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ABSTRACT: In line with the literature that considers that transaction costs, asset specificity and incomplete contracts play a key role in the “make or buy decision”, this paper seeks to discriminate the characteristics of firms that make them more or less likely to integrate their activities in a foreign country. We draw on firm level data for Spanish manufacturing firms from the Survey on Business Strategies (ESEE), which enable us to identify whether their imports are intra-firm (related party) or at arm’s-length (non-related party). Our results show that candidates for vertical integration are the most productive firms and those that receive a large share of their inputs from headquarters. We also demonstrate that international experience and product differentiation favor foreign integration even after controlling for other characteristics of the firm.

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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. The goal of modern sourcing strategies is to obtain the optimum combination of inputs from a variety of opportunities available in the global market. Both the location factor and the choice between the internalization or externalization of the means of procurement will vary with circumstances and will change over time (Buckley and Ghauri, 2004)

The sourcing of intermediate goods and services provides firms with a decision making challenge (Helpman, 2006; Grossman and Helpman, 2002; Antràs and Helpman, 2004). 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 leads to four possibilities: insource at home, outsource at home, insource abroad or outsource abroad.

This paper examines the characteristics of firms that might influence their foreign vertical integration in intermediate inputs by exploiting a unique firm-level offshoring dataset. The data we employ are drawn from a longitudinal survey of Spanish manufacturing firms (Survey on Business Strategies, ESEE). The dataset comprises more than 8,000 observations, corresponding to an average of 2,015 firms per year during the period 2006 to 2009. This survey furnishes an extraordinary opportunity to test the predictions made in the literature regarding foreign integration.

The contribution of this paper is to provide empirical evidence of the firms' characteristics that can influence their foreign integration strategy. Employing various strands of the literature, we investigate the role that intensity in headquarter services (Antràs and Helpman, 2004), international experience (Caves, 2007) and product differentiation (Grossman and Helpman, 2002) play in offshoring sourcing strategies. This paper makes the following contributions to the current empirical literature: first, factors that impact on a firm's offshoring foreign integration, especially intensity in

headquarter services, have received little attention to date in the empirical literature. Although a number of recent papers, including Corcos et al. (2012), Federico (2012) and Jabbour (2012) do address this issue, here we use a full set of variables that strengthen considerably the analysis that headquarter services play in foreign vertical integration. Second, although some evidence has been reported to illustrate the relationship between offshoring and international experience (Tomiura, 2005; Görg, Hanley and Strobl, 2008 and Wagner, 2010), the availability of empirical studies that analyze how international business experience specifically impacts the probability of foreign integration activities is still very limited. Third, the issue of differentiation has not been sufficiently analyzed elsewhere in the field. Here, however, the availability of information related to differentiation enables us to test Grossman and Helpman's (2002) theoretical proposition. Fourth, our dataset provides a unique opportunity to analyze the characteristics of firms involved in offshoring activities distinguishing those that engage in foreign outsourcing from those involved in foreign vertical integration. To date very few studies have enjoyed access to this degree of information disaggregation. A notable exception is Jabbour (2010) who considers the effect of offshoring on a firm's productivity and profitability using a survey that also permits the governance mode to be identified.

In line with most recent empirical studies we conduct our analysis at the firm level. Antràs and Helpman (2004) assume that capital/labor intensity are determined by industry factors but, as Tomiura et al. (2011) show, substantial differences are to be found in capital intensity between firms within the same industry. Indeed, firm level analysis seems particularly appropriate for studying offshoring "make or buy decisions" given the degree of variation in a number of key firm characteristics, including capital intensity and skill intensity (Corcos et al., 2012). Greenaway and Kneller (2007) also conclude that the combination of sunk costs and the heterogeneity in the underlying characteristics of firms accounts for differences in their globalization strategies.

Finally, this paper controls for headquarter and subsidiary firms. Our firm level data provide information related to equity participation by other companies, thereby enabling us to build a restricted sample that we can consider headquarter firms. This is a notable step forward given that most studies of foreign sourcing fail to take this distinction into account, with the exception of the recent contributions of Kohler and Smolka (2011) and Nunn and Trefler (2012).

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. Offshore sourcing strategies

Present-day theories of firms' organizational strategies concern themselves with transaction costs, asset specificity and incomplete contracts. Thus, explanations of qualitative and quantitative changes in foreign trade and in FDI focus their attention on the organizational strategies adopted by firms and attempt to determine what activities are carried out within firms (foreign subsidiaries) as opposed to through market transactions (international outsourcing) and the reasons underpinning their choices. As foreign vertically integrated firms can be seen simply as vertically integrated firms whose production units are located abroad, theoretical models of vertical integration should be equally applicable (Caves, 2007). Coase's (1937) seminal work observed that as firms grow the cost of organizing additional transactions increases and, eventually, the entrepreneur may fail to allocate production factors efficiently since managing all the information is never straightforward, and so the loss in resources will be greater than the cost of completing the transaction through the market.

Taking Coase's main principles as his starting point, Williamson (1975, 1985) examines the nature and determinants of transaction costs. Under market mechanisms, ex ante costs are incurred in finding trading parties and in negotiating incentives for given quantities and specifications of intermediate products. The search can prove expensive and difficulties are frequently encountered when seeking to demonstrate the attributes and quality of certain components. These costs make any real contract inevitably incomplete and, as such, it must be renegotiated and ex post adaptation will be necessary. If a party to a contract has incurred sunk costs in developing specific assets, the other party can opportunistically appropriate a part of the payoff from the investment and hence the parties will find it very difficult to switch partners. Such contractual limitations can lead to problems, such as delivery delays (holdups), given that the supplier might even reduce the amount of product to avoid excessive risk and so as to acquire greater bargaining power. As Kedia and Mukherjee (2009) emphasize, these costs can increase substantially when a firm is operating in a foreign country.

