TITLE

What Drives the Location of Spanish Multinationals in Developing and Transition Countries?

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Abstract

In this paper, we investigate the location determinants of Spanish multinational firms in developing and transition economies. We pay particular attention to the role played by market potential and agglomeration economies as decisive factors in location. We also analyse whether, beyond the observed attributes, there are any significant differences across regions in terms of attracting foreign affiliates. With this aim, we estimate a mixed logit model, which allows us to endogenously consider the existence of complex substitution patterns among different destinations. Our results confirm that Spanish investment in developing and transition countries depends on market potential and agglomeration externalities. The intensity of these externalities, however, depends on the nationality of competitors, greater rivalry being observed among Spanish-owned affiliates. Furthermore, our findings show that the location of multinational firms responds both to factors related to the local business environment, including the cost and quality of labour and infrastructures, and to the existence of specific regional effects.

1.- INTRODUCTION

Over the last few decades, the world has witnessed a significant rise in the scale of multinational operations, which has been accompanied, at the same time, by a substantial change in the location patterns of their offshore activities. The notable reduction in the weight of traditional North-North flows of foreign direct investment (FDI) in favour of North-South, and even South-South, flows appears as one of the most significant stylized facts of the last wave of globalization. In fact, inward FDI flows to developing and transition economies have been growing since the end of the last century (Barba-Navaretti and Venables, 2004), reaching their highest level in 2014, when they attracted nearly 60% of world FDI inflows (UNCTAD, 2015).

This rapid expansion of FDI has triggered a great deal of research into the factors underlying the investment location patterns of foreign affiliates of multinational firms (MNEs). However, in contrast to the recent trends, for a long time research remained focused on the location decisions of multinational firms in developed economies. This is the case of the studies conducted by, among others, Basile et al. (2008) for MNEs in Europe, Basile (2004) and Mariotti et al. (2010) for Italy, Crozet et al. (2004) for France, Duranton and Overman (2008) for United Kingdom, Guimares et al. (2000) for Portugal, and Head and Mayer (2004) for Japanese MNEs in Europe.[1]

In this paper, we try to partially fill this gap by empirically investigating the factors that drive the location decisions of Spanish MNEs in developing and transition economies. . With this aim, we estimate a mixed logit model (MXL) applied to firm-level data for Spanish multinationals in developing and transitions economies from 1990 to 2010. Without ignoring the traditional determinants that explain the location of these offshore activities (such as labour cost, market size, distance, infrastructures or business environment), we mainly base our work on the predictions highlighted by the New Economic Geography (NEG) models applied to FDI. Specifically, we focus on the role played by market potential and agglomeration economies as decisive factors in choice of location. On the one hand, market potential highlights the fact that the relevant measure

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[1] There are some exceptions, however, such as Frenkel et al. (2004), who analyse the determinants of FDI from the five largest industrialized countries to a number of emerging economies in Asia, Latin America, and Central and Eastern Europe; Pusterla and Resmini (2007), who focus on the location decision of foreign firms in four Central and Eastern European Countries; or Rasciute et al. (2014), who studied the location decisions of firms from 20 OECD countries to 13 transition economies (CEECs).

of market size of a location is not limited to just its own market, but extends to other nearby markets (Head and Mayer, 2004). On the other hand, the agglomeration economies allow us to consider the tendency towards the spatial clustering of MNEs in host markets. These agglomeration economies, associated with knowledge spillovers, availability of intermediate goods and services, labour market stability, etc., encourage multinational firms to locate where other firms are already placed (Head et al., 1995, 1999; Mariotti et al., 2010).

Furthermore, we also take into account what Crozet et al. (2004) recently pointed out concerning the nationality of competitors. According to these authors, the agglomeration patterns of the foreign subsidiaries of MNEs are not only determined by the number of firms but also by their country of origin. Thus, we try to ascertain to what extent the nationality of competitors influences the intensity of these externalities. Finally, we analyse whether, apart from the observed attributes, there are any significant differences across regions in terms of the attraction they hold for Spanish foreign affiliates.

From the methodological point of view, the use of mixed logit models methodology allows us to relax the restrictive substitution pattern of the standard logit models.[2] By so doing, we can test for potential substitution patterns among alternatives and obtain more accurate predictions.

In line with the NEG hypotheses, our results show that both agglomeration economies and market potential play an important role in the location of Spanish multinational firms in developing and transition economies. The positive externalities associated with the agglomeration effects nevertheless present important differences, depending on the nationality of the firms located in the same place. The cost and quality of labour, the availability of physical infrastructures and a favourable business environment also appear to be important determinants for Spanish firms when deciding where to locate their affiliates in developing and transition economies. Finally, our findings reveal a specific regional component and the presence of substitution patterns among alternative locations, this latter confirming the appropriateness of the MXL estimation.

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[2] The assumption of independence of irrelevant alternatives imposed by traditional models of discrete choice assumes that the probability of choosing between two alternative options does not depend on the characteristics of the other alternatives. That is, all the alternatives are equally substitutive each other.

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The rest of the paper is organized as follows. In the next section, we review the literature concerning the location determinants of multinational firms. Section 3 describes the dataset and the econometric methodology. Section 4 presents the estimation results, and the final section concludes.

2.- RELATED EMPIRICAL LITERATURE ON MNEs AND FDI LOCATION DETERMINANTS

The theoretical literature highlights the idea that host country characteristics that multinational firms will find most attractive depends on the motives of the foreign investors.[3] In this same line, the most relevant empirical research on the location determinants of foreign investments focuses on host country characteristics such as the size and quality of the host market, the endowment of natural resources or geographical proximity to consumers.[4] Other studies (Blomström and Kokko, 2002; Noorbakhsh et al., 2001) also test to what extent the availability of human capital (skilled versus non-skilled workers, together with the costs involved) influences location choices.

