industry imports of final goods for the period 1999–2005.

To ascertain the ‘best’ firms, we use five determinants: Productivity, R&D intensity, Export, Size and Human Capital intensity. Productivity is measured as the sales amount divided by the number of workers.¹⁰⁾ Unfortunately neither of the two databases used contains information related to the firm level R&D intensity; the proxy used in this case is the R&D at the industry level where each firm is assigned to a group using the classification of R&D-intensive industries provided by the OECD.¹¹⁾ The groups are represented by the three binary variables f1, f2 and f3, which are used as follows: 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 takes 0 if it is not; and f3

10) Unfortunately neither TFP nor value-added are available but sales per worker is a good proxy for labor productivity if we consider that the partial correlation between productivity and size is only 0.025 (see the partial correlation matrix in the Appendix). Tomiura (2005) and Wagner (2010) also use sales per worker as a proxy of productivity and in Tomiura (2007) the author conducts a productivity comparison for foreign outsourcing, exporting and FDI Japanese firms and he finds that the productivity gap between domestic firms and FDI firms is considerably larger for the last ones using alternative measures of productivity, which include value added per worker, sales per worker, firm size and TFP.

11) R&D at the industry level has been used in Antràs (2003) and in Nunn and Trefler (2011).

takes value 1 if the activity of the firm is considered high technology-intensive and 0 if it is not. To define exports we obtain a dummy variable (Export) which takes value 1 if the firm exports and 0 if it does not. The last determinant, Human Capital intensity, 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, and it is obtained to test whether foreign firms are more likely to engage in international insourcing than domestic firms. The Firm Age variable is used to represent the effect of learning over time.

Finally we introduce a variable on the model to proxy the profits of the companies. The behaviour of the profit variable is somewhat difficult to predict. On the one hand, firm profit performance is not even specifically considered in Antràs and Helpman (2004). One would expect the ‘best’ firms to show a better operating performance and, therefore, a positive and significant value in the parameter associated with the variable. But on the other hand, empirical studies such as Paul and Wooster (2010) find that the operating performance of firms that outsource in foreign countries was weaker, suggesting that production that is relocated is no longer profitable in the home country. Based on these considerations we measure the influence of variations in operating results in the probability of international insourcing, distinguishing between those who have experienced an improvement in operating performance (increased benefits) and those others whose operating results have worsened (reduced benefits or increased losses).¹²⁾ From the analysis of the sample companies we observe that firms with improvement in operating profit and involved in international insourcing activities are almost half (in percentage of total firms with improvement in operating profit) compared to the companies whose operating results have worsened and are involved in international insourcing activities.¹³⁾

3.2 Descriptive statistics

Table 3 shows the descriptive statistics of the variables in the database (presented in Table 2). 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 4 we present the frequencies of firms’ international insourcing using the classification of R&D-intensive industries provided by the OECD, which would generally classify the industries we used as follows: electronic equipment would be classified as high technology; transport equipment, chemicals, machinery and electrical equipment would all be classified as medium-high technology; and finally, textiles, clothing, leather and footwear, food and beverages, metal, paper, printing and publishing would all be classified as low technology. The chi-square statistic used to test whether to offshore is independent of R+D intensity’s significance at 1%, indicating the existence of a relationship between the category of both variables. We observed that the propensity to offshore insourcing increases with technological intensity, given that in the case of low technology industries only 1.24%

12) The nominal values of the proxy used for the variables Capital-labour ratio, Productivity, Human Capital intensity and Profits have been deflated, using the consumer price index, in order to obtain the real values.

13) As an anonymous review pointed the introduction of profit variable into the model also can help to circumvent the difficulty of productivity measurement and productivity effect on offshoring.

