

# The Effects of Globalization on the Spanish FDI.

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## ABSTRACT.

After several years under the globalization framework, the Spanish economy is suffering its largest FDI fall ever. The effects of increased integration of economies around the world claims to be tested, especially in regard to the location decisions of foreign companies in Spain. This survey analyzes foreign investments from both microeconomic and macroeconomic points of view. In this sense, McFadden's Conditional Logit model is used for the former and industrial policy tools such as Location Coefficients are used for the latter, with the aim of providing illuminating results. *Has the globalization process boosted a "centre-periphery" pattern of foreign firms in Spain?* As some New Economic Geography (NEG) theories suggest - and our survey empirically evidences - proximity to demand and access to input markets emerge as driving forces on the agglomeration process of foreign firms, creating a "centre-periphery" pattern. Thus, since some regions cannot affect, for instance, their market size, wage structure and endowment of resources in the short run, regional inequalities have grown dramatically since 1993. *How to mitigate the prejudicial consequences of globalization?* Promotional efforts on regional boosterism may work in such a setting. Pro-active industrial policies such as higher public investment in "high added value" sectors, R+D+I (Research, Development and Innovation), technology or transport and telecommunication infrastructures are an effective solution for less favoured regions.

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## I. INTRODUCTION

Economic "globalization" is a historical process, resulting from human innovation and technological progress. It refers to the increasing integration of economies around the world, particularly through trade and financial flows. The term sometimes also refers to the movement of people (labour) and knowledge (technology) across international borders. At its most basic level, it refers to an extension beyond national borders of the same market forces that have operated for centuries at all levels of human economic activity—village markets, urban industries, or financial centres. (1)

Markets promote efficiency through competition and the division of labour—the specialization that allows people and economies to focus on what they do best. Global markets offer greater opportunities for people to tap into more and larger markets around the world. It means that they can have access to more capital flows, technology, cheaper imports, and larger export markets. But markets do not necessarily ensure that the benefits of increased efficiency are shared by all.

In 1985 the Spanish government entered into a treaty for EU Accession, which reflected the willingness of modernization desired by the vast majority of Spaniards. This process reached its official achievement in 1992 (Maastricht Treaty) when Spain became an EU member. Yet, the economic globalization process in Spain did not really take place until the second part of the nineties. Proof of that was the trend of extreme growth, subsequently followed by FDI inflows since then. The extent of this trend was evident in 2000, when FDI inflows reached an outstanding boom when the amount increased to 6.27% of total Spanish GDP.

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(1) Specific definition of "*Globalization*" by the International Monetary Fund (IMF).

Since 1997 more than 965 companies have outsourced own firm-specific assets, such as management, distribution and product specific R&D in Spain. Economic theories suggest they invest outside their headquarters' countries to take advantage of the foreign countries' endowment of resources and geographical positions (See *Dunning, 1998*). During the 1920s, the Marshallian trinity explanation of "*industrial districts*" referred to labour market pooling, larger supply of intermediate goods and the creation of knowledge spillovers as the main economic forces by which firms might be attracted (See *Marshall.A 1920*)

Boosted by the European unification process, there has been an increasing interest in understanding the location of firms across countries. In particular, recent economic geography theories have gone further, which has allowed the construction of a wide range of formal models; thus, attempting to explain the agglomeration of firms in a single region by including product market imperfections.

In this sense, some models have become recently very popular as they apparently have strong backing by the empirics. Three of the most significant models will be discussed below. Firstly *Krugman's* model shows us how a home market effect creates agglomeration. Usually firms settle in regions where the demand for their products is large, and workers prefer to live in regions that have a good access to the products that they consume. Since the demand that is addressed to firms comes from workers, firms locate where workers are and workers go where firms are located. The increase in demand that follows the migration of workers in that region attracts more firms, probably ending up with all firms being agglomerated in one region (See *Krugman.P, 1991*).

The dynamics behind *Venables'* model use an input-output structure to explain the agglomeration of firms. Sometimes when industries are imperfectly competitive and it is costly to ship goods from one region to the other, upstream firms prefer to settle in regions where the demand for their product is large. Thus, they locate near their customers, resulting in the closure of the downstream firms. The lower price for intermediate goods that follows from the increasing of upstream firms in one region inevitably attracts downstream firms, and as a result, firms may cluster in a single region (See *Venables.A.J, 1996*).

Finally, an alternative explanation for the emergence of a “centre-periphery” pattern is proposed by *Picard&Toulemonde*. As noted before, the preference of firms is to settle in a region where the demand for their product is large. Hence, they locate near their customers, that is, in the region with the highest proportion of unionized workers (i.e higher wages). Thus, if a region has a larger concentration of firms, it also has a larger income. The larger income attracts more firms, which increases the income further, therefore, providing for the agglomeration of firms within a region (See *Picard.P.M & Toulemonde.E, 2002*).

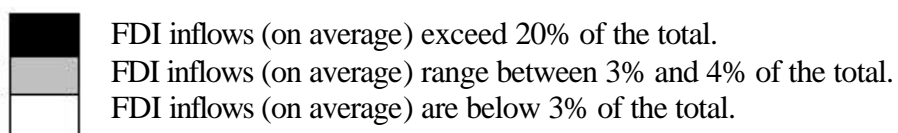
Evidence suggests that the evolution of the FDI regional distribution in Spain has become consistent with NEG theories regarding the emergence of “centre-periphery” patterns. Empirically, over the period 1993-2004 the two regions of Madrid and Catalunya held on average 75% of the total FDI inflows, and have attracted 695 out of a total 965 foreign firms since 1997. (See Table I and Map).