Recently, additional factors from the developments of the NEG theory related to the forces that favour the concentration or dispersion of economic activity have become commonplace in the literature on the determinants of the location decisions of MNEs and FDI.[5] In our view, this literature makes two major contributions to the study of location decisions of MNEs, i.e. it stresses the importance of agglomeration economies, and it retrieves the concept of market potential. In accordance with the market-seeking FDI hypothesis,[6] many works support a positive association between the market size of the host economy and foreign investment inflows (Bevan and Estrin, 2004; Kang and Jiang, 2012). However, according to Head and Mayer (2004) and the new developments of the NEG, while the ability to access a foreign market at little cost motivates firms to locate

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[3] Faeth (2009) and Basile and Kayam (2015) include excellent surveys on theoretical FDI models.
[4] Blonigen (2005) or more recently Basile and Kayam (2015) provide exhaustive overviews of the empirical literature.
[5] Since the seminal work of Krugman (1991a, b) various authors have contributed to the development of the NEG model. Krugman (1999), Neary (2001) and Fujita and Thisse (2002), for example, include excellent reviews on the NEG theory and its contribution to different fields of economics.
[6] Brainard (1997).

production in that country, the ability to enter other markets from that country also matters.[7]

The empirical literature has also dealt extensively with the importance of agglomeration economies and the dynamic process generating industrial clusters. Particularly, the following studies provide evidence on agglomeration economies: Barrel and Pain (1999) and Head and Mayer (2004) for US and Japanese firms investing in Europe, respectively; Barrios et al. (2006) for FDI in Ireland; Disdier and Mayer (2004) and Procher (2011) for French firms locating abroad; Hilber and Voicu (2010) for Romania; Majocchi and Pressuti (2009) for FDI in Italy; Pusterla and Resmini (2007) for the EEC region; and Spies (2010) for multinational firms in Germany.

This literature states that the attractiveness of a country is a function not only of market access but also of the existence of information spillovers arising from industrial agglomerations (Fujita and Thisse, 2002; Mariotti et al., 2010). Head et al. (1999) pointed out that, all other things being equal, foreign investors will prefer locations chosen by preceding investors. For Barry et al. (2003), firms might be further attracted by the presence of existing firms, as the agglomeration of companies is sending out signals to new investors about the reliability of the host country. Agglomeration effects might also be capturing the intensity of competition. Accordingly, the increase in the number of firms operating in a market may have a negative impact on the attractiveness of this place through increased competition. Which of these two effects dominates seems to be more of an empirical question than a theoretical one.

Besides, Alfaro and Chen (2014, 2016) recently pointed out that the agglomeration patterns of foreign subsidiaries of MNEs are different from those of domestic firms. These authors find that foreign affiliate patterns are related both to the number of firms and to their country of origin. For Crozet et al. (2004), depending on the country of origin, positive spillovers from clustering between firms can be more or less pronounced. In particular, they found that for firms investing in France, the agglomeration effects among firms with the same nationality are much higher than with foreign firms. Similar outcomes

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[7] Other authors that show the relevance of market potential in the location decision of foreign firms include Basile et al. (2008), Chang et al. (2014), Crozet et al. (2004), Pusterla and Resmini (2007) and Procher (2011). For these authors, the larger the market potential is, the more attractive the host country or region will be.

were found by Chang et al. (2011) for Japanese and Taiwanese multinational firms in China. These results agree with what Head et al. (1995) defined as the "follow-the-leader" pattern of multinational firms. By analysing Japanese firms investing in the USA, these authors showed that, for these firms, the effect of previous Japanese investments in terms of attractiveness exceeds that of prior US investments.[8]

Bevan and Estrin (2004) and Chang et al. (2014) showed that the decision on where to locate foreign affiliates also depends on the proximity to the investor's home country. According to these authors, a shorter geographical distance results in a lower fixed entry cost because of the decreased costs of communications and of dealing with cultural differences. Blonigen and Wang (2005), however, pointed out that greater distances not only make the control of overseas investment more difficult but also increase trade costs, and therefore the net effect of increasing distance between parent and host countries is ambiguous. Additionally, for the Spanish case, we also need to take into consideration the fact that physical distance does not necessarily match cultural distance, as a number of distant countries, such as those in Latin America (LA), share a similar language and a common history with Spain. Drogenkijk and Martín (2015), for example, identified cultural proximity as the most important driver of FDI in LA for Spanish firms.

The literature on efficiency-seeking FDI has also highlighted relative factor abundance as another important aspect in explaining the geographical distribution of FDI.[9] In the empirical literature researchers have used several proxies to take this factor into account. Perhaps the most widely used have been the input costs or the endowment of skilled labour. For Kinoshita and Campos (2003), if foreign investors segment part of their production process internationally to benefit from low labour costs, the availability of cheap labour is an important stimulus for the location of foreign firms. Moreover, since the theoretical contribution by Lucas (1990) concerning the importance of human capital on FDI flows to less developed countries, many empirical studies have found evidence of the role that the availability of skilled labour plays as a determinant for FDI (see Gauselmann and Marek, 2012; Noorbakhsh et al., 2001; Zhang, 2001, among others).

