Has the crisis affected Spanish investment strategy abroad? A spatial panel data approach

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1 | INTRODUCTION

Over the last few decades, foreign direct investment (FDI) has registered growth rates well above those of global output and trade, fostering economic growth and development in recipient countries and, gradually, changing the landscape of the global economy. No wonder, then, that this rapid increase in FDI has deepened the interest in the study of the determinants and strategies of multinational enterprises’ (MNEs) investments abroad.¹

Indeed, one of the most important decisions made by MNEs when undertaking a foreign investment is the choice of their FDI strategy. Regarding this issue and based on models developed within a two-country framework—that is to say, assuming independence of FDI flows across host countries—horizontal (market-seeking) and vertical (efficiency-seeking) have been the strategies traditionally set up by the FDI literature. However, recent theoretical contributions have incorporated the influence of third-country effects into models dealing with the analysis of FDI determinants, adding to the traditional horizontal and vertical FDI strategies other somewhat more complex strategies: the export-platform, which can be considered a variation of the horizontal FDI, and the complex-vertical as a variation of the vertical one (Baltagi, Egger, & Pfaffermayr, 2007).

But, why the need for third-country effects? This is due to the fact that, from a theoretical point of view, there are many reasons to suspect spatial dependence in FDI data. For instance, the “new economic geography” literature (see e.g., Fujita, Krugman, & Venables, 1999; Krugman, 1991) indicates that agglomeration effects must be considered in the FDI attraction process since FDI in a country is expected to depend not only on its own characteristics but also on those of its neighbours.² Additionally, it must be reminded that the increasing participation in global value chains by different countries relies on the fragmentation of production around the globe, which heightens

¹For a review on this issue, see Assunção, Forte, and Teixeira (2013), Blonigen (2005), Faeth (2009) or Blonigen and Piger (2014).
²Several studies have shown the importance of agglomeration effects in FDI decisions (Baldwin & Okubo, 2006; Brakman, Garretsen, & van Marrewijk, 2009; Egger, Gruber, Larch, & Pfaffermayr, 2007; Ekholm & Forslid, 2001; Gao, 1999; Hoffmann & Markusen, 2008 and Raybaudi-Massilia, 2000).
the interdependence between firms and supply chain partners located in different countries (Gereffi, Humphrey, & Sturgeon, 2005). As if these reasons were not enough to take into account the role of spatial dependence in FDI analysis, we can add another one coming from a methodological perspective: the parameter estimates and statistical inferences of most literature on FDI, which excludes third-country effects or spatial linkages, are questionable since this omission can lead to serious econometric problems in the estimation, such as biased, inconsistent or inefficient estimates, as well as inaccurate inferences (Anselin, 1988).

From an empirical perspective, however, the existence of spatial dependence has been only recently recognised in papers dealing with FDI determinants and MNEs’ choice of FDI strategy (see, e.g., the pioneers Baltagi et al., 2007; Blonigen, Davies, Waddell, & Naughton, 2007). There is, in any case, need for further developments for at least two reasons. On the one hand, because the most popular method to tackle spatial dependence is based on spatial autoregressive models (SAR), which present an important limitation: they circumscribe spatial dependence to FDI but not to its determinants. On the other hand, because the majority of previous studies use the so-called point estimates for inferences and interpretation of the parameters of the spatial regression model, which, according to LeSage and Pace (2009), may give rise to wrong results. Instead, partial derivatives of the dependent variable concerning each independent variable should be employed.

We delve into these two aforementioned issues further in this work, for which we analyse Spanish direct investment abroad. This is an interesting case study not only because Spain has become a significant player in the world economy but also due to changes occurred during the recent economic crisis. Thanks to its integration into the European Union in 1986, Spanish FDI outflows registered notable increases since the second half of the nineties (Campa & Guillén, 1996; Gordo, Martín, & Tello, 2008; Maté Rubio, 1996). The outbreak of the economic crisis was, however, a turning point: from them on, and even though the lack of domestic demand forced Spanish firms to expand their business abroad (Eppinger, Meythaler, Sindlinger, & Smolka, 2018), FDI outflows plummeted. Furthermore, the crisis pushed Spanish firms to be more selective in their international endeavours (Gil-Pareja, Vivero, & Paniagua, 2013). This, naturally, adds interest to our case study, as it allows us to infer whether changes in the economic cycle affected the FDI strategy.