Williamson (2005) stresses two dimensions that are relevant in determining the mode of governance: first, asset specificity and, second, the disturbances to which transactions are subject. Asset specificity (which can take several forms, including physical asset specificity, human asset specificity, site specificity or brand name capital, among others) is considered high when it has value within the context of a particular transaction but it has relatively little value outside this transaction, thus leaving the door open to opportunism. As the degree of asset specificity increases, bilateral dependency (between the contractor and supplier) also increases, which when combined with the uncertainty of incomplete contracts makes vertical integration more pervasive. Internalization occurs when the degree of asset specificity and uncertainty becomes so high that the parties need a high level of cooperation and adaptation.

Based on Williamson's work, Grossman and Hart (1986) developed the property rights approach (or incomplete contracts approach), which is concerned with costly contracts. Their theory stresses that ownership provides the power to exercise control through the purchase of residual rights, which means the right to control all aspects of the asset not made explicit in the contract. Thus, a firm should purchase all the residual rights when it is too difficult to specify all the particular characteristics that the asset possesses. Because of contractual incompleteness and asset specificity, the investing parties cannot collect all the returns from their investment. Hence, the level of investment falls short of efficiency and an ex ante holdup problem of underinvestment emerges, because the agents are less inclined to invest in specific assets if they do not own them. In other words, the allocation of ownership rights will affect the level of investment. According to this theory, integration is optimal when production is intensive in the input that the firm owns. In this case subcontracting in the market means giving the external supplier the power to threaten the firm by withholding its assets.

Grossman and Helpman (2002), Antràs (2003), Antràs and Helpman (2004) and Helpman (2006) consider transaction costs, asset specificity and incomplete contracts to play an important role in the "make or buy decision". Antràs (2003) interprets a multinational firm's inputs in terms of capital and develops a model in which vertical integration of suppliers occurs mostly in capital-intensive industries and intra-firm trade flows mostly between capital-abundant countries. In Antràs and Helpman (2004), a multinational firm's input is referred to as headquarter services,

and the hypothesis implies that FDI is most prevalent in industries in which headquarter services, such as R&D, are most intensive.

Antràs and Helpman (2004) combine heterogeneity of firms (Antràs, 2003) with the property-rights approach to the theory of the firm (Grossman and Hart, 1986). Based on assumptions of incomplete contracts and relationship-specific investment, their model considers two types of transaction: vertical integration and outsourcing. In the scenario in which a firm chooses vertical integration, should the holdup problem not be resolved via bargaining, its outside options are enhanced by obtaining the residual rights of control. The final producer moreover can appropriate higher fractions of revenue under vertical integration than under outsourcing because it has rights of control over inputs.

Antràs and Helpman (2004) also assume a hierarchical order for the fixed costs associated with sourcing activities. Organizational forms are faced by two tensions: the first concerns location, where fixed costs are higher for foreign sourcing than for domestic sourcing; the second concerns the governance mode, where fixed costs are higher for insourcing than they are for outsourcing. The authors claim that insourcing means the production of intermediate inputs has to be controlled, thereby increasing managerial costs. In choosing between vertical integration and outsourcing the final goods producer trades off the benefits of ownership against the benefits of incentives for the independent supplier.

Antràs and Helpman's model predicts the different sourcing choices based on a firm's productivity: thus, the most productive firms pursue foreign integration; firms with high productivity engage in foreign outsourcing to an unrelated supplier; firms with low productivity choose domestic insourcing from a vertically integrated supplier; while the least productive firms choose domestic outsourcing. In their sector analysis, the prevalence of organizational forms depends on the industry characteristics and the degree of productivity dispersion across firms: in component intensive sectors (with very low intensity of headquarter services) no firms integrate. In headquarter intensive sectors all organizational forms are possible, but integration is more prevalent in sectors with higher firm productivity and in those with higher headquarter intensity. As a result, only the most productive firms capture the market share required to offset the high costs of vertical integration, but not all candidates for vertical integration will in fact integrate. The real candidates for vertical integration will be highly productive firms, with a large share of their inputs being provided by their

headquarters. Taking these studies as our starting point, we expect foreign integration to be more pervasive the greater the multinational firm's input intensity is in headquarter services and the higher its productivity.

The few empirical studies that examine the determinants of foreign integration at the firm level support the above hypothesis. Some of these papers center their attention on intensity in headquarter services and the choice of sourcing mode. Marin (2006) shows that intra-firm imports between German firms and their subsidiaries grow when the parent firm is more intensive in headquarter services (R&D) and when the distance is lower, while intra-firm imports between Austrian firms and their subsidiaries grow when the parent firm is more capital intensive and less R&D intensive. Corcos et al. (2012) find that highly productive, capital and skill-intensive firms favor intra-firm trade. Ito et al. (2011) examine the influence of knowledge capital on sourcing behaviour. Their results show that R&D intensity and patenting contribute to offshore sourcing and increase the probability of engaging in vertical integration as opposed to outsourcing. Federico (2012) shows that foreign integration is positively related to a firm's capital intensity and Jabbour (2012) also reports evidence that the intensity of headquarter services can increase the probability of foreign vertical integration at the expense of foreign outsourcing.

Some studies focus primarily on productivity and choice of governance mode. Tomiura (2007) finds that firms integrating part of their activities abroad are more productive than foreign outsourcers and exporters, which in turn are more productive than domestic firms. Fariñas & Martín-Marcos (2010) conclude that high-productivity firms source intermediate inputs in international markets, whereas low-productivity firms acquire them at home. Federico (2010) and Kohler and Smolka (2011) provide empirical evidence for the sourcing strategies and heterogeneity of firms. Both papers find that productivity levels are generally higher (lower) for firms pursuing foreign integration (domestic outsourcing).