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[8] However, contrary to this literature, Procher (2011) concluded that the nationality of firms within a given cluster plays only a minor role. According to her findings, the agglomeration effects are not restricted to the clusters of home country firms, as the agglomeration of firms from other nationalities yields similar results as regards the attractiveness of a location.

[9] See Zhang and Markusen (1999).

Recent empirical works have also identified macroeconomic stability or the availability and quality of different kinds of infrastructures as encouraging factors for FDI, especially for developing and transition economies. As Busse and Hefeker (2007), Demekas et al. (2007), Mina (2012) and Zhang (2001) stated, MNEs prefer to invest in countries with higher stability at the macro level, as this increases the economic security and business opportunities. Besides, for some authors, better access to infrastructures provides an important stimulus for the location of foreign affiliates by MNEs (see Asiedu, 2002; Cheng and Kwan, 2000; Coughlin and Segev, 2000). Similarly, for Kinda (2010), problems with physical infrastructures (included telecommunications restrictions) discourage FDI in developing countries.

However, the incentives for the location of foreign affiliates come not only from physical or hard infrastructures, but also from the so-called soft infrastructures. Hard infrastructures include roads, motorways, information and communication technologies (ICT), etc., while soft infrastructures are those related to a transparent legal system, stable institutions, domestic regulations, and so forth.[10] In this line, Busse and Hefeker (2007), Globerman and Shapiro (2002), Javorcik and Wei (2009), Kinoshita and Campos (2003), Kang and Jiang (2012) and Mina (2012) have confirmed the negative influence of corruption on the location of FDI in developing countries.[11]

3.- DATA AND THE ECONOMETRIC MODEL

a. Data and variables

In this paper we use data from the Investment Map database.[12] This database provides firm-level data about foreign affiliates of multinational firms and the location of their facilities. More specifically, our empirical analysis uses information on the location choice of 4,177 foreign affiliates of 826 Spanish parent companies located in 52

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[10] See Portugal-Perez and Wilson (2010) for a definition of hard and soft infrastructures.
[11] However, other authors, such as Barassi and Zhou (2012), show a positive impact of corruption on FDI, thus providing support to the existence of the "helping-hand" role of corruption.
[12] International Trade Center (UNCTAD and WTO), 2011.

developing and transition countries from 1990 to 2010.[13] Figure 1 shows the geographical distribution of these affiliates.[14]

Figure 1. Distribution of Spanish foreign affiliates in developing and transition countries, 1990-2010.
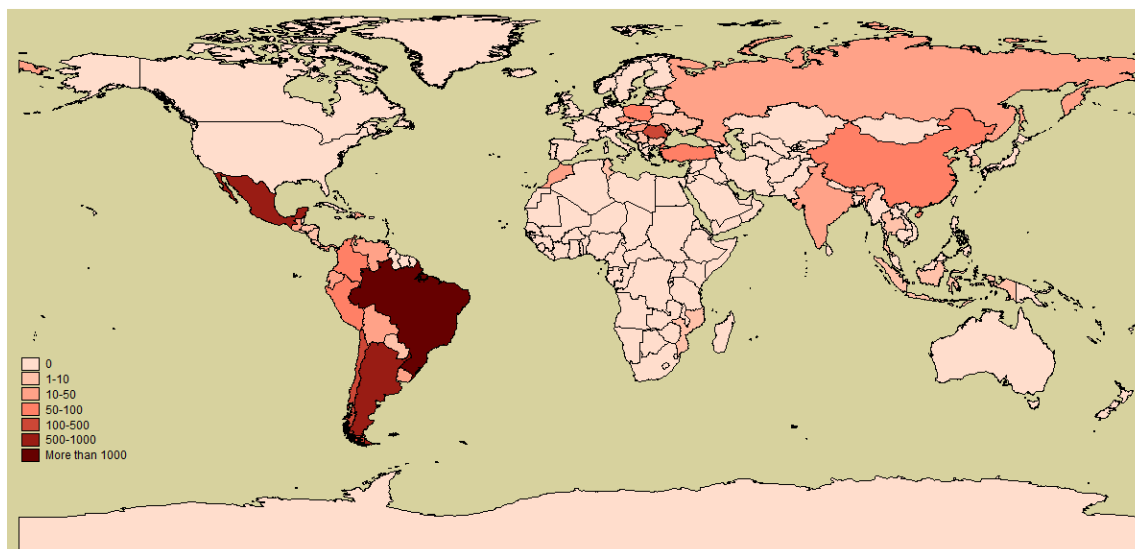
Source: Own elaboration based on Investment Map database (ITC, 2011).

We observe that Latin America attracts a large percentage of offshore Spanish multinationals (Figure 1), the most attractive destinations being Brazil, Mexico and Argentina. Additionally, we appreciate that size matters as a location determinant. Thus, large economies attract quite a significant number of Spanish affiliates, which is consistent with the predictions of the NEG theory. In Central and Eastern European countries, they are mainly located in Romania, Poland and Turkey. For Asia and Africa we find that most of the affiliates in each of these regions are concentrated in only one country, namely China, in the case of Asia, and Morocco, in the case of Africa.

Consistent with previous literature, in the empirical analysis, as factors that may encourage or deter the location of MNEs, we have considered country characteristics related to the size and quality of the host and surrounding markets, including agglomeration forces, geographical proximity, labour market features and the local

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[13] Note, however, that although we have a period of 20 years, the year the different affiliates were established is unknown. Therefore, our dataset has a cross-sectional rather than a panel data structure.

[14] In Figure A.1 in the Appendix, we further show the exact number of Spanish foreign affiliates (and their percentages) across countries.

business environment. Table 1 below shows all the explanatory variables (their definitions, sources and their expected signs).