Bearing all these considerations in mind, the main aim of this paper is to examine whether Spanish FDI determinants and, especially, the FDI strategy depend on the business cycle. More specifically, the main purpose is to analyse the impact of the Great Recession on the Spanish investment strategy abroad. For this reason, the sample period under investigation (going from 1996 to 2014) combines a subperiod of economic expansion (which we call “pre-crisis” [1996–2007]) with the aftermath of the economic downturn (what we call “crisis” [2008–14]). To accomplish this aim, the paper uses a novel methodological approach. It contributes to the literature by estimating a panel spatial Durbin model (SDM), which considers spillovers arising not only from FDI but also from its potential determinants in neighbouring host countries. Moreover, it computes the own and cross-partial derivatives and reports scalar summary measures of the direct and indirect effects of the impact of a change in each of the

3Spanish MNEs took advantage of Europe’s external openness to trade and investment, derived from the implementation of the European Monetary Union and the ongoing process of globalisation. They started to internationalise and take advantage of the growth potential of certain markets and sectors. Consequently, outward FDI flows surpassed inward FDI flows, Spain becoming a net FDI exporter.
FDI determinants, which is much more accurate than the typical point estimates (LeSage & Pace, 2009).

Although it is beyond the scope of this paper we also try, being aware that MNEs face a concurrent decision-making process, to establish a link (tentatively and in need of further research we have to admit) between the FDI strategies and two additional MNEs’ decisions posited by the literature on FDI entry mode research: the investment mode on one side, and on the other the ownership mode. In so doing, we have to keep in mind that under a horizontal FDI strategy (either pure or its export-platform variation), the MNE tends to locate the production in the destination country to save on the transport costs associated with exporting to a targeted market; the MNE will set up foreign facilities that mirror those in the home country. In contrast, under a vertical FDI strategy (either pure or its complex-vertical variation), the MNE tends to fragment the production process across different countries to exploit comparative advantages (Markusen & Maskus, 2002). Accordingly, it seems plausible to believe that a horizontal FDI strategy implies, by and large, a higher level of integration within the host country than a vertical one. Whereas in the case of horizontal FDI, MNEs tend to be somewhat embedded in the host country by creating a local network with local firms, when vertical FDI is prevalent MNEs are less likely to do so (Chen, Chen, & Ku, 2004).

As said, another important decision when it comes to investing abroad has to do with the investment mode. Here, the MNE chooses between cross-border merger and acquisition (M&A) or greenfield investment. As Davies, Desbordes, and Ray (2015) state, M&A investment implies the acquisition of a local firm by a foreign MNE, so it involves a transfer of ownership arising from a desire to integrate, while in the case of greenfield investment the MNE builds new operational facilities from the ground up. Therefore, a priori, it seems more likely that M&A is the main investment mode when the predominant FDI strategy is horizontal (pure or export-platform), whereas greenfield investment is likely to prevail when a vertical (pure or complex-vertical) FDI strategy is widespread.

There must also be a connexion between strategies and the ownership mode. Regarding this point, the MNE has to choose between wholly owned subsidiaries or joint ventures. A wholly owned subsidiary arises when a firm entirely owns the facility in the foreign country, whereas joint ventures are characterised by sharing ownership, returns and risks with local partners. Consequently, it seems the level of integration in the host country is higher for joint ventures than for wholly owned subsidiaries. Additionally, as Lankes and Venables (1996) indicated, the literature suggests that joint ventures are preferred when MNEs need information about the local market, while wholly owned subsidiaries are established when the MNE wants to control some aspects of the production process. Putting two and two together, we might conclude that joint ventures are likely the prevalent ownership mode under a horizontal FDI strategy while under a vertical FDI strategy wholly owned subsidiaries seem to be more likely. The results obtained by some studies (see e.g., Duanmu, 2011) support it.