Table I. Regions selected by Foreign Companies to Invest.  
(Period 1997- June 2005)

Catalunya	506
Madrid	189
País Vasco	52
Comunitat Valenciana	49
Andalucía	34
Castilla León	27
Galicia	21
Rest (<20)	87
<b>Total of Foreign Companies</b>	<b>965</b>

Source: European Investment Monitor Ernst&Young

Regional Map of Spanish FDI inflows  
(Average of the period 1993-2004)



Source: Foreign Investment Registry

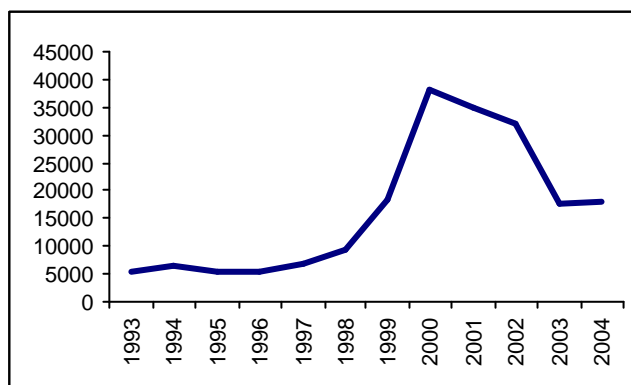
Despite an overview of the Spanish FDI features still remains to be made, FDI regional distribution data traces a sign of the emergence of an agglomeration process around few regions, partly explained by the location choices of foreign companies. Therefore, we will focus our attention on FDI determinants in order to understand the reasons for site selection. Studying the Spanish macroeconomic position and each region's attributes in terms of FDI, GDP and Location Coefficient, for instance, will lead to a better understanding of the agglomeration process.

The imperfect Spanish FDI behaviour of recent years arose from some disinvestments by a few multinational companies, which consisted of profit reaping sales of affiliates to Spanish investors, with the ultimate goal of improving balance sheets at their national headquarters. (See Table II).

Table II. FDI Inflows in Spain.  
(Period 1993-2004)

*Millions of euros*

YEAR	GROSS INVESTMENTS	
	Amount	% change
1993	5427	
1994	6527	20.27
1995	5392	-17.4
1996	5473	1.5
1997	6820	24.61
1998	9214	35.11
1999	18432	100.05
2000	38291	107.74
2001	34741	-9.27
2002	32160	-7.43
2003	17812	-44.61
2004	17847	0.25



Source: Foreign Investment Registry

An estimated 88.39% of the non-SPE - Special Purpose Entities (2) - was carried out by

(2) **Special Purpose Entities**: SPE is used to refer to an entity such as a corporation or partnership created to conduct a specific transaction or business activity. The vast majority of SPEs are used for legitimate purposes. For example, mortgage and credit companies use them to sell loans and other obligations to private investors, multinational corporations use them in tax planning strategies, and consumer product companies use them to allow third parties (the SPEs) to act as their consumer finance company.

investors that had previously invested in Spain. From their 2000 peak, figures have experienced a constant decline probably reflecting that most multinational companies envisaged establishing an SPE in Spain in response to the highly favourable fiscal legislation approved in 2000 (See *UNCTAD Survey, 2004*).

At first sight, an increased volatility of the FDI inflows is observed since 1997. This could be a possible sign of the increasing openness of the Spanish economy, in other words, the effects of globalization may be taking place.

Average size of firms may be highlighted by observing the more usual employment band over the whole period 1993-2004, set between 50 and 99 jobs -small size firms probably favoured by fiscal incentives- followed by medium size firms between 100 and 199 jobs.

Moreover in 2004, for instance, FDI inflows around the world slightly increased by an overall 6.29% relatively not so far from the Spanish 0.25%. (See Table III). This trend reflects several factors that stem from macro developments in the different countries and regions as well as changes in comparative advantages in the production factor markets. In long-run terms, the gradual lowering of information and communication costs also led to well-integrated financial markets easing foreign direct investments (See *Central Bank of Spain Report, 2004*).

In order to enhance our overview of the global FDI behaviour, Foreign FDI data for 2003 and 2004 are shown in the following table, where figures are plotted for the euro zone and US, with a breakdown for major individual countries, including Spain.

Table III. FDI inflows for some major developed countries and regions.  
(Period 2003-2004)

Millions of euros			
	2003	2004	% Change
<b>Euro zone</b>	126000	67000	-47.20%
Germany	11400	-35152	-408.35%
Spain	13585	7187	-47.11%
France	41600	21300	-48.80%
<b>United Kingdom</b>	18566	32141	73.12%
<b>United States</b>	35319	93013	163.35%
<b>TOTAL</b>	180785	192154	6.29%

Sources:  
European Central Bank (euro zone),  
Deutsche Bundesbank (Germany),  
Banque Centrale de France (France),  
National Statistics (United Kingdom),  
Bureau of Economic Analysis (United States) and Registro de Inversiones (Spain).

\* Average annual exchange rates have been used for conversion into euros.

Over time the vast majority of investments were of OECD origin (93.73%), and within the OECD, the European Union accounted for 85.93% of investments in 2004. Through the observed period 1993-2004 the main ultimate investing countries in average were The Netherlands (16.53%) and United Kingdom (13.83%). (See Table IV)

Table IV. Origin Countries of FDI in Spain  
(Average for the period 1993-2004)

The Netherlands	16.53%
United Kingdom	13.83%
Portugal	8.18%
France	6.93%
Luxembourg	5.52%
Germany	4.53%
Italy	2.98%
Europe	61.66%
Rest of the World	38.34%

Source: Foreign Investment Registry.

On average, between 1993 and 2004 more than 60% of the FDI inflows come from European companies. As we will observe through the following pages, the probability of choosing a region or other by a european or non-european firm will also be computed.

Finally, the effects of the globalization (lower communication and transport costs) on the decision of location of foreign firms lead to an increasing of FDI inflows'

volatility and a polarization process in terms of regional distribution, fostering the industrial clustering in Spain. Studying the FDI determinants will help us to understand this agglomeration process. In the 1960s, FDI inflows sought highly profitable investments in Spain due to its low labour costs and the huge necessity of new infrastructures to modernize the country. After fifty years, let us see what make foreign companies still invest in Spain.

## II. DESCRIPTION of the MODEL and DATA

Site selection requires an extensive search for the optimal location due to Spain's size and diversity. This is especially true for foreign investors who have less knowledge of Spain than domestic firms. We assume that firms' evaluation of all relevant characteristics from a set of rational alternative locations. As we cannot observe the whole set of individual profits, we assume firms seek investment locations with the highest expected profits (profit maximizing site). Therefore, once a foreign firm has decided to establish in Spain, the probability of locating in a particular region depends on a region's resource endowment and economic characteristics compared to other competing regions (See *Calvert, 1981*).