Table 1. Definitions of the explanatory variables and their sources.

Variable	Definition	Source	Expected sign
Spanish agglomeration	Natural logarithm of Hoover's location index for Spanish firms in the host country *j* over the period 1990-2010.	Own elaboration based on the Investment Map database (International Trade Center, 2011). http://investmentmap.org	+/-
Foreign agglomeration	Natural logarithm of Hoover's location index for foreign firms in the host country *j* over the period 1990-2010.	Own elaboration based on the Investment Map database (International Trade Center, 2011).	+/-
Market potential	Natural logarithm of GDP of the host country *j* and adds the GDP of all surrounding countries weighted by the Euclidean distance between major cities in the host and surrounding countries (billions).	Own elaboration (the GDP is obtained from the World Development Indicators database, 2012). http://data.worldbank.org/data-catalog/world-development-indicators	+
Distance	Natural logarithm of bilateral distance between the main cities in the home country (thousands of km).	Centre d'Etudes Prospectives et d'Informations Internationales (2012). http://www.cepii.fr/	+/-
GDP per capita	Natural logarithm of GDP per capita in the host country *j* (thousands).	World Development Indicators (World Bank database, 2012).	+/-
Employee compensation	Natural logarithm of compensation of employees, which consists of all payments in cash, and contributions to government social insurance and pension schemes that provide employees with benefits.	World Development Indicators (World Bank database, 2012).	+/-
Non-income HDI (Human Development Index)	Natural logarithm of non-income HDI in the host country *j*. The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, knowledge and the standard of living.	United Nations Development Programme (2011).http://hdr.undp.org/en/statistics/hdi	+
Road density	Natural logarithm of road density (km of road per sq. km of land area) in the host country *j*.	World Development Indicators (World Bank database, 2012).	+
ICT	Natural logarithm of total number of internet users in the host country *j* (per 100 people).	World Development Indicators (World Bank database, 2012).	+
Control of corruption	Captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption. Higher values of this variable represent a higher degree of control of corruption in the host country *j*.	World Governance Indicators (World Bank, 2010).	+
Inflation rate	Natural logarithm of inflation rate in the host country *j*.	World Development Indicators (World Bank database, 2012).	-

Note: Hoover's localization coefficient was computed as follows: $H_h^j = \frac{N_h^j / \sum_h N_h^j}{\sum_j N_h^j / \sum_h \sum_j N_h^j}$, where N_h^j is the number of foreign firms from country *h* in country *j*. If $H_h^j > 1$, then country *j* has a share of foreign firms from country *h* that is higher than that of other countries.

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As mentioned earlier, agglomeration effects have usually been measured in empirical works by the total number of firms in a region or sector (see, for instance, Head et al., 2002, and Disdier and Mayer, 2004). However, according to Pusterla and Resmini (2007), the absolute measure of the total number of foreign affiliates might not be controlling for other relevant effects related with agglomeration patterns. Similarly, Head et al. (2002) showed that the use of an absolute measure of agglomeration may lead to the collection of the same effect as other demand variables. Taking these considerations into account, here we employ Hoover's location index as a relative measure of agglomeration. Moreover, we elaborated this index separately for Spanish-owned and foreign-owned affiliates in order to analyse the sensitivity of the agglomeration spillovers to the nationality of firms (see Table 1 for more details).

Like most of the empirical literature on location choice (see, among others, the work by Chang et al., 2014; Crozet, 2004; and Spies, 2010), the market potential of country j (MKP_j) is calculated here in accordance with Harris (1954) as $GDP_j + \Sigma_{j \neq k}(GDP_k/dist_{jk})$. This expression captures both the size of the host market and its attractiveness as a means to access other nearby markets. We have also included the distance ($dist_{ij}$) between (the capital cities of) the home and the host countries in our model as an explanatory variable.[15] This variable attempts to control for both the transportation costs and the transaction costs that arise from cultural differences and unfamiliarity with the legal framework (Chang et al., 2014; Disdier and Mayer, 2004). In our case, however, the vast distance from Spain to countries that are most likely to have more cultural similarities, as is the case of LA economies, means that this latter situation is not necessarily true.[16]

Moving on to an efficiency-seeking motivation behind the location of MNEs, here we capture the influence of the relative factor abundance by the GDP per capita of the host country. Although much of the empirical literature on this issue uses data on labour costs, the lack of data for many of the countries considered has led us to use GDP per capita instead.[17] Other studies that use GDP per capita as a proxy of labour cost to analyse the

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[15] Given that the information about the cities where the headquarters are located is not available, we cannot capture the effects of firm headquarters, as suggested by an anonymous referee.

[16] We initially included (besides distance) a dummy variable for language (equal to one for Spanish-speaking countries, and zero otherwise). However, this variable was not significant in any regression (results are available upon request).

[17] The Global Wage Report of the International Labour Organization (2008) states that, despite the efforts, "the wage data for developing countries remain incomplete (and) the quality of the data is also an issue", p.10. More specifically, this dataset provides data for labour cost for only 22 of the 52 countries considered

location determinants of FDI include Mayer et al. (2010) and Nefussi and Schwellnus (2010).

Although the measure of GDP per capita is imperfect, there is some evidence of the existence of a high correlation between relative factor endowments and per capita income, especially in the case of developing countries. As Debaere (2003) has found, there is a strong association between GDP per capita and the ratios of capital-labour, skilled-unskilled labour, and capital-unskilled labour, and this association is especially significant for the North-South group of countries considered.