The remainder of the paper is structured as follows. Section 2 provides a brief overview of the spatial FDI literature. Section 3 outlines the pattern of the geographical and sectoral distribution of Spanish FDI. Section 4 specifies the model and describes data used for the empirical analysis. Section 5 estimates the model and presents the results. Section 6 conducts a robustness check by employing sectoral FDI data and alternative specifications of the distance matrix. Finally, Section 7 offers the main conclusions and some policy implications.

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4This fragmentation of the value chain, when different functions are located in different countries, is coined in the management literature as “global value chain” (Hernández & Pedersen, 2017).
2 | FDI DETERMINANTS: A LITERATURE REVIEW OF SPATIAL MODELS

In this section, we briefly review the empirical literature on FDI determinants at the country level that takes into account spatial dependence (see Table 1 for a short reference focused on the treatment of spatial effects).\(^5\) Two different approaches to model FDI spillovers and determine the predominant FDI strategy can be distinguished.\(^6\) The less common one implies the inclusion in the model of spatial lags of the factors driving FDI to consider not only the impact of the host country characteristics on FDI but also those of its neighbours. This strategy is followed by Baltagi et al. (2007), who include spatially weighted explanatory variables (as well as spatial interactions in the error term) to examine the determinants of US outward FDI to 51 countries over the period 1989–99; their findings show the importance of third-country effects. Similarly, Hall and Petroulas (2008) confirm the existence of spatial dependence in the determinants of FDI for 476 country-pairs during the period 1994–2004. Likewise, Uttama and Peridy (2009) analyse US outward FDI to the main ASEAN countries over the period 1995–2007 and find that third-country determinants are relevant to explain FDI.

The other approach, followed by most empirical studies, consists of including the spatial lag of FDI to take account of spatial linkages in FDI across neighbouring countries. That is the case of Blonigen et al. (2007). This paper, by estimating a gravity model extended to include the spatial lag of FDI—and a weighted average of the market potential of neighbouring host countries—analyses US outward FDI to 35 host countries for the period 1983–98. As we will see below, it develops a theoretical framework distinguishing different FDI strategies. As for the results, no matter the subsamples used, the paper points to significant spatial interactions. On the other hand, Garretsen and Peeters (2009), analysing Dutch outward FDI into 18 OECD host countries between 1984 and 2004, and Poelhekke and Van der Ploeg (2009), using US affiliates’ sales in 76 foreign countries during the period 1984–98, conclude that third-country effects matter, although in this case they point to agglomeration in FDI. In the same vein, Martínez-Martín (2011) finds evidence of positive spatial linkages for Spanish outward FDI over the period 1993–2004, and so do Nwaogu and Ryan (2014) for US FDI into Africa, Latin America and the Caribbean over the period 1995–2007. On the contrary, Regelink and Elhorst (2015), by computing direct and indirect effects of FDI determinants, offer evidence of the existence of competition among European countries when attracting US FDI from 1999 to 2008. Alamá-Sabater, Heid, Jiménez-Fernández, and Márquez-Ramos (2016b), focusing on bilateral FDI between the 27 EU member countries in 2007, also find positive spatial dependence across neighbouring FDI host countries. More recently, Siddiqui and Iqbal (2018), employing partial derivatives in line with Regelink and Elhorst (2015), investigate US FDI in the MENA countries over the period 2002–14. These authors find no effect of the spatially lagged FDI (nor of the surrounding-market potential).

\(^5\) Relevant papers on the choice of FDI locations have adopted a spatial analysis at the regional level (Blanc-Brude, Cookson, Piesse, & Strange, 2014; Casi & Resmini, 2014; Coughlin & Segev, 2000; Kayam, Yabrukov, & Hisarcikllar, 2013; Ledyaeva, 2009; Sharma, Wang, & Sunny Wong, 2014; Villaverde & Maza, 2015).