International experience also influences the offshoring mode of the firms. As the cost of information increases, a firm becomes less willing to acquire it and, hence, the perceived risk of foreign integration is greater while other options appear more attractive. The accumulation of foreign experience is costly and as such international experience represents a transaction cost advantage for multinational firms. Moreover, firms perform better when they are able to gather information via a learning process, which usually starts as an extension of domestic activities in similar, nearby host

countries. Starting with exports, firms can obtain more information on overseas suppliers via their dealings with foreign countries. This information minimizes the costs of inexperience when investing in a foreign country. The acquisition of successive incremental steps in experience has been demonstrated to be a more successful process than one in which a firm becomes directly involved in a foreign integration project without previous experience (Caves, 2007).

In particular, 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 ranging from wholly owned FDI, through joint ventures, licensing and subcontracting (Buckley and Ghauri, 2004; Buckley, 2009). Foreign firms, which are assumed to be part of larger multinational companies, can be expected to use higher levels of technology, information and business experience than those employed by domestic firms because they have easier access to the parent firm's specific assets. Supply chain management has emerged as an important factor in the competitive success of multinational enterprises: a firm's relationships with the parent firm and other subsidiaries abroad facilitate the disintegration of production structures (Girma and Görg, 2004). Based on these studies, it is our assertion that firms with more international business experience can be expected to prefer foreign integration as their governance mode.

Most empirical studies of international experiences have focused their attention on offshoring, albeit not specifically on foreign integration. Tomiura (2005), Görg, Hanley and Strobl (2008) and Wagner (2010) show that exports increase the probability of offshoring activities. Tomiura (2005) also reports empirical evidence for the offshoring activities of multinationals. His estimations show that firms with their own overseas affiliates are four times more likely than firms without experience in FDI to choose foreign offshoring. Empirical evidence of international experience specifically in sourcing through foreign integration is low. To the best of our knowledge, only Ito et al. (2011) show a significant positive relationship between export activity and foreign integration.

Differentiation is also important in foreign "make or buy decisions". Grossman and Helpman (2002) identify the industrial conditions that favor vertical integration or outsourcing as the equilibrium mode of organization, emphasizing technology, the

distribution of bargaining power between intermediate and final goods producers, the size of the economy and the degree of substitutability between an industry's consumer products. There are two channels via which final product substitution might affect the relative cost of the two alternative organizational modes.

One channel is the degree of competition in the final goods industry. The effect of this competition on the viability of vertical integration or outsourcing is not direct but depends rather on the difference between the cost disadvantages derived from the diseconomies of scope and the distortion derived from imperfect contracting. When specialized final producers are able to sell their output at a lower price than that set by their vertically integrated counterparts - a situation that comes about because the former enjoy sufficient cost advantages to offset search frictions and holdup problems, then their potential operating profits will be proportionally greater. In other words, a greater elasticity of demand for final goods increases the relative viability of outsourcing. By contrast, when vertically integrated firms can sell their output at a lower price than that offered by specialized final producers - a situation that arises because specialized producers with an imperfect contract only obtain part of the operating profit, yet they must bear all the costs of producing the intermediate good, the component firms produce smaller quantities than are needed to maximize profits, which generates inefficiencies and holdup problems that raise the prices of specialized final producers relative to those charged by vertical integrated producers. In such circumstances, the viability of vertical integration clearly increases.

The other channel is the number of specialized intermediate producers that enter the industry. When markets are highly competitive owing to the fact that products are highly substitutable, the number of firms that enter to produce specialized components remains relatively small. This situation occurs because under incomplete contracts, a producer of components bears all the costs of producing the intermediate good (see discussion above); thus, as the final goods producer obtains a proportion of total revenues as profit, the components producer obtains only the remaining fraction of this revenue, less the variable costs, an amount that is dependent on the elasticity of substitution. Thus, the greater the substitutability of the final products, the smaller the number of specialized component producers we find entering the market, thereby increasing the firm's probability of finding a partner and its likelihood of outsourcing. Note that if contracts were not incomplete, an increase in the elasticity of substitution would affect final and intermediate good producers alike. The combined effect of the two variables on outsourcing is ambiguous; thus, while the number of

providers favors outsourcing, the degree of competition in the industry has no obvious effect. When the degree of substitutability of final goods is high, the prevalence of outsourcing requires a sufficiently high cost advantage to offset search frictions and holdup problems.

Transaction-specific investments tend to be required when the production process involves non-standardized inputs as is the case of differentiated products (Levy, 1985). If a firm develops such products, the risk of opportunism increases when it shares this knowledge with other host country firms, given that the acquisition of this knowledge might enable the latter to operate independently. This risk of opportunism is especially significant in the case of international transactions because legal and social systems may well differ (Agarwal and Ramaswami, 1992). Therefore, when a firm is able to differentiate its products, greater control modes may be more efficient.

Product differentiation is also important when a firm has to choose its international distribution channel. Foreign integration, as opposed to an independent distribution channel, is more profitable for the manufacturer when its final products are highly differentiated, as such products do not compete directly. By contrast, when the degree of substitutability and competition are high, price wars can reduce the manufacturers' profits in vertically integrated firms; however, here manufacturers can protect their profits if these products are sold through independent channels. Indeed, Coughlan (1985) and Anderson and Coughlan (1987) present evidence of the fact that highly differentiated products are more likely to be sold through integrated channels. Taking these findings into account, we would expect a positive relation between product differentiation and foreign vertical integration although, as we have shown, literature reports are inconclusive.

