Foreign direct investment in Spain: Which are the determining factors?[1]

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Abstract:

The purpose of this paper is to explain the behavior of foreign direct investment (FDI) flows across Spanish regions. To accomplish this aim, and for data availability reasons, we examine the period 1996-2013. For our main variable, we employ DataInvex database to obtain information on the amount of inward FDI flows. Additionally, we gather information of other variables that are behind FDI inflows coming to Spain, such as market size, wages, human capital and infrastructure. The analysis is carried out using a regional and a sectoral approach. Empirical results show that the amount of FDI in the previous year, market size, labor costs, human capital, infrastructure endowment and the own characteristics of manufacturing sector determine FDI flows received by Spanish regions.

Keywords: Foreign direct investment, Spanish regions

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1. Introduction

Over the last decades, foreign direct investment (FDI henceforth) has played an important role in the globalization process within different economies, and the Spanish economy has not been an exception. Since the mid-eighties there has been an increase in international capital movements within a context of ongoing liberalization and internationalization of the activities of enterprises. The Spanish economy, thanks to its incorporation to the European Union (EU) in 1986 and to the emergence of the Monetary Union, became a really highly attractive destination of worldwide FDI. In fact, FDI has helped to promote Spanish economic growth. In addition, FDI influences the geographical distribution of production and employment, providing the country receiving the investment with a source of new technologies and a better allocation of resources. It also contributes to increasing human capital formation and productivity among firms. Not only for these reasons but also because the economic and financial crisis has reduced FDI inflows, a study devoted to the determinants of FDI flows is timely.

The literature on foreign direct investment (FDI) in Spain has analyzed its distribution, determinants and economic implications from several theoretical viewpoints. Nevertheless, previous studies have mainly adopted a national perspective (Bajo, 1991; Egea and López, 1991a; Bajo and Sosvilla, 1992, 1994; Martín and Velázquez, 1997; Muñoz, 1999; Bajo and López, 2002) while little attention has been given to the regional aspects (Egea and López, 1991b; Fernández-Otheo, 2000; Pelegrín, 2002, 2003; Rodríguez and Pallas, 2008; Bajo-Rubio et al., 2010; Villaverde and Maza, 2012). We agree that the regional differences deserve special attention when studying the drivers for FDI attraction.

This paper aims at providing further empirical evidence by studying the regional distribution of FDI in Spanish regions and its main determinants. The contribution of our paper is to provide quite a novel approach for the study of the determinants of inward FDI flows in Spain. We have constructed a database with dimension *ijt* (*i*=region, *j*=sector, *t*=time). We consider that sectoral FDI data allows us to obtain a more accurate estimate as it is pertinent to take into account the idiosyncrasy of each sector when it comes to analyzing FDI flows.

The FDI data employed in this study originates from the Spanish Ministry of Economy and Competitiveness. We use data on flows of gross FDI in region *i* and sector *j*. Thus,

our dependent variable is real flows of gross FDI expressed as proportion of sectoral gross valued added. Considering the level of territorial disaggregation, the analysis is carried out for the 17 Spanish autonomous communities or regions (NUTS 2). Additionally, we use a breakdown of nine sectors of the Spanish economy, defined by grouping the sectors and branches of activity of the National Classification of Economic Activities. As regards the sample period, it goes from 1996 to 2013 due to availability reasons.

The remainder of the paper is organized as follows. In section 2 a review of the theoretical and empirical literature on inward FDI determinants. Afterwards, section 3 outlines the pattern of the distribution of FDI across Spanish regions. Then, in section 4, the model to uncover the FDI determinants is specified and estimated, and the results presented. Finally, some concluding remarks are offered in section 5.

2. FDI determinants: theory and evidence

2.1. Main theoretical approaches

It seems pertinent to present a theoretical survey on FDI determinants in order to gain understanding of the motivation for firms to go abroad as well as to identify the most influential variables for our analysis. Thereby, the main theoretical models are briefly summarized in this section aiming at presenting a theoretical framework that allows us to understand the decision-making strategies that lead a company to locate its productive processes abroad. A thorough literature review on FDI determinants can be found in Blonigen (2005), Faeth (2009) and Assunçao et al. (2011).

Before going any further, it should be noted that there is no a generally accepted theory[2] when explaining FDI and the location decision of multinational firms (Faeth, 2009), so the need to delve into the different approaches analyzing FDI from the locational perspective arises.

In this regard, the eclectic paradigm put forward by Dunning (1980, 1988, 2001) is probably the best approach to summarize the pattern of FDI as it provides a general framework within this strand of literature. Dunning suggests that three types of

[2] A general theory on FDI should specified, not only the causes that determine the existence of MNEs, but also, the factors that give rise to the preference for some geographic areas (Díaz Vázquez, 2003).

advantages influence the foreign investment decision-making of a multinational enterprise (MNE): ownership, location and internalization (OLI) advantages.