\(^6\) There is a third, recent and less investigated approach. It incorporates interdependencies across origin and destination countries in the analysis of FDI determinants. Alamá-Sabater, Heid, Jiménez-Fernández, and Márquez-Ramos (2016a) and Leibrecht and Riedl (2014) include the possibility that FDI from every origin country to any destination country depends on the volume of FDI flowing from an origin country’s neighbours to the same destination country, and the volume of FDI flowing from the same origin country to a particular destination country’s neighbours. Needless to say, this approach is not applicable to our case study.
This paper, as we will explain in Section 4, merges both approaches. It considers spillovers arising not only from FDI in neighbouring countries but also those derived from their own characteristics. Besides, and as mentioned in the Introduction, we compute the average direct and indirect effects, in line with Regelink and Elhorst (2015) and Siddiqui and Iqbal (2018), to boost the reliability of the results.

### Table 1: Papers on foreign direct investment determinants modelling spatial spillovers

| Paper                  | Spatial variables included in the model                                                                 | Point estimates/partial derivative effects |
|------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Baltagi et al. (2007)  | Bilateral size, similarity in size, relative physical capital endowments, relative skilled and unskilled labour endowments, interaction of relative physical capital endowments and bilateral size, interaction of relative endowments and distance | Point estimates                            |
| Hall and Petroulas (2008) | Market potential, similarity index, capital ratio, skill difference, trade costs                         | Point estimates                            |
| Uttama and Peridy (2009) | The variables included in Baltagi et al. (2007), and market potential                                   | Point estimates                            |
| Blonigen et al. (2007) | FDI, market potential                                                                                   | Point estimates                            |
| Garretsen and Peeters (2009) | FDI, market potential                                                                                | Point estimates                            |
| Poelhekke and Van der Ploeg (2009) | FDI, market potential, investment potential                                                           | Point estimates                            |
| Martínez-Martín (2011) | FDI, market potential                                                                                   | Point estimates                            |
| Nwaogu and Ryan (2014) | FDI, market potential                                                                                   | Point estimates                            |
| Regelink and Elhorst (2015) | FDI, market potential                                                                                | Point estimates and partial derivative effects |
| Alamá-Sabater et al. (2016b) | FDI                                                                                                    | Point estimates                            |
| Siddiqui and Iqbal (2018) | FDI, market potential, infrastructure, governance                                                        | Point estimates and partial derivative effects |

*Source: Own elaboration.*

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### 3 | DISTRIBUTION OF SPANISH OUTWARD DIRECT INVESTMENT

This section gives an insight into the geographical and sectoral distribution of Spanish direct investment outflows during the period under study (1996–2014), for which data are extracted from the Spanish Foreign Investment Registry (DataInvex).

First of all, Figure 1 displays the evolution of Spanish direct investment outflows. From its consideration, two main results emerge: first, that the series is very volatile and, second, that the financial crisis has severely affected the volume of Spanish direct investment abroad.

With regard to the geographical distribution, Table 2 shows how Spanish direct investment outflows evolved between 1996 and 2014. On average, it can be appreciated that more than half (51.5%) of them went to Europe, 45% to America (35.5% to Latin America) and the remaining 3.5% to Asia, Africa and Oceania (grouped into “others”). Apart from this, four main
characteristics can be highlighted. First, the golden age of Spanish direct investment in Latin America was in the second half of the 1990s; second, Europe has been the main recipient of Spanish direct investment during most of the first decade of the new century; third, the United States is consistently the main recipient of the Spanish direct investment in North America; and fourth, it seems that with the economic and financial crisis, the percentage of FDI going to North America increased, on average, by 6% points and the percentage of FDI going to Asia, Africa and Oceania increased, on average, by 2.2% points to the detriment of that going to Latin America.

Figure 2 provides additional insights into the FDI geographical distribution, both for the pre-crisis (a) and crisis (b) periods. During the pre-crisis period, the main European destinations were Portugal, France, United Kingdom, the Netherlands and Germany, while some countries such as Serbia, Macedonia and Montenegro did not receive any FDI from Spain. Regarding North and South America, the top recipient countries were United States, Brazil, Argentina and Mexico. As for the crisis period, the most significant changes occurred in countries such as Ireland, Turkey, Libya, Saudi Arabia, India and China, which gained relevance with respect to the previous time span. Apart from this, an important feature that can be drawn from the figure is that there seems to exist spatial dependence in the distribution of Spanish direct investment abroad. So this is something to be considered later and, once tested, introduced in the model to explain the pattern of outward direct investment from Spain.