Additionally, and as a robustness check, we have employed the compensation of employees to measure labour cost (see the definition of this variable in Table 1). However, the use of this variable is not free from limitations: by leaving many relevant destination countries (such as Argentina, Mexico and China) out of our analysis, some questions have already been raised as to the representativeness of the sample. Indeed, the lack of information for this variable in these economies reduces our sample by more than 43% of the total number of observations.

The use of GDP per capita to proxy the relative factor cost in the location choice of FDI has also been questioned, since this variable may further capture the greater attractiveness of wealthy countries or a skilled labour force. However, since our analysis also includes other variables from the demand side, such as market potential, here GDP per capita is expected to represent the higher labour costs of the host markets. Moreover, we have also controlled for labour quality. Specifically, we quantify the beneficial impact that a greater availability of skilled labour has on the location decision of multinational firms by including the non-income Human Development Index (HDI), published by UNDP (2011). This is a composite index that combines indicators of educational attainment and life expectancy, and hence a greater value of this index is related with a higher value of skilled labour.

We include two variables to capture for the quality of physical (hard) infrastructures: road density and ICT (proxied by the total numbers of internet users) of the destination countries. The effect of these two determinants on the location choice of multinational

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in our analysis and it has information for 2010 for only 13 of them. Indeed, for many relevant countries (like Chile, Poland and China) there is no data on labour costs in any of the periods considered.

firms is expected to be positive. Besides, to control for macroeconomic determinants, we use a corruption index variable and the inflation rate as proxies for the quality of institutions and macroeconomic stability. Better institutions and a stable economic climate are both assumed to improve the business framework and to thus encourage firms to locate in the country under consideration, especially when this is a developing or transition economy (as is our case). We report some descriptive statistics of the different explanatory variables in Table A.1 in the Appendix.

b. Estimation methodology

In this paper, we estimate the determinants of the location choice for foreign affiliates by Spanish multinational firms by means of a mixed logit model. As in the traditional conditional logit model, here the dependent variable (Y_{ij}) represents the binary response of firms' location decision. In particular, Y_{ij} takes the value of one when the multinational firms choose country j to locate affiliate i and zero for other alternative locations. However, in contrast to the conditional logit model, the MXL allows us to capture any substitution pattern among alternative destinations, thus taking into account the possibility that unobserved factors make some destinations closer substitutes. Hence, by using this novel methodology, we seek to bring the model more into line with reality than most commonly used discrete choice models.

Mixed logit models base on a random utility (profits) maximization (RUM) framework. In this case, each investor selects an alternative location among a set of mutually exclusive locations according to its profit function. Then, we can represent the expected profit of firm i for a location j, π_{ij}, as a linear discrete choice model:

$$\pi_{ij} = \beta_i' X_{ij} + \varepsilon_{ij} \qquad (1)$$

where X_{ij} is a vector of explanatory variables that are observed by firm i and includes host country characteristics that have an impact on the expected profits of the firm; ε_{ij} captures the influence of unobservable factors on a firm's location decision; and β_i is a vector of coefficients.

According to the RUM hypothesis, the firm that knows the value of β and ε for all alternatives will choose the location that will yield it the highest profit. That is, firm j will

choose location i if and only if $\pi_{ij} > \pi_{il} \forall i \neq j (l = 1, \cdots, L)$. Then, the probability of firm j investing in location i can be expressed as:

$$P_{ij} = P(\pi_{ij} > \pi_{il}) \forall i \neq j (l = 1, \cdots, L) \qquad (2)$$

Given the stochastic nature of the profits function – as it depends partly on unobserved factors (the researcher observes the X_s but not β and ε) – we need to make an assumption about the distribution of the unobserved part in order to calculate the probability that a firm will select a particular destination to invest in.

The traditional conditional logit model assumes that the β_s are constant for all firms (thus excluding the possibility of preference variations) and that the error term is independently and identically distributed (IID), with type I extreme value distribution, which imposes the property of independence of irrelevance alternatives, IIA, (McFadden, 1974). According to this property, a change in the characteristics of one location should alter the probability of choosing alternative locations proportionally.[18] However, this fails if certain unobserved characteristics exist that make different locations more competitive with each other. The unobserved attributes may cause correlation in the unobserved part of profits across alternatives, which violates the IID assumption. In this case, the conditional logit estimates would be biased, even when country-specific effects are considered, as shown by Herriges and Kling (1997).[19]

The mixed logit model overcomes these limitations by allowing correlations in unobserved factors.[20] Specifically, by relaxing the IIA assumption, MXL makes it possible to estimate complex substitution patterns that stem from the unobserved similarities and differences among alternative locations, thereby accounting for the possibility that firms perceive some alternatives as being more similar to one another.

The probability of choosing an alternative location in the mixed logit model can be derived under two behavioural specifications: random parameter specification and error components setup. Each of these two derivations provides a particular interpretation of

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[18] The IIA assumes that the ratio of the probability of investing in country A over the probability of investing in country B is independent of the attributes of any other location. See Browstone and Train (1999).

[19] Similarly, although the nested logit model partly relaxes the IID assumption by allowing some correlation between alternatives within the same mutually exclusive groups (nests), it imposes this condition among alternative destinations between groups.