To begin with, ownership advantages refer to the existence of firm-specific and income-generating assets that lead to reductions in a firm's production costs and allow it to engage in foreign production. These assets are both tangible and intangible, ranging from patents, technical knowledge, management skills, experience and technology or capital intensity to labor skills, firm size, brand name and scale economies. For their part, locational advantages, reflected in agglomeration and comparative advantage variables, may be in the form of access to protected markets, favorable tax treatments, lower production and transportation costs, lower risk, favorable structure of competition and the like. This being so, ownership and location advantages are linked by internalization, which gives rise to FDI. In this way, internalization advantages are obtained by lowering transaction costs, minimizing technology imitation or maintaining the firm's reputation through effective management and quality control. These factors make it more profitable to carry out transactions within the firm rather than depending on external markets.

The main contribution of Dunning's eclectic paradigm to the existing literature on FDI was to combine several complementary theories, and identify a group of factors that affect the activities of MNEs (Nayak and Choudhury, 2014). However, Dunning's theory has been the target of much criticism claiming that it includes so many explanatory variables that it loses any operational pragmatism. Dunning himself accepted this fact stating that "every OLI variable identified by the eclectic paradigm is well grounded in economic or organizational theory" and that "the purpose of the eclectic paradigm is not to offer a full explanation of all kinds of international production but rather to point to a methodology and to a generic set of variables which contain the ingredients necessary for any satisfactory explanation of particular types of foreign value-added activity" (Dunning, 2001).

Although Dunning's theory is the more complex one to analyze the motivations of trans-national companies to invest abroad rather than to export their products, there is also room for other theoretical approaches.

In such a manner, internalization theory is considered of great interest as well. The internalization theory of foreign investment, developed by Buckley and Casson (1976) and then by Hennart (1982), tries to explain the growth of transnational companies and

their motivations for achieving FDI. Buckley and Casson demonstrate that transnational companies are organizing their internal activities so as to develop specific advantages, which tend to be exploited. For his part, Hennart addresses the concept of internalization by developing models between the two types of integration: vertical and horizontal. It is also important to note that internalization theory was launched by Coase (1937) in a national context and, subsequently, Hymer (1976) extended it to an international context. By and large, Hymer demonstrates that FDI takes place when the benefits of exploiting firm-specific advantages outweigh the relative costs of the operations abroad (Denisia, 2010).

Another approach to FDI is the production cycle theory[3]. This theory, put forward by Vernon (1966), considers foreign investment as a stage in the penetration of foreign markets. In fact, Vernon claims that there are four stages of production cycle, namely, innovation, growth, maturity and decline. Technological innovations are regarded as the main determinant of the structure of world trade and of the distribution of production among countries, assuming that initial production will be located in the country of innovation, both because the production process uses large quantities of skilled personnel and because the new product can only be successfully developed if close contact with the customer is maintained (Hennart, 1982). Nevertheless, the product cycle model suffers from some limitations, for example, it explains the location of manufacturing facilities, but not their ownership.

Kojima's theory of foreign investment is an extension of the neoclassical theory of trade to accept cross-border transactions of intermediate products (Kojima, 1973). According to this theory, FDI acts as a catalyst to trade and as an arbitrager for improving the international allocation of economic activity. However, this approach fails in some aspects, for instance, it ignores the internalization of intermediate product markets. The main problem is that "Kojima is locked into a neoclassical paradigm of perfect competition that negates the very possibility of market failure" (Dunning, 1988).

Aliber suggested that imperfections in capital markets were the main cause of foreign direct investment (Aliber, 1970). At this regard, he was interested in the export of direct investment as a means of financing foreign capital expenditure rather than a channel by

[3] It seems convenient to mention that this theory was used to explain certain types of FDI made by U.S. companies in Western Europe after the Second World War in the manufacturing industry.

which an enterprise transfers nonfinancial resources between countries. Along these lines, Aliber maintained that MNEs tend to flow from strong currency areas to weak currency areas. Critics of this theory argue that while this view is compatible with the early post-war American domination, it gives no account of the rise of European and Japanese MNEs. In other words, Aliber's conclusion that FDI tends to flow from strong-currency areas to weak-currency areas seems to be contradicted (Ragazzi, 1973).

Other authors, such as Hymer (1976) and Kindleberger (1969) focus on the concept of monopolistic advantage. On this basis, Hymer's theory insists on the fact that firms operating abroad have to compete with domestic firms that are in advantageous position in terms of culture, legal system, consumer's preference and so on. Accordingly, foreign firms must offset these disadvantages by some form of market power so as to make international investment profitable. In a similar fashion, Kindleberger argues that advantages in the form of patents or superior technology possessed by multinational enterprises could be helpful only in a context of market imperfection (Nayak and Choudhury, 2014).