The Conditional Logit model pioneered by McFadden is the procedure best suited for estimating location probabilities (See *McFadden, 1974*).

Let  $i$  represent the foreign firm faced with a set of choices and  $j$  denote possible site locations in regions. Then the profits for a firm  $i$  at location  $j$  are:

$$?_{ij} = \beta' ?_j + e_{ij} \quad (1)$$

where  $\mathbf{x}_j$  is a vector of observable attributes for region  $j$ ,  $\beta$  is a vector of parameters of conformable dimension, and  $e_{ij}$  is a random error term.

If each  $i$  (individual firm) is located in order to maximize profits, then firm  $i$  will choose location  $j$  if expected profits  $\pi_{ij}$  exceed the expected profits  $\pi_{ik}$  of locations  $k$ , where  $k$  indexes the elements of the set of alternative locations. McFadden shows that if the error terms (equation 1) are independently and identically distributed according to a Weibull distribution, the probability that firm  $i$  will be located at site  $j$  is given by

$$P_{ij} = \frac{\exp(\beta' \mathbf{x}_j)}{\sum_{k=1}^K \exp(\beta' \mathbf{x}_k)} \quad (2)$$

where  $K$  is the number of alternatives (Comunidades Autónomas). The parameters  $\beta$ , have the following elasticity-like interpretation:

$$d \log P_j / d \log X_{jl} = \beta_l x_{jl} (1 - P'_j) \quad (3)$$

where  $P'_j$  is the average estimated probability ( $P'_j \sim 0.055$ ),  $x_{jl}$  is the  $l$ th element of the attribute vector  $\mathbf{x}_j$ , and  $\beta_l$  is the  $l$ th element of the parameter vector  $\beta$ . An assumption underlying this specification is that the odds of choosing one alternative relative to another are invariable even though the number of choices is altered. That is known as the Independence of Irrelevant Alternative (IIA) property followed by the initial assumption of independent disturbances (See *Greene.W.H, 2003*). Whenever two or more choices are close substitutes it might be a drawback (See *Woodward.P.D, 1992*).

The arrangement of the 1997-2005 data has been divided into three subperiods:

- (I) 1997-1999
- (II) 2000-2002
- (III) 2003-2005

Each subperiod contains about one-third of the foreign firms' site selection (between 300 and 400 companies approx). Location choices of period (I) are paired with values for 1996 independent variables, for period (II) with 1999 and for period (III) with 2002. This approach takes into account the lag on information availability for firms, assuming that values for independent variables in 1997 may not be relevant for 2005 site location decisions.

Each firm forms a separate observation comprised of  $j$  choices (Comunidades Autónomas) with 1 assigned to the chosen location and 0 otherwise.

Independent variables for 1996, 1999 and 2002 were normalized relative to the national mean in those years, with the aim of aiding interpretation of the coefficients. Moreover, it allows the relative ranking of Comunidades Autónomas for each characteristic to change over time as regions experienced uneven periods of growth and decline, while simultaneously removing systematic drift in the variable due to national growth trends over the sample period.

Micro data information set provided by European Investment Monitor Ernst&Young for 1997-2005 investments in Spain was used to create the dependent

variable in this survey (See *EIM E&Y, 2005*). The whole sample encompasses 965 investments; the bulk of them accounted New Investment's project type (543), followed by Expansion (334) and New Co-location (88).

### III. VARIABLES

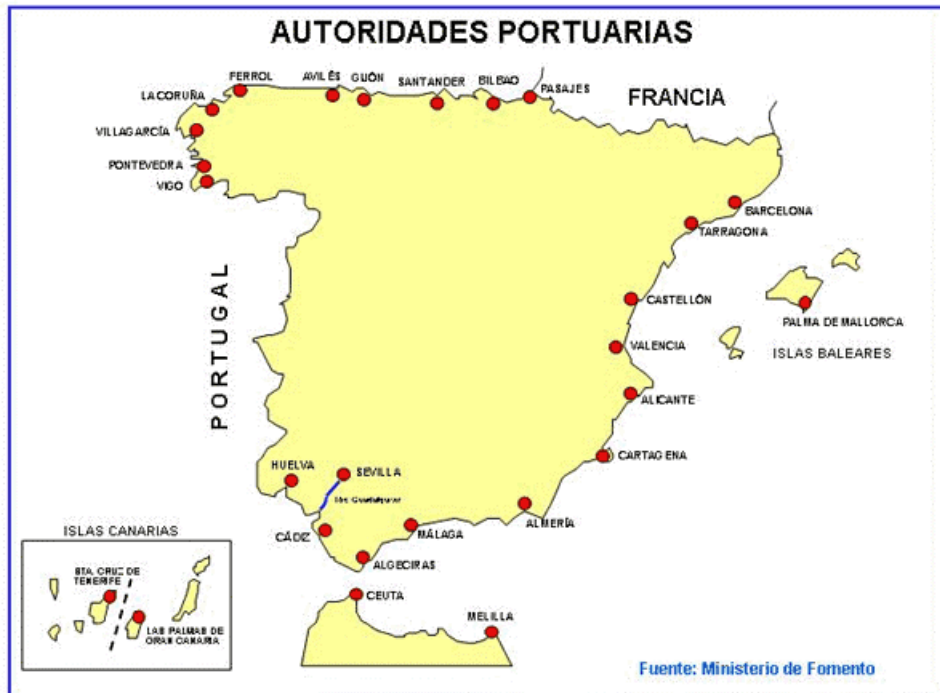
Some empirical studies in economic geography suggest access to demand as the main reason for agglomeration (See *Haaland.J.I, Kind.H.J, Midelfart Knarvik.K.H and Torlensson.J, 1999*). In this sense a gravity adjusted measure of personal income (*DEMAND*) has been included as explanatory variable.

$$DEMAND = \frac{\text{Sum of Personal Income}}{(\text{Distance between principal cities})^2}$$

where sum of personal income is measured by a regional accounting variable including working redundancy and mixed income to broaden the survey horizon at higher population levels (See National Statistics Institute Report, 2005). Distance between regions is measured in kms and principal cities are considered Barcelona, Madrid, Valencia and Sevilla (>1.5 Million population). Each distance between Spanish cities has been computed on the fastest and cheapest way by road and an average for each Comunidad Autónoma is provided. (See Appendix A). By including this variable we want to observe whether an agglomeration effect is taking place, therefore its expected sign should be positive.