As for the sectoral distribution of Spanish direct investment abroad (reported in Table 3), it is important to highlight that industry and services concentrated, on average, 94.7% of the total, the latter being more than twice as much as the former. Besides, in the crisis period, services share increased by 4% points, while industry lost importance. Needless to say that agriculture and construction represented a slight share of the Spanish direct investment abroad over the sample period.

4 | DATA AND MODEL SPECIFICATION

The present section is devoted to studying the determinants of Spanish direct investment abroad. To do so, the sample consists of the top-50 host countries, which received, on average, 96.75% of total Spanish FDI outflows over the period 1996–2014 (see the countries considered in the Appendix). It has to be mentioned that the Chow test confirms, in line with Figure 1, the presence of a
structural break with the outbreak of the crisis, which justifies the splitting of the period into pre-crisis (1996–2007) and crisis (2008–14) subperiods.7

Regarding the specification of the model, we draw on Blonigen et al. (2007) as, apart from identifying FDI determinants, we are also interested in unveiling FDI strategies. In Blonigen et al.’s model, FDI to country i in year t (FDIit) is regressed on a group of traditional host country determinants (Host Determinantsit), the surrounding-market potential (proxied by a weighted average of the GDP of all other countries, ∑jWijGDPjt), and the spatial lag of the direct investment (a weighted average of the investment received by the remaining countries other than i, ∑jWijFDIjt). So, the model is as follows:

$$ FDIit = \beta \text{ Host Determinants}_{it} + \theta \sum_j W_{ij} GDP_{jt} + \rho \sum_j W_{ij} FDI_{jt} + \epsilon_{it}, $$  

where $W_{ij}$ denotes the spatial weight matrix, whose elements reflect the intensity of the interdependence between countries i and j. Then, Blonigen et al.’s model includes the spatial lag of the

7To run this test, we used the FDI models of Equations (2) and (3) presented in this Section. The results, with no exception, confirm the existence of a structural break in 2008.

### Table 2  Destination of Spanish foreign direct investment outflows (%), 1996–2014

| Year  | Europe | Main recipient | North America | Main recipient | Latin America | Main recipient | Others |
|-------|--------|----------------|---------------|----------------|---------------|----------------|--------|
| 1996  | 25.86  | Portugal 10.46 | 10.07         | US 10.04       | 62.80         | Argentina 24.69 | 1.27   |
| 1997  | 28.35  | Netherlands 12.72 | 5.39 | US 5.38       | 65.51         | Argentina 26.80 | 0.74   |
| 1998  | 28.73  | Netherlands 7.04 | 9.13         | US 9.12       | 60.49         | Brazil 32.48   | 1.65   |
| 1999  | 21.05  | Netherlands 7.17 | 2.06         | US 1.32       | 75.61         | Argentina 36.73 | 1.28   |
| 2000  | 32.22  | Portugal 7.02    | 14.94        | US 14.92      | 52.05         | Brazil 28.57   | 0.79   |
| 2001  | 57.47  | Netherlands 27.75 | 6.64 | US 6.57       | 35.23         | Mexico 8.08    | 0.67   |
| 2002  | 59.88  | Germany 26.17    | 7.13         | US 6.36       | 25.05         | Brazil 8.62    | 7.95   |
| 2003  | 55.68  | UK 18.57        | 3.77         | US 3.47       | 31.03         | Chile 9.91     | 9.51   |
| 2004  | 76.28  | UK 37.66        | 4.11         | US 2.69       | 18.85         | Mexico 10.66   | 0.76   |
| 2005  | 73.19  | France 18.78    | 7.51         | US 6.40       | 16.49         | Argentina 6.99 | 2.82   |
| 2006  | 81.54  | UK 51.62        | 10.66        | US 10.54      | 16.49         | Brazil 2.26    | 1.88   |
| 2007  | 78.81  | UK 30.48        | 10.22        | US 10.12      | 8.90          | Mexico 3.96    | 2.08   |
| 2008  | 50.69  | UK 13.59        | 21.89        | US 21.68      | 20.12         | Mexico 9.92    | 7.30   |
| 2009  | 43.05  | UK 15.55        | 28.42        | US 27.21      | 24.69         | Mexico 11.38   | 3.84   |
| 2010  | 64.48  | Netherlands 27.19 | 10.11 | US 9.47     | 18.42         | Mexico 12.89   | 6.99   |
| 2011  | 57.09  | Turkey 14.91    | 10.48        | US 10.17      | 27.80         | Brazil 15.59   | 4.64   |
| 2012  | 48.52  | Netherlands 11.53 | 6.84 | US 4.53     | 41.28         | Chile 14.55    | 3.36   |
| 2013  | 55.13  | Germany 17.13   | 3.78         | US 3.29       | 37.72         | Peru 20.07     | 3.36   |
| 2014  | 37.23  | Ireland 15.92   | 11.71        | US 10.91      | 46.63         | Brazil 14.12   | 4.43   |
| Period average | 51.33 | UK 17.21 | 9.73 | US 9.32 | 35.50 | Brazil 9.48 | 3.44 |
| Pre-crisis average | 51.59 | UK 19.01 | 7.63 | US 7.24 | 38.16 | Brazil 10.06 | 2.62 |
| Crisis average | 50.89 | UK 12.31 | 13.32 | US 13.13 | 30.95 | Brazil 7.90 | 4.85 |