Table 3 Descriptive statistics for all firms, sample size N=6335

VARIABLE	Mean	STD	Median
Antiquity	20.1972	13.9137	18
Size	0.1019	0.4798	0.0311
Human capital	26.1556	78.6493	21.9300
Pos_Ch_Or(a)	2.1633	14.5580	0.5797
Neg_Ch_Or(b)	2.1729	17.3510	0.5915
KvsL	39.4138	206.1219	17.1935
Product	6.4179	41.2848	4.1419
Imports	10.3232	10.3796	5.8425
Export	0.3943	0.4887	0
Foreign	0.0865	0.2811	0

(a) Only firms with Pos_Ch_Or >0

(b) Only firms with Neg_Ch_Or >0

Table 4 Cross frequencies between RD activity and offshore insourcing

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

of firms relocate, in the case of medium-high technology industries we can see that 4.24% offshore insource and, finally, in the case of high technology industries the percentage increases to 9.05%.

Table 5 contains the descriptive statistics for non-offshore insourcing firms (OFF=0) and for offshore insourcing firms (OFF=1). We also tested whether there were significant differences between the means of variables in offshoring and non-offshore insourcing firms

Table 5 Descriptive statistics for OFF=0 (sample size N=6194) and for OFF=1 (sample size N=141)

VARIABLE	OFF=0			OFF=1		
	Mean	STD	Median	Mean	STD	Median
Antiquity***	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
Pos_Ch_Or(a)	2.1526	14.6648	0.5661	2.8422	3.6336	1.6265
Neg_Ch_Or(b)***	2.0388	16.6849	0.5708	7.1393	33.5963	1.8464
KvsL	39.3725	208.3402	16.9765	41.2280	46.0077	28.2201
Product	5.8881	11.1039	4.12334	29.6928	266.6000	5.2737
Imports	10.3021	10.3653	5.84251	11.2483	10.9917	5.84251
Export***	0.3863	0.4869	0	0.7447	0.4376	1
Foreign***	0.0719	0.2580	0	0.7376	0.4415	1

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

(a) Only firms with Pos_Ch_Or >0

(b) Only firms with Neg_Ch_Or >0

by using the Student *t*-statistic to compare groups with different variances. This descriptive indicates that firms that offshore are older, larger, have more human capital and show higher negative variations in operating performance. Moreover, most of the firms are exporters and foreign-owned.

The inference shows that the productivity, import intensity and capital-labour ratio do not differ between insource offshoring and non-offshore insourcing firms. Afterwards, we see that when we consider the combined effect of all variables and certain interactions between them, these variables explain the differences between firms. For this, we specify a logit model for analysing the determinants of propensity to offshore.

$$\ln\left(\frac{p_{ij}}{1-p_{ij}}\right) = \sum_{k=1}^3 \gamma_k f_{ij,k} + \beta_1 R + D + \beta_2 \text{Firm Age}_{ij} + \beta_3 \text{Size}_{ij} + \beta_4 \text{Human Capital}_{ij} + \beta_5 \text{Profit}_{ij} + \beta_6 \text{KvsL}_{ij} + \beta_7 \text{Productivity}_{ij} + \beta_8 \text{Imports}_{ij} + \beta_9 \text{Export}_{ij} + \varepsilon_{ij}$$

where p_{ij} denotes the probability of offshoring, subscript *i* denotes the index of the firm and *j* denotes the index of the industry, and $f_{ij,k}$, $k=1,2,3$, are binary variables that represent industry intensity (low $k=1$, medium $k=2$ and high $k=3$).

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 6.

Model 1 in Table 6 includes all the variables described in Table 2. As the Human Capital

Table 6 Estimation results for all firms

Coefficients	MODEL 1		MODEL 2	
		Marginal Effects		Marginal Effects
Intercept	−6.5682***		−6.5633***	
f2	0.9107***	0.004403	0.9121***	0.004413
f3	1.2504***	0.011406	1.2556***	0.011491
Antiquity	−0.0036	−0.000017	−0.00351	−0.000017
Size	2.0193***	0.009763	2.0183***	0.009761
Size ²	−0.1359***	−0.000657	−0.1358***	−0.000657
Human capital	0.0004	0.000002		
Pos_Ch_Or	−0.0390	−0.000189	−0.0387	−0.000187
Neg_Ch_Or	0.0152***	0.000074	0.0154***	0.000075
KvsL	−0.00527**	−0.000025	−0.0052**	−0.000025
Product	0.00670	0.000032	0.0067	0.000032
Imports	0.0645***	0.000312	0.0644***	0.000312
Export	0.2353	0.001169	0.2351	0.001168
Foreign	3.5371***	0.106391	3.5394***	0.106635
N=6335	$\chi^2=566.8330$ ***		$\chi^2=566.8254$ ***	

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

variable shows a correlation with capital-labour intensity (KvsL) above 0.8, we eliminate the human capital explanatory variable in model 2 to avoid multi-colinearity problems (see the Partial correlation matrix in the Appendix).