Another variable, whereby proximity to markets can be observed is, *ACCESS*. It measures the closest distance from each main Comunidad Autónoma city (in terms of average personal income) to a major container port. (See Appendix A). The 80.000kms of coast offer a total amount of 53 government ports. Foreign firms usually import raw

materials and components for local assembly in their Spanish facilities. The importance of sea transport in Spain may be highlighted by its increasing traffic, rising to 78% of total imports and 51% of total exports in 2004 (See *Spanish Promotion Ministry Report, 2005*). An overview of the geographical distribution mentioned above is reflected in the following map:



Out of 53, there are 27 major ports in Spain (*major* ports are considered those whose annual movements exceed 1 million transactions). Led by Cádiz with a total traffic of 55.275.637 movements (14.093.102 containers), and followed by Barcelona, Valencia and Tarragona. This variable should reflect the importance of access to input markets and its expected sign should be negative.

Both former and latter variables reflect the agglomeration effect determinant of FDI by means of proximity to markets approach (See *Glickman and Woodward, 1998*). Advantages such as agglomeration economies, well-developed infrastructures and

transportation facilities can be found in locations with large amount of activity (See *Blackbourn*, 1982).

Since 1992 free mobility of workers became legal within EU frontiers, and with it large number of migration movements was expected. How has this affected Spanish labour market conditions? Will this globalization effect lead to a substitution between domestic and foreign employment? And, will this pressure be followed by wage reductions? Including variables such as average wage (labour cost) and labour productivity in the research, we should be able to weigh up the relative importance of labour market conditions and answer all these questions (See *Konings and Murphy*, 2001).

The average labour cost has been measured by means of the following variable;

$$\text{LABCOST} = \frac{\text{Sum of Total Wages } j}{\text{Total Employment } j}$$

where the sum of total wages for each Comunidad Autónoma brings together wage-earning and non-wage-earning amounts. Since several Central and Eastern European countries joined the EU, the expected importance of labour costs should be theoretically higher. Basically, due to new ease of reaching cheaper wage levels. Likewise, the labor expected sign should be negative.

Labour productivity has been measured as each region's GDP over its employment (in number of works). GDP has been considered at market prices (current prices). Although the pace of economic growth in Spain still remains higher than the European average trend, in terms of productivity the so-called convergence to higher

European levels is not following the optimistic expected path (See *World Bank Report, 2004*). Nevertheless, its expected sign still should be positive.

Economic literature suggests other factors which may influence investment decisions such as taxes on profits (See *Sullivan and Newman, 1988*), promotional efforts, antipollution policies, unionized areas, unemployment rates and so on. Nevertheless, so far some of these statistical variables related to government's budgeting are out of our reach.

#### IV. EMPIRICAL RESULTS

McFadden's choice model is also called fixed-effects logit for panel data, allowing a common constant parameter for every individual. Therefore, since variables are normalized, the relative importance of the coefficients corresponds to their magnitude. Thus, if multiplying by 0.055 (described in Equation 3) the coefficients of nondummy variables could be interpreted as elasticities.

The results are shown as follows; the following table includes the clogit estimation for foreign firm's site selection from 1997 to 1999 paired with 1996 independent variables. Clogit estimation output with STATA reveals the following conditional fixed-effects logistic regression outcomes (See Table V).

Table V. Estimation output (STATA) for 305 firm's choices,  
(Period 1997-1999)

Conditional (fixed-effects) logistic regression				Number of obs = 5490		
Log likelihood = -626.1618				LR chi2(4) = 510.8		
				Prob > chi2 = 0.000		
				Pseudo R2 = 0.2897		
choice	Coef.	Std. Err.	z	P>z	95% Conf.	Interval
demand	1.062538	0.0659205	16.12	0.000	0.9333366	1.19174
access	-0.9162729	0.0777644	-11.78	0.000	-1.068688	-0.7638575
laborcost	-0.213863	0.2465118	-0.87	0.386	-0.6970172	0.2692912
laborprodu~y	0.4966951	0.2329532	2.13	0.033	0.0401152	0.9532751

Regretfully, the relevant variables omission can be seen by observing  $R^2$  figure by which solely about 30% of site selection dependent variable would be explained by means of proximity to markets and labour conditions independent variables. Nonetheless, the joint significance of the estimation allow us specify several FDI determinants.

Expected sign of the coefficients are rationally consistent with our forecasting and all variables except labour cost can be considered significant at 5% level of confidence.

choice	Coef.	Elasticity
demand	1.062538	0.058439
access	-0.9162729	0.050395
laborcost	-0.213863	0.011762
laborprodu~y	0.4966951	0.027318

The basic model includes statistically significant and non-significant variables. Both *DEMAND* and *LABOR PRODUCTIVITY* are a significant positive influence on the location decision by foreign firms. Since non-dummy variables have been interpreted as elasticities by multiplying by 0.055, an increase of 1% on the gravity adjusted measure for personal income would increase by 5.94% the number of site selections in a specific region. In the same direction, a labour productivity rise of 1% would lead to 2.7% more firms investing in the affected region.

On the other hand, negative influence on location decisions is seen as *ACCESS* and *LABOR COST* variables. The former is rationally consistent with a greater distance to major container ports precipitating a lower site selection probability for the region. In terms of relative importance, the proximity to input markets becomes very relevant on location decisions (-0.916) and elasticity of 0.0503. The latter - even being non-significant at 5% of confidence level - is considered relevant at higher confidence levels, albeit the relative importance of location decision remains low.

In the basic model, foreign firms are more sensitive to proximity to markets than labour market conditions -as a whole- due to the relative size of their coefficients. Next in importance is *LABOR PRODUCTIVITY*.