Similarly, Caves (1971) focused on product differentiation as a monopolistic advantage, stating that the main advantage that multinationals have over their local competitors in foreign markets is their ability to differentiate products. Knowledge about how to differentiate products is the primary determinant of FDI because it is "the main advantage for which local production per se increases the rents yielded by a market" (Caves, 1971).

Likewise, Porter (1986) developed a model relating the extent to which different types of firms seek to coordinate their cross-border value-adding investment with the propensity to centralize or decentralize the location of this investment. He argued that a firm with a geographically concentrated configuration of activities and a high international coordination among these activities pursues a simple global strategy (Rugman, 1996).

An alternative framework for analyzing FDI and MNE activity was offered by the new trade theory[4]. It combines ownership and location advantages with technology and country characteristics and explains both horizontal and vertical FDI. The first type of

[4] New trade models were empirically tested by Brainard (1993, 1997) who found strong support for the horizontal FDI model.

FDI is explained using the proximity-concentration hypothesis, while the second by using the factor-proportions hypothesis. On the one hand, the proximity-concentration hypothesis explains the trade-off between maximizing proximity to customers and concentrating production to achieve scale economies. On the other hand, the factor-proportions hypothesis accounts for the existence of vertically integrated firms with geographically fragmented production (Faeth, 2009).

This strand of literature was complemented by Markusen's knowledge-capital model that allowed for both FDI forms (Markusen, 1997). He integrated vertical and horizontal motivations for FDI in his model. Thereby, similarities in market size, factor endowments and transport costs were determinants of horizontal FDI, whereas differences in relative factor endowments determined vertical FDI. On this basis, he argued that horizontal MNEs were more common than vertical MNEs, which only existed for some host economies in some industries (Faeth, 2009).

It is obvious from the above review that there exists a large number of theories that explains the reasons for a firm's decision to move abroad. Despite their different approaches, most of these theories agree that a firm moves abroad to reap the benefits of the advantages enjoyed by them in the form of location, firm-specific or internationalization of markets.

In conclusion, drawing on these different theories, it is worth noting that different sets of variables influencing FDI could be distinguished: locational advantages, ownership advantages, macroeconomic variables, and institutional and policy variables.

2.2. Main empirical evidence for Spain

In this section we present a brief overview of the most relevant studies analyzing the locational determinants of foreign investment in Spain, both at a national and regional level.

That is the case of the work produced by Egea and López (1991b), who carry out a cluster analysis for the period 1985-1989 in order to study the factors explaining the attraction of FDI by Spanish regions. They identify three key determinants of the FDI location, namely, a high per capita and per employee income, a high human capital and a productive structure based on industrial and services sectors; however, unemployment rate, infrastructure endowment and subsidies received are not found significant.

For their part, Bajo and Sosvilla (1994) explain the determinants of Spanish FDI inflows from a macroeconomic and sectorial point of view. Developing a cointegration analysis for the period 1964-1989, they find a long-run relationship between total gross FDI inflows and several macroeconomic variables, such as the level of real GDP, the rate of inflation, the level of trade barriers and the lagged foreign capital stock. Moreover, when separating total FDI into manufacturing and non-manufacturing, the determinants are virtually similar to those of aggregate FDI.

Moreover, Martín and Velázquez (1997) study the determining factors in the bilateral direct investment flows between OECD countries, particularly those received by Spain. These authors conclude that the supply of skilled labor, a large and dynamic market, the availability of good transport infrastructure and liberal regulations with respect to FDI are essential factors in attracting capital from abroad.

Besides, Muñoz Guarasa (1999) develops an empirical model for the period 1987-1995 in which the determining factors to contrast are the market size measured by the GDP, the labor costs measured by the remuneration per employee, the quality of the work force and the labor productivity, among others. Her results reveal positive and significant coefficients for the three first variables mentioned whereas labor productivity shows a non-statistical significant coefficient.

Similarly, Pelegrín (2002) investigates the determining factors of FDI in Spanish regions over the period 1993-1998. Using different methods of estimation (ordinary least squares, least squares with fixed effects and generalized least squares), Pelegrín shows that the market size, the quality of the labor force, and aid and official incentives positively influence the regional location of FDI flows. On the contrary, infrastructure is not found to be a significant driver for FDI.

In another paper, Pelegrín (2003) analyzes the determinants of FDI in manufacturing activities in Spanish regions, paying special heed to agglomeration economies. For the period 1993-2000, agglomeration factors, concentration of research and development activities and the availability of skilled labor are proved to be important drivers for manufacturing FDI. Nevertheless, at the industry level, location determinants vary between industries.

Additionally, Rodríguez and Pallas (2008) investigate the determinants of FDI in Spain during the period 1993-2002 by examining macroeconomic, sectoral and regional

factors. The results of their model, estimated by GLS (cross-section weights) and by W2SLS (weighted two-stage least squares), make it clear that demand factors, the evolution of human capital, the export potential of the sectors, the differential between labor productivity and the cost of labor, and macroeconomic determinants measuring the fiscal pressure and the inflation differentials between Spain and the European Union average play a vital role in attracting flows of FDI.