In Table 6, 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, Size²), Negative changes in operating results, capital/labour intensity (KvsL), Imports and Foreign. In Model 2, on elimination of the human capital variable, no significant changes appear in the parameters associated with the variables. For all significant parameters, the signs are as expected in the hypotheses we formulated.

Using the results obtained in Table 6, we analyse the support for the hypotheses formulated above in Section 2.

Hypothesis H1 posits cost-cutting determinants of offshore insourcing. We observe that firms with high labour intensity (H1.1) 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 (H1.2) 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. Examples are 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 (Table 1).

With regard to H2, are these the ‘best’ firms? First of all firms with higher productivity are not more likely to engage in offshore insourcing (H2.1). Second, R&D-intensive firms tend to be involved in more extensive international insourcing (H2.2).

With regard to size (H2.3), the larger the firm, the greater the probability of its vertical

integration abroad. However, the negative parameter associated with the variable *Size*² shows that the effect is non-linear because the effect decreases as size increases. Larger firms have a greater capacity to establish and manage offshore insourcing activities. However, human capital intensity (H2.4), firm age and export experience (H2.5) show no statistical significance.

Foreign firms (H3) are more likely to engage in international insourcing. 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, shows no statistical significance.

Firms that register increases in operating results are not more likely to offshore insourcing activities (the parameter associated with the variable *Pos_Ch_Or* is not significant). On the other hand, when losses increase or profits decline, firms are more likely to relocate production to a foreign country, suggesting that offshore insourcing is used as a strategy to enhance operating performance.

To more closely examine the results of Table 6, we studied the determinants and firm characteristics for foreign and national firms separately. Table 7 describes the frequency of international insourcing, classifying firms by foreign firm and national firm. In the columns we can see that 73.76% of firms that engage in offshore insourcing are foreign; the rows show that only 0.64% of national firms offshore compared with 18.98% of foreign firms. Given that offshoring rates are higher for foreign firms, in Table 8 we calculated the same models as in Table 6, but only for foreign firms. Compared to Table 6, in the estimation for foreign firms in Table 8 the parameters associated with human capital and productivity appear to be significant, corroborating the theoretical models of Antràs and Helpman (2004) and Helpman (2006).¹⁴⁾

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. A number of the studies already mentioned, including Girma and Görg (2004) and Tomiura (2005), also obtained empirical evidence on the offshoring activities of multinationals. The estimations of Tomiura (2005) show that firms with their 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.

However, when we calculated the same models only for national firms, in Table 9, some parameters that appeared significant in the calculation for all firms (Table 6) and for foreign firms (Table 8) showed no statistical significance, i.e., capital-labour intensity and productivity. On the other hand, the parameter associated with variable exports appears significant and positive and the parameter associated with variable human capital appears significant

14) These results hold when the percentage of foreign capital participation increases to an investment share of over 33%, this is because the percentage of sample firms that are foreign only decreases from 73.76% to 72.8%. Even if we consider more than 50% share then the participation rate decreases only to 71.1% of foreign firms in the sample.

Table 7 Cross frequencies between national or foreign and offshore insourcing

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

Table 8 Estimation results for foreign firms

Coefficients	MODEL 1		MODEL 2	
		Marginal Effects		Marginal Effects
Intercept	-3.2292***		-3.0365***	
f2	0.3578	0.053115	0.4143	0.063118
f3	0.9419**	0.175349	1.1229**	0.220092
Antiquity	-0.00456	-0.000677	-0.00367	-0.000559
Size	5.1459***	0.763876	5.1052***	0.777827
Size ²	-0.3490***	-0.051800	-0.3466***	-0.052809
Human capital	0.00996**	0.001479		
Pos_Ch_Or	-0.0207	-0.003073	-0.0153	-0.002332
Neg_Ch_Or	0.0439**	0.006517	0.0386*	0.005881
KvsL	-0.0094**	-0.001400	-0.0071**	-0.001082
Product	0.0283*	0.004208	0.0289*	0.004404
Imports	0.0502**	0.007450	0.0516**	0.007868
Export	-0.3654	-0.054236	-0.3665	-0.055844
N=548	$\chi^2=184.8848$ ***		$\chi^2=181.5554$ ***	

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

and negative (Table 9). 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.