3. Data and Model

3.1. Data

The dataset we use is the Survey on Business Strategies (*Encuesta Sobre Estrategias Empresariales*, henceforth ESEE) which has been conducted yearly since 1990 by the SEPI foundation on behalf of the Spanish Ministry of Industry. This survey gathers information from manufacturing firms operating in Spain employing more than nine workers. The annual survey comprises extensive information on around 2,000 companies (see <http://www.funep.es/esee/en/> for a more detailed

description of the database). The sampling procedure ensures representativeness for each two-digit NACE manufacturing sector, following both exhaustive and random sampling criteria. In the initial year (1990) all firms employing more than 200 employees were required to participate and a sample of firms employing between 10 and 200 workers were selected using a stratified, proportional, restricted and systematic sampling method with a random start. In order to guarantee a high level of representativeness and to preserve the inference properties, newly created companies have been incorporated in the survey every year according to the same criteria. This database has been frequently used in empirical analyses (see, among others, González *et al.*, 2005; Lopez, 2008) and also specifically for offshoring and outsourcing analyses (Fariñas and Marcos, 2010; Kohler and Smolka, 2011)

The objective of this study is to provide empirical evidence about the features that influence firms' foreign vertical integration. Although the ESEE survey is particularly useful in this regard, it presents two main limitations: first, we are unable to study the location choice of the offshoring strategy as the survey provides no information about exporting countries; second, the survey has only provided information about offshoring governance modes since 2006. Therefore, for most firms included, we are unable to determine the year in which the decision was taken to integrate in a foreign country. So, while we can examine the relationships between a firm's characteristics and its offshoring strategy decision, they cannot necessarily be interpreted as being causal.

3.2. Variables

Dependent variable

In 2006 the ESEE survey first began to incorporate information about the firms' organizational dimensions and their location. Here, we are particularly interested in details related to their offshoring activities. The questionnaire allows us to distinguish between foreign outsourcing and foreign integration in the following questions:

"Indicate whether during the year (year) the company imported goods and services that are incorporated (transformed) in the production process and the percentage they represent of the total imports, according to type of supplier" (yes/no) (if yes, the percentage rate)

(1) From firms which belong to the same group and/or foreign firms participating in the capital of your company (yes/no) (if yes, the percentage rate)

(2) From other foreign firms (yes/no) (if yes, the percentage rate)

This information allows us to identify whether imports are intra-firm (related party) or at arm's-length (non-related party) and it enables us to examine the empirical implications of theoretical models of the "make or buy decision". We construct the dependent variable Foreign Integration (FI), which is a binary variable indicating whether the company imported intermediate goods and services from other companies belonging to its group and/or from foreign companies participating in the capital of the company.

Table 1 shows the distribution of firms with respect to the inclusive sourcing modes for the period 2006-2009. On average 44 per cent of all firms engage in offshoring activities (extensive margin), of these 96 per cent are involved in foreign outsourcing and 23 per cent integrate. These percentages are notably higher than comparative figures for Italy where Federico (2012) shows that only 298 firms (7.7 per cent of the sample) purchase subcontracting inputs from abroad while in 84 per cent of these all foreign inputs are foreign outsourcing inputs. This relatively small proportion of offshoring firms is attributable to the fact that Federico only considers the subcontracting of custom-made inputs, while we consider a much broader definition of sourcing, i.e. imports of intermediate goods and services that are incorporated in the production process. In Japan, Tomiura et al. (2011) also report a greater percentage of firms with an involvement in foreign outsourcing than in foreign integration. The prevalence of outsourcing over integration found here is, therefore, consistent with the evidence reported elsewhere.

If we consider exclusive offshoring modes we find that, on average, merely 1.6 per cent of total firms (or 3.6 of offshoring firms) integrate. As in Tomiura (2007) and in Kohler and Smolka (2011), these results confirm that firms active in one globalization mode are more likely to engage in other modes of offshoring. In Kohler and Smolka (2011), for example, the probability of a large firm integrating abroad increases from 27 per cent to 36 per cent, if this firm is already engaged in foreign outsourcing.

(Table 1)

Figure 1 shows the heterogeneity of offshoring participation by industry. In the case of foreign integration, the motor vehicles (34 per cent), chemicals and pharmaceuticals (26 per cent) and computer, electronic and optical (21 per cent) sectors present the highest levels of participation. This reflects the fact that these industries are able to segment their activities and so seek the optimal source for each activity. At the other extreme, we find industries with no foreign integration or with a very low propensity to integrate. These include beverages, food, meat, leather and footwear, textiles and clothing, furniture and printing, all of which are characterized by a low intensity in technology and in capital related to labor.

(Figure 1)

Table 2 shows that size matters in relation to a firm's propensity for integration. In line with the theory, size reflects the capability of firms to absorb the higher costs of foreign activities. This is particularly notable in the case of fixed costs, where we assume, in line with Antràs and Helpman (2004), that the fixed costs of foreign integration are higher than those of foreign outsourcing. As such, large firms show a much greater propensity for foreign integration (39 per cent of offshoring firms) than that shown by small companies (11.8 per cent of offshoring firms). As for the intensity of foreign integration, the difference between large and small firms is not so marked but is higher in small firms.

(Table 2)

Independent variables

Headquarter intensity: The proxies used to reflect headquarter intensity include R&D, skill intensity, capital intensity, design, marketing, quality control (see Antràs, 2003; Antràs and Helpman, 2004; Nunn and Trefler, 2008 and 2011; Corcos et al; 2012; Ito et al. 2011; Jabbour, 2012). To capture headquarter intensity we construct the following measures instead of relying on just one: skill intensity (Skill); R&D intensity (R&D); capital intensity (K/L), patents (Patents) and quality control (Quality). See Table 3 for a description of the variables and descriptive statistics.

Productivity: We use labor productivity measured as the value added per worker. Labor productivity has the advantage of being relatively simple to construct and it is

one of the most frequently used measures in offshoring studies (see Girma and Görg, 2004; Tomiura, 2007; Görg, Hanley and Strobl, 2008; Görg, Greenaway & Kneller, 2008; Wagner, 2010; Federico, 2010 and Kohler and Smolka, 2011)

International experience: To capture international experience we construct two measures: foreign ownership (Foreign) and export intensity (Export). We expect foreign ownership to increase the probability of foreign integration. Export activity should help to explain the probability of foreign sourcing since the experience accumulated by a firm in foreign markets should reduce transaction costs, thus favoring both foreign integration and foreign outsourcing (Federico, 2012).