For his part, Martínez-Martín (2011) investigates long-run determinants of Spanish FDI during the period 1993-2003 by estimating a spatial panel data model for Spanish outflows to top-50 host countries. He concludes that spatial linkages for Spanish outflows do not vary across time and that transmission channels of shocks across Spanish FDI outflows may arise.

To sum up, Villaverde and Maza (2012) analyze the regional distribution of FDI in Spain and its main determinants between 1995 and 2005/2008. These authors perform an explanatory factor analysis which leads to four extracted factors labelled as economic potential, labor conditions, market size and competitiveness. The econometric analysis reveals that economic potential, labor conditions and competitiveness are important for attracting FDI, both at aggregate and sectoral levels. Additionally, they find negative geographical spillovers associated to the economic potential and competitiveness factors.

Overall, although the results are mixed, one preliminary conclusion can be drawn from the literature review: the main factors attracting FDI inflows in Spain are market size, human capital, labor conditions and infrastructure endowment. The next two sections, adopting a regional scale, will try to reinforce, or qualify, this statement.

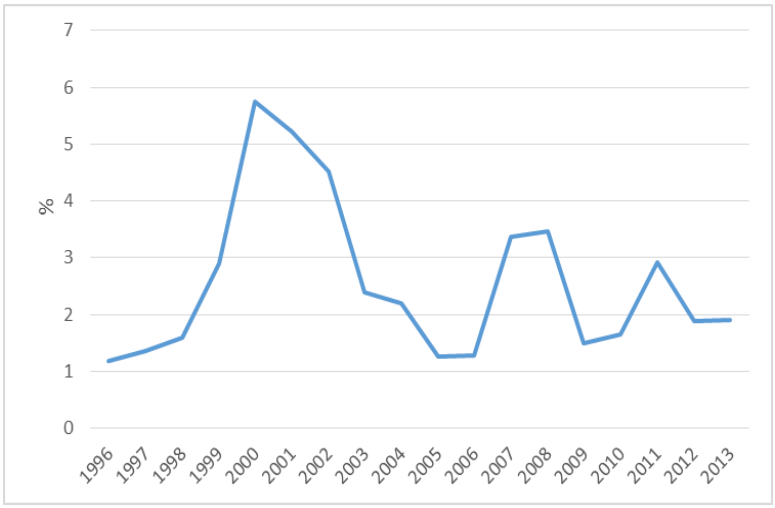
3. The distribution of foreign direct investment across Spanish regions

As the starting point for our empirical analysis, this section furnishes an overview of the regional distribution of inward FDI flows in Spain for the period 1996-2013.

To begin with, Figure 1 provides a graphic view of the evolution of inward FDI over GDP during the whole period in Spain. It can be noted that the series is very volatile over time. FDI/GDP ratio increases from 1996 reaching its highest level in 2000. From this year on, FDI goes down until the year 2005, to then increase sharply in 2007 when

it begins to decrease dramatically until 2009. Finally, FDI goes up until 2011, showing a downward trend until the next year and a slight rise in 2013.

Figure 1: Inward FDI over GDP in Spain (period 1996-2013)



Source: Spanish Ministry of Economy and Competitiveness and Spanish Statistical Institute

As regards FDI regional distribution, Table 1 yields the impression that foreign investment is highly concentrated in just a few regions. For the whole sample period, Madrid and Cataluña received, on overage, 79.5% of total FDI, although the amount received by the first is four times bigger than that of the second. Besides, should we add the volume received by Comunidad Valenciana, País Vasco and Andalucía, the total FDI received by these five regions would reach nearly 90% of total FDI in Spain. So, we can see that the distribution of inward foreign investment is not homogeneous across Spanish regions.

Table 1: Inward FDI in Spanish regions

(Flows in thousand euros of 2000)

Regions	*1996*	*2013*	*1996-2013*	*1996*	*2013*	*1996-2013*
Andalucía	251415	357603	397412	4.09	2.60	2.19
Aragón	58402	119111	424888	0.95	0.86	2.34
Asturias	13381	16096	223028	0.22	0.12	1.22
Baleares	116698	561341	219125	1.90	4.08	1.21
Canarias	115409	28177	496356	1.88	0.21	2.73
Cantabria	5742	10112	13085	0.09	0.07	0.07
Castilla y León	38328	122638	64142	0.62	0.89	0.35
Castilla-La Mancha	29729	15179	82054	0.48	0.11	0.45
Cataluña	1566549	2840395	2765969	25.48	20.67	15.24
C. Valenciana	146528	119466	683336	2.38	0.87	3.76
Extremadura	13817	11598	19093	0.22	0.08	0.11
Galicia	25239	298231	157498	0.41	2.17	0.87
Madrid	3472566	8386643	11671853	56.46	61.02	64.30
Murcia	9408	36724	99509	0.15	0.27	0.55
Navarra	67958	7956	55508	1.10	0.06	0.31
País Vasco	207978	769216	765730	3.38	5.60	4.22
Rioja (La)	11584	43502	14453	0.19	0.32	0.08
Spain	6150731	13743988	18153039	100	100	100