[20] Hensher and Greene (2003) provides a more detailed explanation about mixed logit models.

the MXL model. Under a random parameter specification, the values of β_i represent the preference of the firms (Train, 2002). In this case, the β_i coefficients from Eq. (1) are treated as random parameters instead of fixed parameters (thus encompassing preference heterogeneity among firms). In the error components setup, instead, the unobserved (random) part of the profit function represents substitution patterns over alternatives. Random coefficients and error components specifications are formally equivalent when X_{ij} and Y_{ij} overlap. However, as mentioned above, they provide different interpretations. Given that our goal in this paper is to capture any potential substitution patterns across locations, we focus on estimating the correlations across alternatives through an error components approach.[21]

Accordingly, we specify the profits function as a combination of the IID extreme value error term of the conditional logit, u_{it}, and another distribution (mixing distribution) that induces heteroskedasticity and correlation across alternatives (thus relaxing the IIA assumption). More particularly, the profit from location j is modelled as:

$$\pi_{ij} = \alpha' X_{ij} + \left[\eta_i' Y_{ij} + u_{ij}\right] \tag{3}$$

where Y_{ij} is a vector of observed variables of each location choice, α is a vector of fixed coefficients and η_i is a vector of randomly distributed parameters with density g(.) over all firms.[22] In this model, the variances of the error components capture the magnitude of the correlations and, hence, the different substitution patterns among alternatives. Specifically, a value of this variance other than zero indicates that firms perceive the different regions as closer substitutes for location in terms of the observed attribute.

An advantage of the MXL model is that any element may be included in the random term, which allows us to endogenously identify those factors that make the different countries closer substitutes for the location of foreign affiliates.[23] In fact, contrary to the nested logit

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[21] However, it is important to note that, as mentioned by Train (2002), regardless of the motivation, the mixing distribution is indeed capturing variance and correlations in unobserved factors. In fact we have a mixture of random coefficients and an error component setup.

[22] In this paper, we have assumed that the distribution of g(.), mixing distribution, is normal, with mean *h* and covariance *W*. Alternatively, we could specify g(.) to be discrete (latent class model) or use data segmentation strategies. However, the challenge of these last strategies consists in picking the right number of points (latent classes) on the distribution or segmentation criteria (Hensher and Greene, 2003).

[23] McFadden and Train (2000) demonstrated that MXL can be specified to approximate any discrete choice model derived from random utility maximization (to an arbitrary degree of closeness) with the appropriate choices of *g* and *Y*.

model, which relies on a particular nesting structure, an MXL model enables us to obtain any substitution pattern among alternatives by making the appropriate choice of variables that enter the error components, Y_j.

Specifically, the unconditional probability of choosing destination j in the mixed logit model can be obtained by estimating P_{ij} over all the possible values of η.[24] Thus, a mixed logit probability is a weighted average of the logit formula evaluated at different values of η, with the weights given by the density g(.). With non-zero error components, profits are thus correlated over alternative locations.

$$P_{ij} = \int_{\eta} \frac{e^{\alpha' X_{ij} + \eta_i' Y_{ij}}}{\sum_{l=1}^{L} e^{\alpha' X_{ij} + \eta' Y_{ij}}} g(\eta \vee h, W) d\eta \tag{4}$$

This equation, however, has no closed-form solution, and therefore it must be solved through simulation.[25] In this work, we have specified different mixed logit models to endogenously determine what leads Spanish firms to view locations as being more similar in the competition to attract foreign investors.[26]

4.- MAIN RESULTS

Table 2 below presents the outcomes for the estimation of the MXL models. In this table, the endogenous variable represents the binary response of firm's location decision. We show both the estimate coefficients and the standard deviation of the error term for the different variables (bottom part of the table), this latter capturing the potential correlation across alternatives in terms of the different local factors.

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[24] The standard logit model is in fact a special case of the mixed logit when g(.) is degenerated at fixed parameters, thus implying no correlation in profits across alternatives. It is also possible to gain a nested logit model from the MXL specification by defining Y_{ij} as a vector of dummy variables, which are equal to one when the alternative j is in nest k and zero otherwise (see Brownstone and Train, 1998).

[25] The results reported in this work are from 1000 random draws.

[26] In this work, we implemented mixed logit estimation by a STATA package developed by Hole (2007).