In table VI the choice of 410 has been analysed pairing them with 1999 independent variables' figures. The results go as follows;

Table VI. Estimation output (STATA) for 410 firm's choices.  
(Period 2000-2002)

Conditional (fixed-effects) logistic regression						Number of obs =	7380
Log likelihood = -699.45385						LR chi2(4) =	971.2
						Prob > chi2 =	0.000
						Pseudo R2 =	0.4098
<b>choice</b>	<b>Coef.</b>	<b>Std. Err.</b>	<b>z</b>	<b>P&gt;z</b>	<b>95% Conf.</b>	<b>Interval</b>	
demand	1.50635	0.0689273	21.85	0.000	1.371255	1.641445	
access	-1.123998	0.0686164	-16.38	0.000	-1.258.484	-0.9895124	
lcost	-0.1999361	0.2685377	-0.74	0.457	-0.7262603	0.3263882	
lprod	0.2789664	0.242178	1.15	0.249	-0.1956938	0.7536265	

The largest sample of 410 firms' site choices offer us wide range of coefficients' interpretations. Expected sign still remain rationally consistent with what economic theories suggest. However, further dispersion is observed in terms of relative

importance between variables. Coefficient's size of proximity to market indicators rose for the 2000-2002 period and labour market conditions decrease in same terms.

choice	Coef.	Elasticity
demand	1.50635	0.05809
access	-1.123998	0.06181
lcost	-0.1999361	0.01099
lprod	0.2789664	0.01534

Loosely speaking, the positive influence of *DEMAND* became higher -probably due the rise of personal income- keeping distances

between major cities constant. More and more, profit dispersion across regions is increasing. Moreover, agglomeration effects are even more relevant.

The equal rise in sea transport (in terms of imports and exports) and firm's necessity of easy access to input markets, makes *ACCESS* extremely relevant in location decisions. In this sense, closer major cities (in terms of personal income) to container ports explain part of this rise.

On the other hand, *LABOR COST* and *LABOR PRODUCTIVITY* became relatively less important to location decisions. The largest fall between period I and II is led by productivity, probably because of increasing regional convergence -in terms of productivity- across main regions.

The basic model is jointly significant and this period's  $R^2$  behaves quite well, since 40% of FDI location choices can be explained by included independent variables.

During this period foreign firms have been beating a path to major cities, which ended up assembling the bulk of site choices in extremely few regions, i.e. clustering large economic activity centres. Unlike rest of periods, from 2000 to 2002 demand

forces attracted the highest amount of FDI ever in Spain, rising to 38291 millions euros, quite likely due to structural changes on the Spanish economy.

In table VII about 250 site choices are observed matching them with 2002 independent variables figures. The following table stretch the results;

Table VII. Estimation output (STATA) for 250 firm's choices.  
(Period 2003-2005)

Conditional (fixed-effects) logistic regression				Number of obs = 4500		
Log likelihood = -441.56414				LR chi2(4) = 562.06		
				Prob > chi2 = 0.000		
				Pseudo R2 = 0.3889		
choice	Coef.	Std. Err.	z	P>z	95% Conf.	Interval
demand	1.54762	0.1008807	15.34	0.000	1.349898	1.745343
access	-0.9929344	0.0821757	-12.08	0.000	-1.153.996	-0.8318729
labc	-0.5685065	0.3312603	-1.72	0.086	-1.217765	0.0807517
labprod	0.4558267	0.2750728	1.66	0.097	-0.0833062	0.9949595

During last 2 years *DEMAND* even has raised more importance in terms of coefficient's size, reaching its top on 1.54 (0.085 highest elasticity). The *LABOR COST* and *LABOR PRODUCTIVITY*, although insignificant at 5% confidence level, have the correct sign.

choice	Coef.	Elasticity
demand	1.54762	0.08511
access	-0.9929344	0.05461
labc	-0.5685065	0.03126
labprod	0.4558267	0.02507

*ACCESS* loses relative importance during this last period, nevertheless its sign is still correct. In this sense, the basic model

for the last period behaves better than any other in terms of individual significance of the independent variables. Moreover, the 38% of FDI inflows could be explained by these variables.

The change on size coefficients moves the relative importance from labour productivity to labour costs, making them more relevant and raising its highest level by this time. However, little contribution to firm's agglomeration may be explained by both variables. Rather, international investors are drawn to areas with strong existing economic activity, even more in this last period due to proximity market variables' power.

The agglomeration effect suggested by new economic geography (NEG) theories appears a reality after observing evidence from FDI inflows in the last period, with stronger centralization in fewer regions.

Period IV refers to all site selections from 1997 to 2005 matched with 1996, 1999 and 2002 independent variables. (See Table VIII). It behaves well as other periods do in terms of correct signs, individual and joint significance, and  $R^2$  turned out to be about 36% explanation of FDI site selections. As a whole period IV is noted in order to observe the average figures of the entire period.

Labour costs and productivity keep little relevance over the whole period, probably because both are not dramatically different across Spanish regions. Instead, an increasing importance of access to market variables may be supported by highly regional inequalities leading to a "centre- periphery" pattern in Spanish FDI inflows.

Table VIII. Conditional Logit Estimates, All 965 Foreign Firms.  
(Period 1997-2005)