Source: Spanish Ministry of Economy and Competitiveness

Subsequently, with the aim to know the relative performance of the regions, we have computed the *Inward FDI Performance Index*, proposed by UNCTAD (2001). This index is given by the expression:

$$\text{Performance Index}_i = \frac{\left(FDI_i \Big/ \sum_{i=1}^{17} FDI\right)}{\left(GDP_i \Big/ \sum_{i=1}^{17} GDP\right)}$$

where *i* refers to each of the Spanish regions.

The *Performance Index*, or location index, compares the shares of inward FDI to GDP in order to see the relative performance or attractiveness of the regions. A ranking of the Spanish regions based on their Performance Index is shown in Table 2. It is important to note that Madrid is in the first position, being the only region with an index greater than one, which indicates that FDI inflows in Madrid are more than three and a half times superior to what its share of GDP proportionally should point out. For its part, Cataluña gets a bit less than expected according to its share of GDP. The rest of regions receive low shares of FDI with respect to GDP, showing clear regional inequality in FDI relative to GDP.

Table 2: Regional distribution of FDI and GDP in Spain

(Average for the period 1996-2013)

	$FDI_i \Big/ \sum_{i=1}^{17} FDI$ (%)	$GDP_i \Big/ \sum_{i=1}^{17} GDP$ (%)	Performance Index
Madrid	64.30	17.80	3.61
Cataluña	15.24	18.58	0.82
Aragón	2.34	3.15	0.74
País Vasco	4.22	6.18	0.68
Canarias	2.73	4.10	0.67
Asturias	1.23	2.20	0.56
Baleares	1.21	2.49	0.48
C. Valenciana	3.76	9.72	0.39
Murcia	0.55	2.52	0.22
Navarra	0.31	1.72	0.18
Galicia	0.87	5.31	0.16
Andalucía	2.19	13.62	0.16
Castilla-La Mancha	0.45	3.49	0.13
Rioja (La)	0.08	0.75	0.11
Castilla y León	0.35	5.47	0.06
Extremadura	0.11	1.67	0.06
Cantabria	0.07	1.24	0.06

Source: Spanish Ministry of Economy and Competitiveness and Spanish Statistical Institute

Considering the sectoral breakdown, Table 3 shows the sectoral distribution of FDI in Spain. One aspect to be highlighted when comparing the situation in the first and final years of our period of study is the growing share of services in the distribution of FDI flows by sectors. Besides, FDI is mainly concentrated in manufacturing; transport, storage and communications; and extractive industries, energy and water supply, as these three sectors represent, on average, 57% of total inward FDI.

Table 3: Inward FDI by sectors

(Flows in thousand euros of 2000)

Sectors (*)	*1996*	*2013*	*1996-2013*	*1996*	*2013*	*1996-2013*
Agriculture	65372	62624	121066	1.06	0.46	0.67
Extractive industries, energy and water supply	121346	1277174	2125522	1.97	9.29	11.71
Manufacturing	2531363	3142985	5403526	41.16	22.87	29.76
Construction	385639	1266989	707150	6.28	9.22	3.90
Hotels and restaurants, and wholesale and retail	1168784	1038310	3490241	19.00	7.55	19.23
Transport, storage and communications	642922	1485845	2806951	10.45	10.81	15.45
Financial services	588681	2977134	1709373	9.57	21.66	9.42
Real estate, renting and business activities	403502	1570009	1285159	6.56	11.42	7.08
Other services	243122	922918	504051	3.95	6.72	2.78
Total	6150731	13743988	18153039	100	100	100

Note: (*) This sectoral breakdown is defined by grouping the sectors and branches of activity of the National Classification of Economic Activities (Spanish Statistical Institute). We opt to use this sectoral breakdown due to remuneration, employment and GVA data availability from Cambridge Econometrics.

Source: Spanish Ministry of Economy and Competitiveness

4. Econometric analysis

After the descriptive study of the distribution of FDI flows across Spanish regions, in this section we shall address more precisely the econometric analysis of FDI determinants in Spain.

In attempting to advance in our knowledge of the determinants of FDI flows received by Spanish regions, an econometric analysis is performed using the most notable factors in the OLI model as regressors, according to previous studies. As mentioned in the introduction, we develop the analysis of the economic factors that could have been influencing the decision of foreigners to undertake foreign direct investment.