Table 2. Mixed logit estimations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Spanish Agglo.	5.062 (0.899)***	4.001 (0.599)***	3.320 (0.718)***	4.287 (0.830)***	4.388 (0.662)***	4.427 (0.928)***	4.086 (0.619)***	2.631 (0.669)***
Foreign Agglo.	69.462 (14.173)***	54.266 (11.194)***	41.813 (11.037)***	54.460 (13.241)***	57.532 (12.270)***	59.375 (14.982)***	52.204 (11.230)***	32.843 (10.484)***
Market potential	1.306 (0.035)***	1.341 (0.045)***	1.358 (0.040)***	1.295 (0.040)***	1.401 (0.054)***	1.157 (0.046)***	1.403 (0.053)***	1.304 (0.047)***
Distance	-0.001 (0.063)	-0.042 (0.058)	-1.181 (0.160)***	0.118 (0.081)	-0.075 (0.063)	0.226 (0.062)***	-0.063 (0.066)	-0.641 (0.156)***
GDP per capita	-0.018 (0.077)		-0.377 (0.097)***	-0.317 (0.081)***		-0.304 (0.081)***		-0.693 (0.108)***
Employee Comp.		-0.121 (0.011)***			-0.115 (0.013)***		-0.111 (0.014)***	
Non-income HDI	3.712 (0.569)***	4.019 (0.361)***	3.979 (0.588)***	3.134 (0.526)***	4.888 (0.525)***	2.780 (0.515)***	4.795 (0.524)***	3.100 (0.601)***
Hard Infra.								
Road density				0.091 (0.032)***	.0127 (0.030)***	0.083 (0.032)***	0.126 (0.032)***	0.143 (0.032)***
ICT				0.461 (0.100)***	-0.200 (0.086)*	0.416 (0.099)***	-0.198 (0.093)*	0.122 (0.064)*
Soft Infra.								
Contr. Corrupt.				0.425 (0.071)***	-0.081 (0.113)	0.258 (0.085)***	-0.099 (0.116)	0.635 (0.097)***
Inflation rate						-0.416 (0.074)***	-0.044 (0.089)	-0.093 (0.094)
Asia			1.605 (0.343)***					0.021 (0.434)
CEE			1.669 (0.353)***					0.832 (0.340)***
Latin America			3.740 (0.410)***					2.454 (0.498)***
Std. Dev.								
Spanish Agglo.	1.740 (0.462)***	1.602 (0.325)***	1.396 (0.377)***	1.358 (0.453)***	1.838 (0.355)***	1.388 (0.496)***	1.685 (0.344)***	1.031 (0.357)***
Foreign Agglo.	47.938 (7.314)***	0.037 (3.655)	34.683 (5.619)***	40.521 (6.868)***	0.759 (3.956)	44.115 (7.887)***	0.332 (3.637)	33.574 (5.480)***
Market potential	0.560 (0.034)***	0.496 (0.057)***	0.514 (0.045)***	0.518 (0.037)***	0.497 (0.063)***	0.399 (0.051)***	0.507 (0.058)***	0.475 (0.042)***
Distance	0.213 (0.134)	0.092 (0.150)	0.238 (0.308)	0.219 (0.201)	0.079 (0.146)	0.101 (0.120)	0.105 (0.468)	0.141 (0.405)
GDP per capita	0.076 (0.088)		0.130 (0.110)	0.043 (0.088)		0.044 (0.092)		0.055 (0.073)
Employee Comp.		0.002 (0.006)			0.001 (0.008)		0.003 (0.007)	
Non-income HDI	2.711 (0.382)***	4.019 (0.361)***	4.620 (0.425)***	1.836 (0.900)**	3.306 (0.425)	1.893 (0.728)***	3.220 (0.539)***	2.541 (0.782)***
Hard Infra.								
Road density				0.004 (0.028)	0.007 (0.014)	0.004 (0.029)	0.001 (0.014)	0.007 (0.016)
ICT				0.557 (0.194)***	0.021 (0.071)	0.463 (0.215)**	0.154 (0.104)	0.029 (0.068)
Soft Infra.								
Contr. Corrupt.				0.086 (0.152)	0.131 (0.199)	0.177 (0.268)	0.020 (0.207)	0.412 (0.201)
Inflation rate						0.041 (0.043)	0.008 (0.048)	0.075 (0.081)
Asia			0.131 (0.208)					0.225 (0.263)
CEE			0.890 (0.762)					0.051 (0.332)
Latin America			0.454 (0.862)					0.453 (0.926)

Log-likelihood	-10020.51	-4950.77	-9906.11	-9924.51	-4938.84	-9910.43	-4940.87	-9807.23
Number of obs.	217204	100548	217204	217204	100548	217204	100548	217204

Note: ***, ** and * denote significance levels at the 1%, 5% and 10%, respectively. Robust standard errors are in parentheses.

In this table, we first estimate the probability of a multinational firm locating in a country by considering both the NEG model factors and other traditional determinants of foreign firms' location, such as distance, labour cost and human capital. We present the results for two alternative measures of labour cost: GDP per capita and employee compensation. In the first case, we also estimate the different regional effects for Asia, Latin America, and Central and Eastern Europe. However, the drastic reduction in the number of observations required to introduce the employee compensation variable (not available for many countries in the sample) prevents us from estimating these effects in the latter case. Second, we have further considered the role that hard and soft infrastructures and macroeconomic stability play in this choice.

The main results of interest in Table 2 are the estimated parameters related to agglomeration forces, market potential, and cost and skills of the labour force. The table shows that the estimates confirm the systematic relevance of the variables identified by NEG models.[27] The coefficients on the concentration of foreign-owned firms and Spanish-owned firms are both positive and significant in every regression. These results reveal that, for Spanish multinational firms, the positive spillovers from the agglomeration of firms more than offset the negative impact of increased competition. However, contrary to the results obtained by Crozet et al. (2004) for French firms, in the case of Spanish firms, the spillovers arising from a clustering of foreign-owned firms are greater than those coming from clusters of Spanish-owned firms. This suggests that, for Spanish investors, on average, the existence of a large number of Spanish firms in a given country is viewed not only as a signal of the profitability of a certain location but also as an indicator of stronger competition. This centrifugal force derived from the increased competition due to the clustering of firms seems, however, to be lower in the case of foreign-owned affiliates.

Our results also reveal that affiliates of Spanish multinational firms concentrate in countries with higher market potential, which is in agreement with a location choice driven by market access motivation. The coefficient on this variable is positive and strongly significant in all regressions. Similar results are obtained when, as a robustness

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[27] In these regressions, the sign of the parameters can be interpreted as the direction of the influence of the variable. That is, if a coefficient (β_j) is greater than zero, we can say that the probability of choosing a destination is an increasing function of the associated variable (X_j). However, the absolute value of the parameters is meaningless, as the marginal effect of X_j depends on X_j.

analysis, we estimate the model for Latin America and the CEE separately (Table A.2 in the Appendix shows these regressions).[28] Furthermore, we observe that after controlling for the potential regional effects, the influence of distance on the location of Spanish firms in foreign markets becomes negative and significant.[29] These findings allow us to highlight the significant presence of horizontal FDI or market-seeking motivation in the offshore activity of Spanish multinationals.