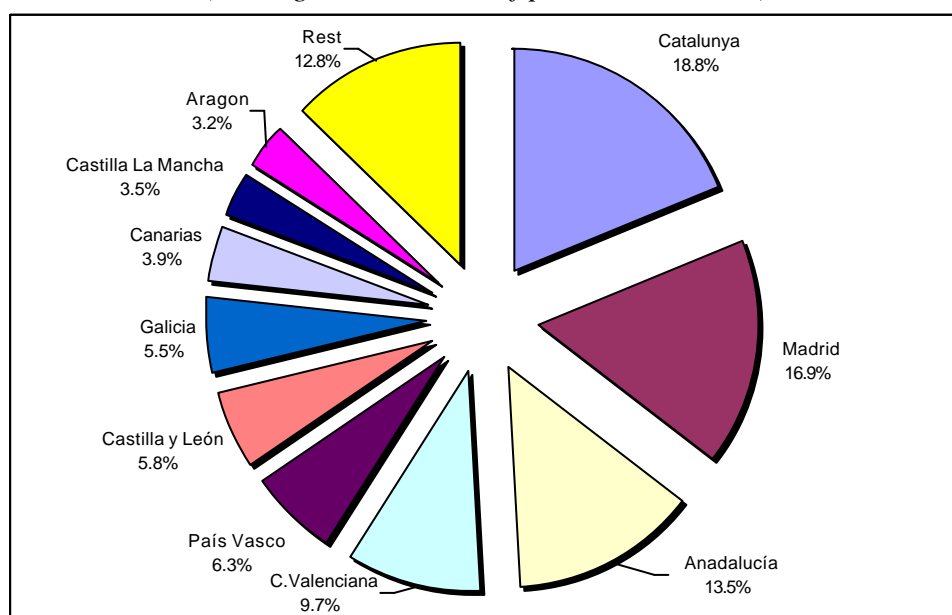
	I	II	III	IV
<b>Access to markets</b>				
<i>Demand</i>	1.076 (-16.29)	1.506 (-21.85)	1.547 (-15.34)	<b>1.356</b> <b>(-32.24)</b>
<i>Port</i>	-0.08 (-9.95)	-1.123 (-16.38)	-0.992 (-12.08)	<b>-1.017</b> <b>(-23.62)</b>
<b>Labor market conditions</b>				
<i>Labor Cost</i>	-0.52 (-2.04)	-0.199 (-0.74)	-0.568 (-1.72)	<b>-0.222</b> <b>(-1.45)</b>
<i>Labor productivity</i>	0.786 (-3.4)	0.278 (-1.15)	0.455 (-1.66)	<b>0.315</b> <b>(-2.29)</b>
<i>Joint Significance</i>	0.000	0.000	0.000	<b>0.000</b>
<i>Observations</i>	5490	7380	4500	<b>17370</b>
<i>R<sup>2</sup></i>	0.293	0.4098	0.388	<b>0.36</b>
<i>Log Likelihood</i>	-623.02	-699.45	-441.56	<b>-1783.72</b>
<i>N</i>	305	410	250	<b>965</b>

(*t*-statistics in parentheses)

What can we say about specific regions?

To answer this question further research is required. In this sense, specific characteristics of the choices (regions) such as GDP and FDI regional distribution and Location Coefficients have been also examined for the period 1993-2004 (See Graph I and II, and Table IX).

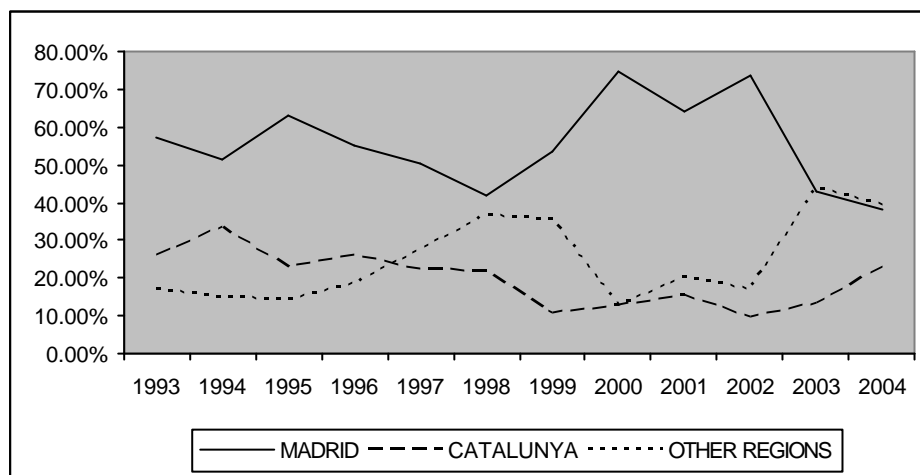
Graph I. GDP Regional Distribution in Spain \*  
(Average contribution of period 1993-2004)



Source: INE (\*) at market prices

Catalunya led the way in GDP contribution followed by Madrid, whose combined amount is approximately 35% of total Spanish GDP. The provided data shows that very few regions have such a huge GDP proportion. Likewise, FDI inflows are following a similar polarization process. (See table IX).

Graph II. Regional FDI evolution in Spain  
(Period 1993-2004)



Source: Foreign Investment Registry

As mentioned in the first section, FDI inflows partly illustrate the emergence of an agglomeration process in Spain. In spite of Catalunya is ranking in the top position of foreign firms' choices, higher amounts of FDI inflows have been focused on Madrid over the whole period, probably due to fewer operations but larger investment amounts.

Likewise, an interaction of GDP and FDI regional distribution would reflect its numerical evidence: the Location Coefficients, whose results in other words, are to show the difference between each region contribution to the Spanish GDP and how much FDI they receive. (See table VII and Appendix B).

Table IX. Regional Distribution of GDP and FDI in Spain and Location Coefficients.  
(Average of period 1993-2004)

	COEF	IED	PIB
MADRID	<b>3.30</b>	55.54%	16.83%
BALEARIS	<b>1.27</b>	1.38%	2.26%
ARAGON	<b>1.05</b>	3.27%	3.20%
CATALUNYA	<b>1.04</b>	19.66%	18.73%
ASTURIAS	<b>0.86</b>	1.96%	2.33%
CANARIAS	<b>0.69</b>	2.73%	3.94%
PAIS VASCO	<b>0.68</b>	4.30%	6.32%
MURCIA	<b>0.37</b>	0.90%	2.39%
COMUNIDAD VALENCIANA	<b>0.33</b>	3.15%	9.65%
NAVARRA	<b>0.33</b>	0.54%	1.68%
ANDALUCIA	<b>0.17</b>	2.23%	13.49%
RIOJA	<b>0.15</b>	0.12%	0.78%
GALICIA	<b>0.14</b>	0.77%	5.45%
CASTILLA LA MANCHA	<b>0.11</b>	0.37%	3.50%
EXTREMADURA	<b>0.10</b>	0.17%	1.76%
CEUTA Y MELILLA	<b>0.09</b>	0.03%	0.30%
CASTILLA LEON	<b>0.07</b>	0.40%	5.83%
CANTABRIA	<b>0.06</b>	0.07%	1.27%

Source: INE

Four regions: Madrid (with 3.30 coefficient), Baleares (with 1.27 coefficient), Aragon (with 1.05 ratio) and Catalunya (with 1.04 ratio) take the first places in the ranking of FDI attracting focus regions. Location Coefficients higher than one, suggest higher FDI inflows in certain regions than proportionally their GDP contribution should indicate. Data evidences further confirm the hypothesis of more favoured regions. Obviously, not only proximity to markets and labour conditions variables lead foreign firms to locate in Madrid, but also other variables such as promoting efforts becomes of huge relevance. For instance, the conservative party Partido Popular (PP) who led the state government from 1996 to 2004 multiplied its efforts on promoting Madrid. This centralist oriented policy led to highest Location Coefficients of this region, to the detriment of Mediterranean regions such as Catalunya and Comunidad de Valencia who historically have been always amongst top-3 FDI attracting focuses.