Thus, we use a dynamic panel approach where the lagged dependent variable is also included in the model. The regression equation of our model is the following:

$$FDI_{ij,t} = \alpha + \rho\, FDI_{ij,t-1} + \beta_1\, MS_{i,t-1} + \beta_2\, W_{ij,t-1} + \beta_3\, HC_{i,t-1} + \beta_4\, RI_{i,t-1} + \beta_5\, SD_3 + \beta_6\, SD_6 + \varepsilon_{it} \quad (1)$$

where the subscripts *i, j* and *t* denote region, sector and time, respectively, and ε_{it} is the error term.

The information about the variables used in our econometric model, their measurements and the statistical sources are provided in Table 4.

Table 4: Variables, measures and data sources

Variable	Measurement[5]	Data source
Dependent variable		
Inward FDI	Flows of inward gross FDI relativized by sectoral gross valued added, expressed in constant euros of 2000.	Spanish Ministry of Economy and Competitiveness (DataInvex)
Independent variables		
Host region market size	Per capita gross valued added, expressed in thousand euros of 2000.	Cambridge Econometrics and Spanish Statistical Institute
Host region sector labor cost	Monthly remuneration per employee, expressed in thousand euros of 2000.	Cambridge Econometrics
Host region human capital	Education index(*) computed with data of employed population by educational attainment	Valencian Institute of Economic Research (IVIE)
Host region road infrastructure endowment	Kilometers of motorways per 1000 km^2	Eurostat
Control variables		
Sectoral dummies	Two dummy variables: one for manufacturing sector (SD_3) and another for transport, storage and communications sector (SD_6)	Author's own

Note: (*) The education index is defined as $HC = \sum_{i=1}^{7} \varphi_i A_i$ where φ_i indicates the weight associated with each level of human capital *i* over the total employed population and *A* takes the values 0, 6, 10, 12, 14, 15 and 17 for $i = 1, 2, 3, 4, 5, 6$ and 7. The levels of human capital are as follows: $i = 1$ = illiterate, $i = 2$ = without studies and primary education, $i = 3$ = compulsory secondary education, $i = 4$ = high school and middle-level training program, $i = 5$ = higher level training program, $i = 6$ = previous to superior and $i = 7$ = superior studies.

[5] The monetary variables have been deflated (base year = 2000) considering the Consumer Price Index extracted from the Spanish National Statistical Institute.

The dependent variable FDI_{ijt} used in our analysis denotes flows of gross FDI in region *i* and sector *j* during a period *t* expressed as proportion of sectoral GVA in order to capture the importance FDI has in each sector and region.

Following the literature on the determinants of FDI previously discussed, we consider the following explanatory variables in the regression equation. It should be highlighted that all the explanatory variables are lagged one year with the aim to capture the fact that FDI decision takes place based on the characteristics of the host region in the previous year.

(1) Flows of gross FDI during the previous period *t*-1 ($FDI_{ij,t-1}$). We use one-year lagged flows of FDI relativized by sectoral gross valued added as an independent variable to capture the agglomeration effects[6]. We use this indicator to relativize the importance that FDI has on each sector and region. A positive and significant coefficient of lagged flows of FDI means the presence of agglomeration economies, which emerge when there are some positive externalities derived from the self-reinforcing effect of foreign investment.

(2) Market size ($MS_{i,t-1}$), measured as per capita gross valued added. Market size[7] of the host region of the investment is a relevant driver for FDI since regions having high and sustained growth rates are likely to receive more FDI flows. According to Dunning's OLI framework, to the proximity-concentration hypothesis and to the knowledge-capital model, the characteristics of the market of the recipient countries or regions such as the size or the growth rate greatly influence the decision of a MNE to invest. Market-seeking investors are attracted to regions with large and fast-growing markets because a larger host market provides more opportunities for sales and profits to foreign firms and, hence, attracts FDI inflows. A higher per capita income in the host region not only denotes good economic performance, but it also entails higher productivity associated with good labor quality, advanced technology and better local infrastructure. For all these reasons, market potential has been incorporated in our model. Another aspect to

[6] Foreign investment is found to agglomerate since it is a long-term capital investment. Empirical studies investigating the importance of industrial agglomerations for the location of FDI in the host country area are, for instance, Head et al. (1995) and Cheng and Kwang (2000).

[7] Empirical studies for the Spanish case such as Bajo (1991), Egea and López Pueyo (1991a), Bajo and Sosvilla (1992) at a national level, and Egea and López (1991b), Pelegrín (2002) at a regional level, show that market size is an important determinant of FDI.

be stressed is that Madrid and Cataluña specific characteristics concentrating most of the FDI are captured in market size variable. A positive relationship between FDI and market size is expected because FDI is supposed to be positively linked to the perspectives of sales expansion in the recipient region of the investment.