Product differentiation: This is a binary variable indicating the extent to which the products the company manufactures are differentiated. The variable indicates either high differentiation, when some specific investment is needed in order to attend to customer requirements, or low differentiation, when products are largely standard for all buyers as the producer has its own product range. Díaz-Mora and Triguero-Cano (2012) and Merino and Rodriguez (2007) also use this variable as a proxy of product differentiation. Although product differentiation might be introduced in other ways, such as by advertising, in line with Merino and Rodriguez (2007), we consider adaptation to customer requirements to be a major source of product differentiation.

Finally we include two control variables, *Age and Size*. The firm's age, defined as the number of years since the firm was established, is used to capture the effect of learning over time, a potential factor facilitating the firm's foreign operations. Size, measured as the total number of staff employed, also captures the firms' heterogeneity. As Tomiura (2007) claims large companies, with higher labor productivity, stronger headquarter functions, distribution networks, higher earnings and brand identification are more likely to offshore their activities.

Another desirable control variable would have been a proxy for the contracting environment in the exporting country, as differences across destinations can be critical in the make or buy choice. Tomiura et al. (2011) consider the choice of offshoring mode to a given region, and report some remarkable differences between China and ASEAN countries, on the one hand, and the United States and European countries, on the other. Corcos et al. (2012) find that intra-firm trade is more likely with countries that have good judicial institutions, especially in the case of highly productive, capital-, skill- and headquarter-intensive firms. Yet, for the Spanish case,

this information is not available, although this absence of a variable for the contracting environment in the host country should not be a source of concern, given that Spain's main supplier of imports is the European Union (EU) and the top five countries, Germany, France, Italy, United Kingdom and the Netherlands, present similar institutional environments and legal systems (Kohler and Smolka, 2011). Similarly, for the Italian case, Federico (2012) claims that the contracting environment in the host country is not a problem as Italy's foreign suppliers are mainly located in the EU.

(Table 3)

3.3. Methodological issues

To carry out the empirical analysis, we use a binary dependent variable (foreign integration) in a probit estimation.

$$Prob(\text{foreign integration})_{it} = \beta_0 + \beta_1(\text{headquarter intensity})_{it} + \beta_2(\text{productivity})_{it} + \beta_3(\text{international experience})_{it} + \beta_4(\text{differentiation})_{it} + \beta_5(Z)_{it} + \varepsilon_{it} \quad (1)$$

The dependent variable is a dummy variable which equals one if the firm integrates its activities in a foreign country and zero otherwise. The subscript i refers to the unit of analysis, firms, and t represents time. The independent variables are described in detail above and ε_i is an error term. As is well known, the estimation of a probit model is preferable to an OLS estimation when the dependent variable is binary.

A pooled probit estimation has been carried out (Table 4, model 1). Given the short period of time (four years) covered by the panel, and the fact that the relevant variation in the data is mostly cross-sectional, panel regression techniques are of limited use here. Therefore we implement a pooled data estimation over the sample period clustering the error terms at firm level to control for intra-firm serial correlation. To control for any industry specific characteristics that may affect a firm's likelihood of integrating its activities abroad, a set of industry dummies (19 two-digit dummies) is included in both regressions. In addition, time dummies are included to control for cyclical effects.

4. Results and discussion

4.1. Main results

The main results from the estimation are shown in Table 4 model 1. The empirical analysis confirms, first, that firms with the highest intensity in their headquarter services are the ones most likely to be involved in activities of foreign integration. Of the five variables used to control headquarter service intensity, the coefficient associated with the capital intensity and skill variable, which capture human capital, are positive and significant. By contrast, the variables that capture the research and development activities (R&D and patents) are not significant.

Our results regarding capital intensity are similar to those obtained in current empirical studies of the determinants of foreign integration. Corcos et al. (2012) and Tomiura et al. (2011) report that capital intensive firms are more likely to engage in foreign integration. Federico (2012), when using a set of variables to estimate the influence of headquarter intensity on the choice between integration or outsourcing, reports that the only variable to have a positive and significant influence on foreign integration is the capital intensity of the firm.

(Table 4)

Skill intensity has often been included in estimations of intra-firm characteristics, both at the industry and firm levels, but results have been inconclusive. Corcos et al. (2012) at the firm level and Nunn and Trefler (2011) and Bernard et al. (2010) at the industry level find that skilled labor increases the prevalence of intra-firm trade, while Antràs (2003), at the industry level, finds that human capital is not statistically significant. In this study our results support a positive relationship between human capital and foreign integration at the firm level.

Part of the empirical literature reports a positive and significant relationship between research and development activities and foreign integration. For example, Antràs (2003) and Nunn and Trefler (2011) find that, at the industry level, R&D expenditure increases U.S. intra-firm imports. Ito et al. (2011) report that a firm's R&D intensity and patenting are positive and significant increasing the probability of engaging in foreign integration. Jabbour (2012) finds that marketing services and industry R&D intensity (two variables used to proxy headquarter service intensity) appear positive and significant. However, Federico (2012) does not obtain significant values for R&D activity at either the firm or the industry levels. Our results suggest that human capital

has a stronger influence than R&D activities. Nevertheless, as discussed in the robustness section below, when we consider a restricted sample comprising firms with majority of domestic capital, then R&D activity becomes positive and significant.

Our results also show that firms involved in foreign integration are more productive than the rest of the firms. This result is consistent with the empirical literature related to productivity and foreign integration. Tomiura (2007) and Ito et al. (2011) for Japan, Corcos et al. (2012) for France, Federico (2010 and 2012) for Italy and Kohler and Smolka (2011) for Spain find that productivity and foreign integration are positively and significantly related.

Second, international experience is also seen to matter for foreign integration and the coefficients associated with both variables (foreign and exports) are positive and significant. Specifically, the variable that captures the presence of foreign capital in the company is highly significant demonstrating the prominence of foreign firms among those that engage in foreign integration. International experience was found to be an essential characteristic for firms engaged in foreign integration when conducting the estimate for the whole set of firms. As we show below in the robustness checks, these two variables (foreign and exports) also maintain their significance when we conduct the estimate just with the offshoring firms.