Additionally, and consistent with an efficiency-seeking FDI, the estimates show that a negative impact of labour cost on the probability of locating a foreign affiliate remains across regressions. Both GDP per capita and employee compensation present a negative and significant coefficient in all cases. This confirms the harmful influence of higher labour costs in the attraction of investment flows, as shown in previous works (see, for instance, Mayer et al., 2010, and Nefussi and Schwellnus, 2010).[30]

Concerning the impact of human capital on the location choice of multinational firms, we find that the coefficient on the non-income HDI is positive and strongly significant in all cases. Therefore, as expected, we can say that skills exert a beneficial influence on the probability of developing and transition economies being attractive to Spanish firms. Gauselmann and Marek (2012) obtained a similar result for the location of multinational firms in post-transition regions.

Our results also confirm the importance of taking into consideration the role played by infrastructures and the macroeconomic background. Regardless of the measurement, the availability of physical infrastructures appears to be an important factor in explaining the location of multinational firms, as derived from the estimates in Columns 4, 6 and 8 (when all destination countries under analysis are included). A similar conclusion is highlighted in the works by Coughlin and Segev (2000), Chan et al. (2014), and Chen and Kwan (2000). Likewise, the institutional framework seems to exert an important influence on the location choice. In line with Busse and Hefeker (2007), Diez et al. (2016), Globerman

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[28] Given that most of the Spanish affiliates in Asia and Africa are concentrated in one single country (China and Morocco, respectively), it is not possible to estimate the model for these areas separately.

[29] Conversely, if we divide the sample by regions (as in Table A.2 in the Appendix), distance seems to have a positive influence on the location of FDI. This is probably because when we focus on destination countries within the same region, physical distance is more closely related with cultural distance than when we consider destination countries between different regions.

[30] The lower variability shown by per capita GDP among the countries within the different regions would justify their lack of significance when we estimate the model separately for LA and CEE, as shown in Table A.2 in the Appendix.

and Shapiro (2002) and Mina (2012), among others, the estimated coefficients on the control of corruption variable for the whole sample indicate that the probability of a Spanish multinational firm choosing a certain location increases with the quality of the institutions. These outcomes, however, do not hold when we reduce the sample to include the employee compensation variable. Nonetheless, although this is probably a better measure of labour cost, the drastic reduction of the sample, in general, and the elimination of important destination countries for the Spanish MNEs, in particular, lead us to be cautious when interpreting the results from these regressions.

As expected, macroeconomic instability seems to deter Spanish investments in developing and transition economies, although this result is not very robust. The coefficient on inflation rate is only significant when we include all the countries and we consider the regional effects.

We also found the expected regional effects on the location decision of MNEs (see Columns 3 and 8). According to our estimates, Spanish multinational firms have a greater propensity to invest in Latin America and in Central and Eastern Europe than in Asia or Africa, regardless of the observed attributes. In the first case, as mentioned previously, this can be explained by the cultural ties between Spain and LA and hence by the greater access of Spanish firms to these countries.

Finally, the estimation of standard deviations of the error terms in the MXL models corroborates the existence of complex substitution patterns among alternative locations (as shown at the bottom of Table 2). Particularly, the statistical significance of these variables reflects the idea that Spanish multinational firms find closer substitutes, in terms of location choice, in those countries that share similar market potential, agglomeration forces, human capital and ITC. However, distance, road density and macroeconomic stability do not seem to be relevant characteristics in the substitution pattern for Spanish foreign investments.

5. CONCLUSIONS

In recent decades, Spanish FDI in developing and transition economies has increased considerably. Taking this fact into account and bearing in mind that the reasons driving investments in these economies may differ from those in developed countries, in this work we analyse what factors drive the offshore localization of Spanish MNEs in developing

and transition economies. A better understanding of the role played by these factors can indeed guide policies of recipient economies aimed at improving their potential for attracting foreign investment inflows. To study this phenomenon empirically, and given the availability of firm-level data, we use a mixed logit model, which makes it possible to consider complex patterns of substitution among alternative destinations.

Our results show that, in line with the NEG hypotheses, both agglomeration economies and market potential play an important role in the location decision of Spanish foreign investment in developing and transition economies. However, different magnitudes of the agglomeration economies are obtained for the clustering of foreign-owned firms and Spanish-owned firms, the latter showing a lower effect. This suggests that, in spite of the positive effect that an increased number of foreign firms located in a host country can have on the location decision, the deterrence effect associated with more competition is greater for Spanish firms than for firms from other countries.

In addition to geographic factors, we find that the business framework also matters for the location choices of Spanish multinationals. Thus, aspects related to the business environment, including the cost and quality of labour, the availability of physical infrastructures, the institutional background or macroeconomic stability, are also relevant. These factors are obviously of special relevance in policy-making, as they can be affected by the national government. In this regard, our findings reinforce the idea that in developing and transition countries a set of policies that broadly benefit the local business conditions will promote the location of multinational firms and hence the effects derived from higher foreign investment.

Our estimates further reveal the positive influence of cultural similarities and lower sunk costs on the location of Spanish multinational firms, as shown by their greater propensity to invest in LA and CEE countries. Finally, the results confirm the advisability of using a mixed logit model. We find that some degree of correlation in the unobserved part of the profits from investing in different countries does exist. This gives rise to substitution patterns among different locations as a result of the combination of diverse attributes such as market potential, skilled labour, agglomeration economies, and information and communication technology.

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