(3) Remuneration per employee by region *i* and sector *j* ($W_{ij,t-1}$), computed as the ratio of remuneration to employment. Initially, it seems that the relationship between labor costs and FDI may be negative as labor costs have traditionally been considered as a locational advantage influencing the decision of where to invest provided that it doesn't imply lower levels of productivity. The Heckscher-Ohlin theory of international trade hypothesizes that low relative wages are important determinants in capital attraction. Nevertheless, a positive sign would suggest that FDI is attracted by regions with higher wages or remuneration per employee. It would mean that higher levels of remuneration are associated with a more highly qualified workforce. Taking into account the empirical evidence[8] shown in the second section, it cannot be confirmed that lower labor costs of the Spanish economy have played a pivotal role for MNEs when locating manufacturing plants overseas (Díaz Vázquez, 2003).

(4) The level of human capital or the quality of the labor force ($HC_{i,t-1}$). In our study we use an education index computed with data of employed population as a proxy variable for human capital (see note of Table 2). We include this variable since it is often linked to the attraction of FDI as a higher quality of education[9] and training means better productivity and lower labor costs. Skill intensity measured by the level of human capital is an essential ownership-specific advantage to consider as potential explanation for inward FDI flows (Dunning, 1980, 1988). Additionally, in accordance with Heckscher-Ohlin theory of international trade, there exist locational advantages based on the human capital as an explaining factor of the location of FDI flows. Consequently, we initially expect a positive relationship between human capital and FDI. Thus, the

[8] Empirical studies are not concluding as regards the relationship between labor costs and FDI. For instance, Bajo (1991) finds a positive and significant relation whereas Bajo and López (1996) find a not significant relationship.

[9] Most empirical studies for the Spanish economy find a positive and significant relationship between the quality of the labor force and FDI inflows (Bajo, 1991; Egea and López, 1991b; Bajo and López, 1996; Martín and Velázquez, 1997).

inclusion of human capital variable together with remuneration per employee helps characterize the labor market.

(5) Road Infrastructure ($RI_{i,t-1}$), expressed in kilometers of motorways per 1000 km^2. This variable is included in the model because transport infrastructure[10] endowment is considered to be an important factor when decided the location of FDI. Good infrastructure allows faster transport and communication, increasing the productivity of the investment and, therefore, stimulating FDI flows. On the contrary, an inadequate infrastructure endowment could hinder the location of FDI in a particular area (Díaz Vázquez, 2003). Accordingly, it should exist a positive relationship between FDI and infrastructure development.

(6) Sectoral dummies (SD_J). Two dummy variables are considered in the model, one for the manufacturing sector (SD_3) and another for transport, storage and communications sector (SD_6). We opt to include these two dummies because these two sectors attract more foreign investment flows than the rest of sectors.

Here we would like to make some comments about the estimation technique concerning equation (1). Within our econometric strategy, we decided to perform a dynamic panel-data estimation. Panel data has several advantages over cross-sectional or time-series data. It allows more degrees of freedom and less collinearity among explanatory variables, hence improving the efficiency of econometric estimates. Besides, panel data sets have greater capacity for capturing the complexity of human behavior, for instance, by controlling the impact of omitted variables, by controlling for individual heterogeneity or by uncovering dynamic relationships (Hsiao, 1986).

We took into account that equation (1) could have endogeneity problems in some variables, that is, causality may run in both directions and the explanatory variables may not be strictly exogenous (correlated with past and possibly current realizations of the error). Therefore, and in order to correct the potential endogeneity bias, we decided to use the Generalized Method of Moments (GMM) developed by Arellano and Bond (1991) and Arellano and Bover (1995), a dynamic panel data technique that provides unbiased and efficient estimates. This method is especially designed for situations with

[10] It seems that infrastructures are an important factor for FDI from developed countries into developing countries. However, Porter (1991) suggested that infrastructure endowment is a less relevant determinant of FDI attraction in developed countries.

"small T, large N" panels, meaning few time periods and many cross-section units, which is suitable for our panel data. These authors propose first-differencing the model in order to eliminate the individual specific effects, and using valid instruments (lagged values of the instrumented variables) to tackle the problem of the new error being correlated with the lagged dependent variable. Additionally, the instruments are required to control for the potential endogeneity of the explanatory variables.

The difference GMM estimator of Arellano and Bond (1991) has a drawback. Sometimes the lagged levels of the regressors are poor instruments for the first-differenced regressors. So, to solve this problem, a new estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998), the system GMM, builds a system of two equations: the regression in differences in addition to the regression in levels with lagged differences as instruments. A further assumption of no correlation between the variables in differences and the fixed effects is required, although there might be correlation between the levels of the explanatory variables and the fixed effects. This allows the introduction of more instruments and can dramatically improve efficiency. Given these considerations in mind, a two-step[11] system GMM[12] model is estimated in order to correct the potential endogeneity bias.

The results for the estimated model by two-step System GMM are reported in Table 5. In order to correct the downward bias that occurs under the two-step GMM estimation, the use of Windmeijer's finite-sample correction for the two-step covariance matrix is required (Windmeijer, 2005). Additionally, standard errors robust to heteroskedasticity and autocorrelation are considered[13]. The two specification tests for the validity of the instruments are included in Table 5. We can see that the null hypothesis of no second-order serial correlation cannot be rejected. Besides, the validity of the instruments used in the estimation is not rejected by the Hansen test.