In Tables 6, 8 and 9, beside the estimated parameters, we show marginal effect of explicative variables; in general we observe that the marginal effects in foreign firms estimations (Table 8) are larger than the same effects in national firms. This is because the probability of offshore insourcing in foreign firm is much greater. If we observe results in Table 7, the

Table 9 Estimation results for national firms

Coefficients	MODEL 1		MODEL 2	
		Marginal Effects		Marginal Effects
Intercept	−6.8905***		−7.1200***	
f2	2.0146***	0.005467	1.7857***	0.005400
f3	1.6388**	0.010582	1.4570**	0.009425
Antiquity	−0.0031	−0.000008	−0.00708	−0.000021
Size	2.2510***	0.006109	2.1816***	0.006597
Size ²	−0.2511***	−0.000681	−0.2380***	−0.000720
Human capital	−0.0233**	−0.000063		
Pos_Ch_Or	−0.1554	−0.000422	−0.1316	−0.000398
Neg_Ch_Or	0.0261***	0.000071	0.00899	0.000027
KvsL	0.0012	0.000003	−0.00223	−0.000007
Product	0.0013	0.000004	0.00298	0.000009
Imports	0.0791***	0.000215	0.0781***	0.000236
Export	0.6954*	0.002117	0.7201*	0.002455
N=5787	$\chi^2=73.1184***$		$\chi^2=64.9122***$	

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

Appendix

Partial correlation matrix for the quantitative variables.

	Size	Human capital	Pos_Ch_Or	Neg_Ch_Or	KvsL	Product	Imports
Antiquity	0.176	0.085	−0.011	−0.018	−0.048	0.007	−0.058
Size		−0.012	−0.001	−0.001	0.019	0.025	−0.033
Human capital			−0.137	0.117	0.878	−0.024	−0.002
Pos_Ch_Or				−0.014	0.208	0.298	−0.012
Neg_Ch_Or					−0.049	0.012	−0.004
KvsL						0.025	−0.021
Product							−0.016

percentage of foreign firms that offshore insource is 18.98%, however, for national firms this percentage is only 0.64%. If we analyse the expression used to estimate the marginal effects, this is equal to the parameter estimated multiplied by the value of the density function of the standard logistic distribution evaluated at the centre of the fitted model, this last value is much greater for foreign firms. Also, in the case of the parameter associated with the variable Size, its value is more than double in foreign firms than for domestic firms, then the marginal effect associate with variable Size increases considerably for foreign firms.

All the same, while results are not as sound as for foreign firms, national firms consider offshore insourcing as a strategy to improve operating results and to cope with imports from low-wage countries, which means that costs remain an important determinant. In addition, these are still the ‘best’ firms (larger, more technology-intensive and larger exporters), as against national firms that do not relocate activity to foreign countries.

5. Concluding Remarks

This paper analyses the characteristics that make firms more or less likely to relocate their activities in a foreign country (offshore insourcing or international insourcing), using micro-level data for Spanish manufacturing firms for the period 1999–2005. The paper aims to contribute to our knowledge of the determinants of offshore insourcing 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 initially raised. First, we show that the international insourcing practices of manufacturing firms in Spain are much more likely to be cost driven. Firms with high labour intensity and imports of final goods from low-wage countries are more likely to carry out international insourcing. Second, we noted the special prominence of foreign firms among those that engage in international insourcing. Our results prove that self-selection of ‘best’ firms is much more significant in foreign firms, in particular where productivity and human capital intensity are concerned. In the case of national firms we observed a self-selection of exporters into international insourcing, confirming that international experience is a key factor in moving production abroad. Third, firms consider offshore insourcing as a strategy to enhance operating performance. 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 the near future.

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