Finally, in order to know more about the FDI inflows in Spain, research has also been conducted regarding the location decisions of foreign firms. Thus, by

implementing McFadden's conditional logit model, the odds of location in one region or another by a european or a non-european firm have been examined. (See Table X and Appendix C for methodology).

Table X. Odds of Location by european and non-european firms.  
(Period 1997-2005)

ANDALUCIA	1.12
ARAGON	1.02
ASTURIAS	0.87
BALEARS	0.27
CANARIAS	0.20
CANTABRIA	1.45
CASTILLA LEON	2.00
CASTILLA LA MANCHA	0.98
CATALUNYA	0.81
COMUNIDAD VALENCIANA	0.46
EXTREMADURA	2.72
GALICIA	0.66
MADRID	0.68
MURCIA	0.44
NAVARRA	0.95
PAIS VASCO	1.81
RIOJA	1.63
CEUTA Y MELILLA	2.08

We see, for instance, that in this sample (965 foreign companies) european firms are more likely to choose peripheral regions like Extremadura (odds ratio 2.72) or Castilla León (odds ratio 2.00) rather than non-european firms, who actually prefer agglomerated regions such as Catalunya (odds ratio 0.81), Madrid (0.68) or Comunidad Valenciana (0.46).

## V. SUMMARY AND CONCLUSION

The importance of regional markets is reflected in all periods. The “*gravity-adjusted demand*” variable corroborates this evidence, whereby markets play a dominant role in the location preferences of foreign firms. The increasing returns to scale benefits from clustering seem to be the rational explanation for the agglomeration process evidenced empirically by this survey (See *Puga, 1999*).

Likewise, domestic (Spanish) market potential and access to foreign markets become important influences on foreign location. Regions with large market potential (*DEMAND* and *ACCESS*) can offer: well-developed infrastructure, transportation facilities, agglomeration economies and access to main customers markets. These few regions are led by Catalunya, Madrid and Comunidad de Valencia.

But is the “*agglomeration effect*” beneficial for all regions? Obviously, it is not the case. Although, other regions cannot affect their market size and wage structure in the short run, regions’ promotional efforts still could improve their chances of site selection. The delocalization process suffered by Catalonia, especially during recent years is an example of what is expected to happen through all other Spanish regions unless industrial policy changes are to be taken. In this sense, little policy changes may have dramatically non-linear effects. The government may influence the state of the economy by coordinating the expectation of workers – regional boosterism may work in such a setting. In fact, a region that promises a subsidy can attract all activities without actually having to pay the subsidy afterwards because agglomeration externalities lock in industry (see *Balwin, Forslid, Martin, Ottaviano and Robert-Nicoud, 2003*).

Nevertheless, how can these theories be implemented in practice? Spanish FDI facts and figures demonstrate how unsuccessful public policies and incentives based in low wages costs, fiscal and financial aids, and location facilities are. Nowadays, proactive industrial policies are needed, seeking complicity between firms and governments and promoting comparative advantages by which FDI may be attracted.

The more capital flows the more competitive a region becomes. It is necessary to attract those firms who best fit on each region's economic and social conditions. Thus, those linked to technological development, to research and to new products and processes development would usually lead the way (see *Costas, González, Tugores et al., 2004*). Besides, public policies ought to help size increasing of region's firms in order to allow the competition in more global markets.

Finally, to fight against non-beneficial effects of the globalization, some strategic decisions may be taken by both state and regional policy-makers:

- Technology Investment, meaning the creation of specialized technological centres, a suitable scientific and technological environment at foreign investment firm's disposal and higher R+D+I (Research, Development and Innovation) public investment.
- Higher investment in "high added value" sectors and in "New Knowledge Society" industries (i.e. access to the internet, information networks...etc).
- Giving a boost to the third sector, trying to attract foreign headquarters, centres of decisions, share service centres, international institutions, conferences and conventions.
- Higher investment focused on transport and telecommunication infrastructures

Perhaps the most interesting result uncovered in the survey is the estimated response of site selection to other expected relevant variables such as corporate taxes, regions' promotional effort, anti-pollution policies, and educational attainment or land area theories. Moreover, we could jointly test whether unit labour costs (the wage rate

divided by productivity) act as a determinant. Under the hypothesis that higher labour productivity attracts investment, by holding wages constant, we could test the existence of offsetting effects (see *Cushman, 1987*). A detailed analysis of new investment by industry would be illuminating, even more a full model might examine the role of incentives in the final site selection.

## APPENDIX A

Easing the understanding on how independent variables have been constructed is the ultimate goal of this section. On one hand there is the *DEMAND* variable; the sum of personal income measured in working redundancy and mixed incomes according to the National Statistics Institute (INE). On the other hand, there is the distance between principal cities (Barcelona, Madrid, Sevilla and Valencia) with more than 1.5 million of inhabitants and all the Spanish cities was measured in Kms, after that, an average for every region (Comunidad Autónoma) has been computed. In this sense, GuiaCampsa 2005's software provides minimal and cheapest distances by road. ([www.guiacampsa.com](http://www.guiacampsa.com))

A brief example goes as follows: Catalunya has 4 provinces: Barcelona, Girona, Tarragona and Lleida. In this case, from Barcelona (principal city >1.5m) to Girona 101kms becomes the separating distance. From Barcelona to Tarragona 99kms, to Lleida 156kms and from Barcelona to Barcelona 1km was the assumption extended to distance between same cities in the whole set. Then average of all these distances squared leads to 11.084 as a result, fixing the denominator of *DEMAND* variable.