Third, the coefficient of the differentiation variable has a positive sign and is significant. Thus, foreign integration is more likely when a firm develops differentiated products that require a superior relationship between parent and subsidiary and specific assets (for example, marketing, brand, technology, quality, etc.) that are better protected against imitation within the firm's boundaries.

Of the control variables, firm size is relevant in foreign integration. As Tomiura (2007) points out, larger firms have a greater capacity to cope with the higher costs of foreign integration. Firms need asset power to engage in international expansion, which is costly and size reflects the capability of a firm to absorb these costs. Tomiura et al. (2011) note that large firms may prefer integrated sourcing based on their rich internal resources within multinationals, and they report that exclusively insourcing firms are significantly larger than exclusively outsourcing firms.

4.2. Robustness checks

To verify the robustness of our results we carried out four complementary estimations. In the first, we estimate the determinants of foreign integration using a restricted sample of offshoring firms only (Table 4 model 2). In the next two we estimate foreign integration using a restricted sample of domestic headquarter firms (Table 4 models 3 and 4) and, finally, in the fourth estimation we consider intensity (or intensive margin) instead of participation (or extensive margin) as the dependent variable (Table 4 model 5).

Firstly, most of the firms that carry out foreign integration are also involved in foreign outsourcing. Therefore to analyze if the results obtained in the estimation of foreign integration characteristics hold also for firms involved in offshoring activities, we conducted a complementary estimation only for those firms that import intermediate goods and services (Table 4 model 2). The results are similar to the previous estimation (Table 4 model 1) demonstrating that the characteristics recognized for foreign integration also hold for the restricted sample of offshoring firms, with the sole exception of the variable that controls for productivity. Although most theoretical and empirical studies conclude that firms involved in FI are the most productive, our results only confirm this when the analysis compares FI firms with all other firms. By contrast, our results show that the productivity indicator is not significant. Likewise, Jabbour (2012) finds that productivity is not significant for vertical integration relative to outsourcing firms. The author justifies his findings by suggesting that contractual agreements are associated with higher fixed costs of organization in comparison to those associated with vertical integration, confirming the predictions of Grossman et al. (2005).

Secondly, in the theoretical models the strategic decision as to whether to make or buy is taken by the parent company, who imports the intermediate inputs produced in the country of one of its foreign subsidiary. As Nunn and Trefler (2011) point out, it could be the case that these imports were shipped from a foreign parent to a subsidiary. Empirical studies usually lack such information, which is critical if firm level variables are related to intensity in headquarter services. Jabbour (2012) considers this to be especially important in the case of firms affiliated to a group, as it is difficult to know if the decision maker is the parent firm or the firm conducting the trade transaction. Our data, in line with Kohler and Smolka (2009), provide information related to equity participation by other companies, enabling us to build a restricted sample in which we consider domestic headquarter firms. This is a marked

improvement as most foreign sourcing studies do not take this difference into account.

To control for parent firms, we assume that firms with more than 50 per cent of national capital are the ones that take the organizational decisions, and we run two Probit estimations (Table 4 models 3 and 4): the first considering firms with less than 50 per cent of foreign capital participation, and the second reducing this threshold control value to less than 10 per cent of foreign capital participation. As Table 4 shows the number of observations falls from 5,848 in model 3 when considering firms with less than 50 per cent of foreign capital participation, to 5,756 in model 4 when considering firms with less than 10 per cent of foreign capital participation. The difference is very small (the reduction being just 92 observations), which suggests that once a firm is controlled by domestic capital the rate of control becomes very high.

Our results for the restricted domestic headquarter sample (Table 4 models 3 and 4), show some differences from those for the general model 1. First, we confirm that more productive firms and those with more intensive headquarter services are more likely to engage in foreign integration activities, with skill and capital intensity showing positive and significant coefficients, but here the coefficient associated with the R&D variable is also positive and significant. Therefore, for these domestic headquarter firms our results suggest that R&D activities are relevant in the foreign integration decision. Second, the coefficient associated with the differentiation variable is no longer significant. In this sense, it should be noted that our variable, which proxies differentiation, only captures product adaptability to the client and not differentiation understood in a much broader sense. Highly detailed information would be needed to explain these differences in the main estimation and in that for just domestic headquarter firms.

The results for domestic headquarter firms also show that international experience, measured by export intensity, is positive and significant. However, the intensity of foreign participation is no longer significant. Hence, when the domestic capital is dominant then the intensity of foreign capital participation is not a particularly notable characteristic of firms involved in foreign integration activities. These results suggest that minority foreign capital is not relevant as a supplier of international experience, since it is the domestic headquarter which provides the international business experience.

Finally, in the last estimation (Table 4 model 5) we use the intensity of foreign integration measured as the percentage of total imports represented by imports of intermediate goods and services from foreign companies belonging to the firm's group and/or foreign companies participating in the capital of the company. The estimation has been carried out using a Tobit model because the dependent variable ranges between 0 and 100 per cent. The results confirm those obtained for the main estimation (Table 4 model 1), with the exception of the coefficient associated with the capital intensity variable which is no longer significant. This result suggests that capital intensity matters particularly for the integration decision, but not as far as the intensity of integration is concerned.

5. Concluding remarks

This paper has undertaken an analysis of the characteristics that influence a firm's foreign integration strategy. We examine the role that intensity in headquarter services, productivity levels, multinational experience and product differentiation play in this vertical integration sourcing mode. The dataset we employ comprises a longitudinal survey of Spanish manufacturing firms drawn from the Survey on Business Strategies (ESEE) for the period 2006 to 2009. The analysis is conducted at the firm level.