[11] Two step GMM results in more asymptotic efficient estimates than one step.

[12] The command to perform system GMM in Stata is *xtanbond2* (Roodman, 2009).

[13] The presence of heteroskedasticity is confirmed by Breusch-Pagan test.

Table 5: GMM-system regression results

Dependent variable: $FDI_{ij,t}$	
Constant	0.0451* (0.0239)
$FDI_{ij,t-1}$	0.3627*** (0.0286)
$MS_{i,t-1}$	0.0011** (0.0005)
$W_{ij,t-1}$	0.0036** (0.0017)
$HC_{i,t-1}$	- 0.0066** (0.0031)
$RI_{i,t-1}$	0.0004* (0.0002)
SD_3	0.0062** (0.0028)
SD_6	0.0022 (0.0042)
Test p-values:	
AR (2)	0.066
Hansen test	0.065

Notes:

(1) Results are reported for two-step System GMM with robust standard errors.

(2) Three lagged values of remuneration per employee and flows of FDI during the previous period are used as instruments.

(3) Robust standard errors (Windmeijer, 2005) in parentheses; ***Significant at 1%, ** Significant at 5%, *Significant at 10%.

Source: Own elaboration

As for the relevance of the variables, the results from the two-step system GMM estimation show that prior-year FDI decisions, market size, labor costs, transport infrastructure endowment and the dummy variable for the manufacturing sector are positive and statistically significant, fostering the attraction of FDI flows in Spanish regions. However, human capital results negative and statistically significant to explain the location of FDI.

So, as expected, variables measuring lagged FDI flows, the size of the host regions and the endowments of transport infrastructure are positively correlated with gross FDI flows. With respect to the sectoral dummy variables, it seems that the variable capturing the own characteristics of the manufacturing sector turns out to be positive and statistically significant, so there are some idiosyncrasies of this sector triggering FDI.

By contrast, the quality of the labor force, having a negative impact on FDI, is quite a surprising and counterintuitive result. A priori human capital was expected to positively

affect FDI. A plausible explanation for this could be the low dispersion[14] in human capital data across Spanish regions, but it will be mandatory to delve into this result in future research.

As regards labor costs variable, it has a positive and significant sign, which, at first, seems a bit surprising. However, it is a common result in the literature about inward FDI in Spain (Bajo, 1991; Egea and López Pueyo, 1991a). It could be due to a higher quality of the labor force. Additionally, Egea and López Pueyo (1991a) claim that most FDI in Spain goes to sectors with a high or medium demand where labor costs are not considered as a competitive advantage. In fact, a negative association between wages and FDI may be more expected in host countries with a highly different level of development from the source country (Pelegrín, 2002).

5. Conclusions

This paper provides new insights into some key factors influencing the attraction of FDI in Spain. Specifically, it develops a study of the determinants of foreign investment flows received by Spanish regions over the period 1996-2013.

As a starting point, the main theoretical models and empirical studies on inward FDI determinants are reviewed. Market size, human capital, labor conditions and infrastructure endowment appear to be the main drivers for FDI.

The next part of the paper offers an overview of the distribution of inward FDI flows. It can be noted that the evolution of inward FDI over GDP is very volatile during the sample period. The regional distribution of FDI reveals Madrid concentrates the bulk of the foreign investment received in Spain during the sample period. Moreover, the *Performance Index* points out that Madrid gets a share of Spanish FDI much greater than its share of GDP. Besides, examining the sectoral breakdown of FDI, it can be

[14] For the sake of robustness, we perform another GMM estimation including a dummy variable for Madrid and human capital this time results non-statistically significant, indicating that the dummy for Madrid is capturing the negative effect of human capital on FDI. This is in line with the low dispersion in human capital data in Spanish regions. Human capital average education index for the sample period reaches the value of 12.20 in Madrid, closely followed by País Vasco (12.13), Navarra (11.77), Cantabria (11.48), Aragón (11.41), Asturias (11.35) and Cataluña (11.33). The lower value of the education index (10.57) belongs to Castilla-La Mancha.

inferred that the manufacturing sector together with transport, storage and communications sector concentrate a large share of FDI.

Subsequently, we carry out an econometric analysis to evaluate what the main determinants on foreign investment are. In order to correct the potential endogeneity bias, a two-step system GMM model is estimated. The results reveal that the size of the host regions, the level of human capital, the endowment of transport infrastructure, the remuneration per employee, the decision of FDI taken in the previous year and the idiosyncrasy of manufacturing sector are the main variables explaining the FDI flows coming to Spain. All of them, expect for the human capital, act as factors fostering the attraction of FDI. However, the quality of the work force seems to be hindering this process. Therefore, it appears that the location factors have governed the FDI flows over the period of study.

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