The independent variable *ACCESS* measures the minimal distance between the main city of each region (in terms of personal income) and the closest major container port. Personal income changes over time as main cities of each region do. In this sense, for 1996, 1999 and 2001 the main city of every region has been selected measured by its larger personal income. Major ports have been considered those who exceed 1 million of annual movements (27 out 53). Also figures for ports have evolved over time and major ports have been changing and it was also taken into account.

For example, the main city of Castilla León for 1995 and 1999 in terms of personal income is Valladolid, then the closest major has been computed resulting Santander (249kms), therefore this figure would be the result for Castilla León in 1995 and 1999. However for 2001 León became the main city, and nearest major port was Avilés what makes reduce the distance to (157,3kms). For Catalunya 1km is assumed for the whole period, because major city Barcelona has major port, and the same has been extended to equal cases.

## APPENDIX B

The Location Coefficients have been computed as follows; firstly, taking each single FDI inflow for every year respect to FDI total; (results in %)

$$IED_i / \sum_{i=1}^{i=18} IED$$

The same methodology was used for GDP regional distribution;

$$GDP_i / \sum_{i=1}^{i=18} GDP$$

And finally, the *Location Coefficient* (LC) figures were obtained as a result of:

$$LC_i = \frac{IED_i / \sum_{i=1}^{i=18} IED}{GDP_i / \sum_{i=1}^{i=18} GDP}$$

## APPENDIX C

For this model, we have a set of unordered choices, say, 1,2,...T. Let  $y_{it}$  be an indicator variable for the choice actually chosen by the  $i$ th individual. That is,  $y_{it} = 1$  if individual  $i$  chose choice  $t$ , and  $y_{it'} = 0$  for  $t' \neq t$ . We write the independent variables of the model as  $\mathbf{z}_{it} = [ \mathbf{x}_{it} \ \mathbf{w}_i ]$ , where  $\mathbf{x}_{it}$  are the attributes of the choices for the  $i$ th individual and  $\mathbf{w}_i$  are attributes of the individual.

In our case, we have data on 965 foreign companies and their choice of location in Spain. We have an 18-category choice *region*, whether Aragon, Andalucia, Asturias....and so on. We want to explore the relationship of the choice of *region* to *DEMAND*, the adjusted gravity measure of access to markets, and to the european ownership of the firm (variable *europe*). *DEMAND* is obviously an attribute of the choice ( $\mathbf{x}_{it}$  in previous notation), and *europe* attributes of the individual ( $\mathbf{w}_i$ ). The firms' choice of *region* is indicated by the variable choice ( $y_{it}$ ).

Since we want to examine how the firm's attributes (european or non-european) apply to the choices (*region*), we must interact the attributes with dummy variables for the choices (*europe*).

Displaying the results as odds ratios makes them easier to interpret. (See following page).

Conditional (fixed-effects) logistic regression

Number of obs = 17370  
 LR chi2(35) = 2372.82  
 Prob > chi2 = 0.0000  
 Pseudo R2 = 0.4254  
 Log likelihood = -1602.8002

choice	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
and	4.45e-06	.000019	-2.89	0.004	1.05e-09	.0188843
ara	9.48e-07	4.41e-06	-2.98	0.003	1.03e-10	.0087326
ast	6.68e-07	3.16e-06	-3.01	0.003	6.28e-11	.0070953
bal	2.99e-07	1.41e-06	-3.19	0.001	2.89e-11	.0030892
can	2.81e-22	6.01e-15	-0.00	1.000	0	.
cant	3.95e-07	1.88e-06	-3.10	0.002	3.58e-11	.0043652
cleo	1.30e-06	5.88e-06	-2.99	0.003	1.82e-10	.009278
clam	1.32e-06	5.86e-06	-3.04	0.002	2.14e-10	.0080888
cat	.0232427	.0447177	-1.96	0.051	.0005353	1.009145
cval	.0001253	.0004034	-2.79	0.005	2.28e-07	.0688112
ext	1.45e-07	6.95e-07	-3.29	0.001	1.24e-11	.0017023
gal	2.68e-06	.0000119	-2.89	0.004	4.51e-10	.0158771
mur	6.92e-07	3.26e-06	-3.01	0.003	6.70e-11	.0071454
nav	5.32e-07	2.52e-06	-3.05	0.002	4.93e-11	.0057305
pv	1.77e-06	8.26e-06	-2.83	0.005	1.84e-10	.0169374
rio	1.31e-07	6.33e-07	-3.29	0.001	1.03e-11	.0016668
cym	9.68e-21	3.53e-14	-0.00	1.000	0	.
eurand	<b>1.139924</b>	.7136719	0.21	0.834	.3341676	3.888548
euara	<b>1.02099</b>	.6837011	-0.07	0.966	.0244911	2.621184
eurast	<b>.8724968</b>	.6659477	-0.18	0.858	.1954655	3.894553
eurbal	<b>.2725532</b>	.3613338	-0.98	0.327	.020276	3.663704
eurcan	<b>.2006358</b>	8262730	-0.00	1.000	0	.
eurcant	<b>1.454077</b>	1.230316	0.44	0.658	.2769324	7.634865
eurcleo	<b>2.001716</b>	1.371866	1.01	0.311	.5224388	7.66954
eurclam	<b>.9828954</b>	.7412152	-0.02	0.982	.2241838	4.309336
eurcat	<b>.8135914</b>	.4195022	-0.40	0.689	.2961499	2.235121
eurcval	<b>.4574264</b>	.2687552	-1.33	0.183	.1446133	1.446886
eurext	<b>2.726468</b>	3.291667	0.83	0.406	.2558254	29.05741
eurgal	<b>.6552162</b>	.4350705	-0.64	0.524	.1783108	2.40764
eurmad	<b>.6792971</b>	.3588245	-0.73	0.464	.2412295	1.912887
eurmur	<b>.4361983</b>	.3669193	-0.99	0.324	.083883	2.268265
eurnav	<b>.9542637</b>	.7696084	-0.06	0.954	.196417	4.636152
eurpv	<b>1.817636</b>	1.099497	0.99	0.323	.555407	5.948435
eurrio	<b>1.635867</b>	2.06334	0.39	0.696	.1380756	19.38114
eurcym	<b>2.082219</b>	8535972	0.00	1.000	0	.
demand	<b>.0482829</b>	.0604658	-2.42	0.016	.0041478	.5620467

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