The results provided by our study offer immediate responses to some of the questions we raised at the outset. First, in line with Tomiura (2007) and Kohler and Smolka (2011), our results confirm the fact that firms active in one globalization mode are more likely to be involved in other modes of offshoring. Second, as Antràs and Helpman (2004) predict, our estimations confirm that the real candidates for vertical integration are the most productive firms and those that have a large share of their inputs provided by headquarters. Capital- and skill-intensive firms are more likely to be involved in foreign integration. In this study, we present evidence that supports a positive and highly significant relationship between skill levels and foreign integration. These results also hold for domestic headquarter firms, whose capital, skill and R&D activities have a strong influence on their foreign integration strategy. Moreover, capital intensity favors the establishment of a related-company, but it has no impact on the intensity of foreign integration once the latter has been established.

Third, firms with international experience, including foreign firms and export firms, are more likely to engage in foreign integration - in the case of subsidiaries, because they enjoy easier access to the international experience of the foreign parent; and, in the case of exporting firms, because their foreign market experience facilitates access to overseas information. The acquisition of international business experience is a costly learning process, making the course of international expansion highly path dependent (Caves, 2007). Firms without any foreign market experience are likely to face greater problems when attempting to manage their foreign operations, thereby reducing the likelihood of their engaging in foreign integration activities. Our results for domestic headquarters show that the intensity of foreign participation is not significant. This result suggests that international business experience is an intangible asset related to ownership.

Fourth, as in Grossman and Helpman's (2002) theory, our results regarding the role of differentiated products are inconclusive. In some of our estimations differentiation appears to be a relevant characteristic of firms engaging in foreign integration. This suggests that the diseconomies of scope are not as great as the costs generated by incomplete contracts, and that the risk of opportunism in international transactions is high for these firms (Agarwal and Ramaswami, 1992). However, this is not the case for firms operating as domestic headquarters, where the variable capturing differentiation is not significant.

Our results suggest that only firms with very specific characteristics are able to take advantage of foreign integration. Such companies are in a minority among the group of sourcing firms, because the higher integration costs incurred abroad have to be met by higher rates of productivity. These firms tend to be intensive in their headquarter services and they strive to retain control over their ownership specific advantages. At the same time they are companies with sufficient international experience to be able to reduce their transaction costs. Without these conditions, the chances of success of a foreign integration strategy are low and other sourcing options are better, or more efficient.

In this paper we have focused our attention on the characteristics of the firms that are most prevalent in the foreign integration governance mode. However, a number of interesting points remain to be addressed in future studies. First, a better understanding is needed of the characteristics of the exporting country and the attributes of the imported inputs that determine the foreign sourcing strategy in the

light of existing literature on incomplete contracts. Second, the contracting environment in the exporting country and the associated governance mode is an additional aspect to investigate, as empirical evidence to date is limited and largely inconclusive. A third aspect of interest concerns the determinants of foreign integration at firm level and its ex-post effects. To further our understanding here would require a larger database so that we might establish the point in time when the firm establishes a foreign subsidiary.

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Table 1- Inclusive offshoring modes
(percentages of participation)

	OFF/total firms	FO/total firms	FI/total firms	FO/OFF	FI/OFF	DO	Total firms
2006	41	39	9	95	21	59	2023
2007	45	43	10	96	23	55	2013
2008	46	44	11	97	23	54	2009
2009	45	44	11	97	24	55	2015
2006-2009	44	43	10	96	23	56	2015

OFF: Offshoring firms. Companies that import intermediate goods and services.

FO: Foreign outsourcing firms. Companies that import intermediate goods and services from foreign firms that do not belong to the same group or participate in the capital of the company.

FI: Foreign integration firms. Companies that import intermediate goods and services from other firms belonging to its group and/or foreign firms participating in the capital of the company.

DO: Domestic firms. Companies that do not import intermediate goods and services.

Table 2
Firms' Heterogeneity: Size matters

2006-2009	Small firms*	Large firms**
%OFF/Total firms	35,9	68,7
% FO/OFF	97,4	93,8
% FI/OFF	11,8	39,4
FO intensity	73,3	64,7
FI intensity	41,4	37,5

* If the firm has fewer than 200 workers

** If the firm has more than 200 workers

FO and FI intensities are measured as the percentage of total imports represented by imports of intermediate goods and services from foreign companies that do not belong to the same group or participate in the capital of the company and the percentage from other companies belonging to its group and/or foreign companies participating in the capital of the company, respectively.

Table 3: Summary statistics

Variable	Description of the variable	Obs.	Mean	SD
FI	Foreign integration. Dummy=1 if the firm sources abroad through foreign integration, 0 otherwise.	8059	0.101	0.301
Skill	Skill intensity. Percentage that senior engineers and graduates represent among the total company staff.	9172	5.951	8.904
R&D	R&D effort (internal R&D expenditure over sales).	8046	0.007	0.022
Patents	Number of patents registered abroad by the company during the year.	8060	0.337	5.817
Quality	Quality control. Dummy=1 if the company has made or contracted standardization and quality control, 0 otherwise.	10028	0.415	0.492
Capital Intensity	Capital stock (tangible fixed assets) divided by the number of employees.	8049	10.8957	1.1844
Productivity	Value added per hour worked (in logarithms).	8000	3.147	0.714
Foreign	Percentage of direct or indirect foreign capital in the company.	8050	14.50	34.360
Export	Export intensity (exports over sales)	8050	0.191	0.268
Differentiation	Product differentiation. Dummy=1 if most of the products manufactured by the company are highly differentiated, 0 otherwise.	9112	0.419	0.493
Size	Total number of employees.	8060	221.45	723.90
Age	Number of years that the firm has been operating.	18440	34.31	20.19

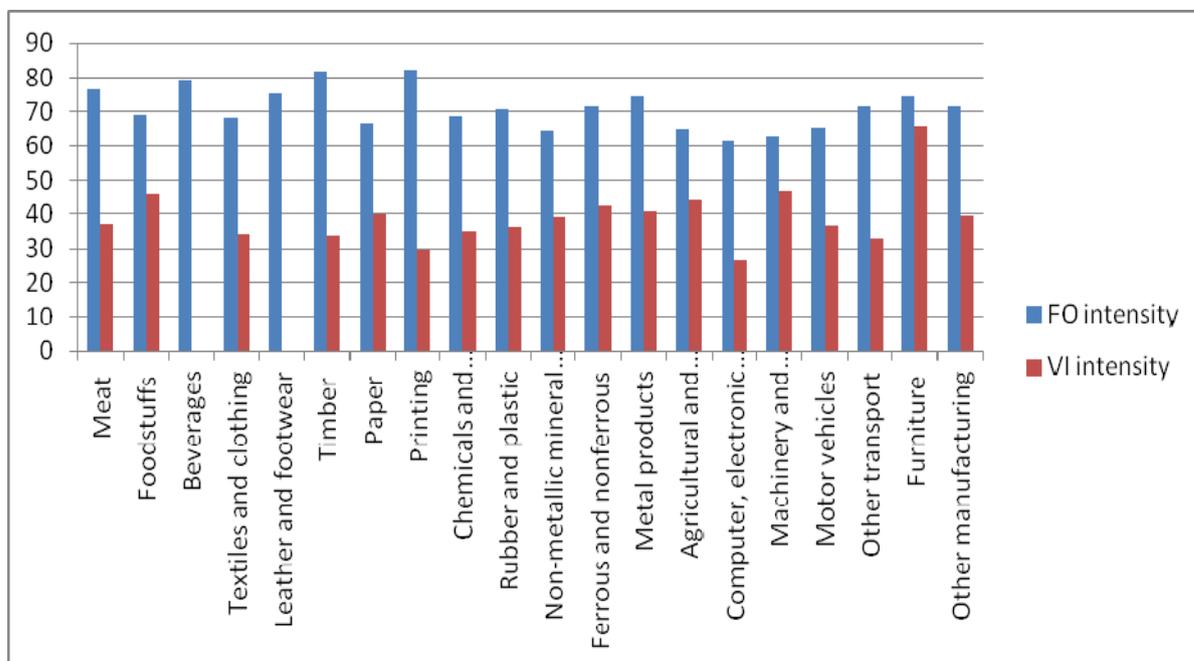
Table 4. Probit and Tobit estimations

	Probit	Probit	Probit	Probit	Tobit
	(1)	(2)	(3)	(4)	(5)
VARIABLES	FI	FI	FI	FI	FI
					(intensity)
	All firms	Only offshoring	All firms Foreign<50%	All firms Foreign<10%	All firms
Skill	0.0183*** [0.00431]	0.0193*** [0.00499]	0.0166*** [0.00604]	0.0168*** [0.00613]	0.923*** [0.239]
R&D	2.030 [1.554]	1.068 [1.668]	3.832** [1.736]	3.356* [1.849]	29.96 [102.6]
Patents	0.00276 [0.00402]	0.000587 [0.00400]	-0.00151 [0.00409]	-0.000932 [0.00415]	0.119 [0.151]
Quality	0.0417 [0.0855]	-0.0178 [0.0968]	0.151 [0.119]	0.154 [0.121]	2.653 [4.583]
Capital intensity	0.0770* [0.0406]	0.0863* [0.0496]	0.140*** [0.0506]	0.127** [0.0507]	2.562 [2.277]
Productivity	0.167*** [0.0603]	0.0763 [0.0646]	0.182** [0.0887]	0.154* [0.0887]	12.24*** [3.485]
Foreign	0.0170*** [0.000947]	0.0183*** [0.00104]	0.00360 [0.00764]	0.120 [0.128]	0.915*** [0.0567]
Exports	0.597*** [0.136]	0.472*** [0.159]	0.736*** [0.166]	0.745*** [0.173]	31.70*** [7.882]
Differentiation	0.222** [0.0950]	0.226** [0.108]	0.0337 [0.140]	0.0321 [0.144]	9.127* [4.917]
Size	0.000105** [4.73e-05]	0.000184** [7.66e-05]	0.000425*** [0.000116]	0.000418*** [0.000118]	0.00446** [0.00207]
Age	0.000625 [0.00221]	0.00111 [0.00249]	0.00117 [0.00303]	0.00133 [0.00311]	0.0247 [0.111]
Constant	-3.429*** [0.444]	-2.961*** [0.555]	-4.586*** [0.539]	-4.350*** [0.539]	-184.3*** [26.44]
Observations	7,197	3,214	5,848	5,756	7,546
Wald Chi-squared	786.5	497.1	233.6	233.1	.
Pseudo R_squared	0.416	0.398	0.206	0.198	0.172

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

All estimations include a complete set of industry (19) and year (3) dummies.

Figure 1: Percentages of participation by industry



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 infrastructure 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"
- 2010/28, **Molloy, R.; Shan, H.:** "The effect of gasoline prices on household location"
- 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"
- 2010/33, **Hilber, C.; Robert-Nicoud, F.:** "On the origins of land use regulations: theory and evidence from us metro areas"
- 2010/34, **Picard, P.; Tabuchi, T.:** "City with forward and backward linkages"
- 2010/35, **Bodenhorn, H.; Cuberes, D.:** "Financial development and city growth: evidence from Northeastern American cities, 1790-1870"
- 2010/36, **Vulovic, V.:** "The effect of sub-national borrowing control on fiscal sustainability: how to regulate?"
- 2010/37, **Flamand, S.:** "Interregional transfers, group loyalty and the decentralization of redistribution"
- 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"
- 2010/41, **Lee, S.; Li, Q.:** "Uneven landscapes and the city size distribution"
- 2010/42, **Ploeckl, F.:** "Borders, market access and urban growth; the case of Saxon towns and the Zollverein"
- 2010/43, **Hortas-Rico, M.:** "Urban sprawl and municipal budgets in Spain: a dynamic panel data analysis"
- 2010/44, **Koethenbuerger, M.:** "Electoral rules and incentive effects of fiscal transfers: evidence from Germany"

- 2010/45, Solé-Ollé, A.; Viladecans-Marsal, E.:** "Lobbying, political competition, and local land supply: recent evidence from Spain"
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