Source: Spanish Foreign Investment Registry (DataInvex).
dependent variable, as the investment decision in a host country may be influenced by the investment going to neighbouring countries; that is, spatial spillovers, derived from direct investment, may arise. The inclusion of the surrounding-market potential is, on the other hand, instrumental in their model since, together with the spatial lag of the dependent variable, allows to determine the investment strategy.

The problem with Blonigen et al.’s model is that there are still spatial interdependencies that are overlooked. It seems likely that the decision to invest in a foreign market may depend on some other characteristics of neighbouring countries, apart from the market potential. For this reason, once the variables acting as host determinants are selected on the basis of existing studies on the determinants of FDI (variables such as population (POP), trade costs (TC), human capital (HC) and regulatory quality (RQ), along with market potential (GDP)), we extend Blonigen et al.’s

**FIGURE 2**  (a) Share of Spanish foreign direct investment (FDI) outflows (average pre-crisis 1996–2007).  
(b) Share of Spanish FDI outflows (average crisis 2008–14)  
*Source: Spanish Foreign Investment Registry (DataInvex)*
Then, our model, namely the resulting SDM, is as follows:

$$
FDI_{it} = \rho \sum_j W_{ij} FDI_{jt} + \beta_1 GDP_{it} + \theta_1 \sum_j W_{ij} GDP_{jt} + \beta_2 POP_{it} + \theta_2 \sum_j W_{ij} POP_{jt} + \beta_3 TC_{it} + \theta_3 \sum_j W_{ij} TC_{jt} + \beta_4 HC_{it} + \theta_4 \sum_j W_{ij} HC_{jt} + \beta_5 RQ_{it} + \theta_5 \sum_j W_{ij} RQ_{jt} + \mu_i + \mu_t + u_{it},
$$

where the spatial weight matrix ($W_{ij}$) is defined here as the (row-normalised) inverse distance matrix and the dependent variable $FDI$ denotes gross outflows of Spanish foreign direct investment (in logs), $i$ refers to the host country, $j$ to the remaining countries and $t$ denotes time. Time fixed effects ($\mu_t$) are included to control for shocks affecting all or most of our set of countries. Besides, country fixed effects ($\mu_i$) are included to account for time-invariant unobserved heterogeneity across countries. In any case, and as the influence of some variables could be absorbed by the inclusion of country fixed effects, we also specify an alternative model by including two potential time-invariant factors affecting FDI: the geographical distance of hosting countries with Spain ($DIST$), and a variable capturing cultural links, which is proxied by the share of a common language ($LANG$). Needless to say, when these two variables are included in the equation, country fixed effects are dropped from the model to avoid perfect multicollinearity. Thus, we also estimate the following SDM:

### TABLE 3 Sectoral distribution of Spanish foreign direct investment outflows (%), 1996–2014

| Year | Agriculture | Industry | Construction | Services |
|------|-------------|----------|--------------|----------|
| 1996 | 0.59        | 23.34    | 2.68         | 73.40    |
| 1997 | 0.97        | 38.13    | 0.96         | 59.95    |
| 1998 | 0.32        | 29.92    | 4.05         | 65.71    |
| 1999 | 0.12        | 62.40    | 0.68         | 36.80    |
| 2000 | 0.13        | 19.28    | 0.54         | 80.05    |
| 2001 | 0.36        | 41.42    | 1.92         | 56.30    |
| 2002 | 0.25        | 31.98    | 4.10         | 63.67    |
| 2003 | 0.14        | 60.14    | 2.23         | 37.49    |
| 2004 | 0.14        | 18.31    | 1.49         | 80.05    |
| 2005 | 0.29        | 23.03    | 16.14        | 60.55    |
| 2006 | 0.22        | 16.10    | 8.19         | 75.49    |
| 2007 | 0.20        | 33.57    | 3.93         | 62.30    |
| 2008 | 0.31        | 38.45    | 5.41         | 55.84    |
| 2009 | 0.30        | 28.93    | 7.49         | 63.28    |
| 2010 | 0.24        | 15.06    | 6.94         | 77.77    |
| 2011 | 0.24        | 21.78    | 7.43         | 70.56    |
| 2012 | 0.27        | 26.83    | 7.73         | 65.17    |
| 2013 | 0.42        | 21.77    | 5.77         | 72.03    |
| 2014 | 0.47        | 27.98    | 7.45         | 64.09    |
| Period average | 0.32  | 30.44   | 5.01         | 64.24    |
| Pre-crisis average | 0.31  | 33.13   | 3.91         | 62.64    |
| Crisis average    | 0.32  | 25.83   | 6.89         | 66.96    |

Source: Spanish Foreign Investment Registry (DataInvex).
\[
F_{DI_{it}} = \rho \sum \omega_{i} F_{DI_{ij}} + \beta_{1} G_{DP_{it}} + \theta_{1} \sum \omega_{i} G_{DP_{ij}} + \beta_{2} P_{OP_{it}} + \theta_{2} \sum \omega_{i} P_{OP_{ij}} + \beta_{3} T_{C_{it}} \\
+ \theta_{3} \sum \omega_{i} T_{C_{ij}} + \beta_{4} H_{C_{it}} + \theta_{4} \sum \omega_{i} H_{C_{ij}} + \beta_{5} R_{Q_{it}} + \theta_{5} \sum \omega_{i} R_{Q_{ij}} + \beta_{6} D_{IST} \\
+ \beta_{7} L_{ANG} + \mu_{t} + u_{it}.
\]

At this point, it is mandatory to make some comments about the variables included in the model, whose metrics and data sources are reported in Table 4. These variables are as follows:

1. GDP_{it} as a proxy for market potential. Income of the host country is usually considered as a determinant for horizontal (market-seeking) FDI; the higher the income level of the host country, the more FDI is expected to go to that country.

2. POP_{it}. Population is included to control for the known tendency for FDI to move towards wealthy countries (Blonigen et al., 2007). Holding GDP constant, an increase in a country’s population reduces its per capita GDP, and so does FDI. Hence, a negative sign is expected.

3. TC_{it}. Trade costs between Spain and potential host countries capture tariffs and other components such as currency barriers, informational costs and bureaucratic red tape. With regard to the expected sign of the coefficient associated to this variable, it all depends on the motivation for investing. In the case of horizontal investment, which serves as a substitute for exports, higher trade costs to the host country would promote it. In contrast, vertical investment is

| Variable                  | Measurement                                      | Data source                                                                 |
|---------------------------|--------------------------------------------------|----------------------------------------------------------------------------|
| Dependent variable        |                                                  |                                                                            |
| FDI_{it}                  | Ln(Gross outflows of Spanish FDI), expressed in thousands of euros of 2010 | Spanish Foreign Investment Registry (DataInvex)                            |
| Independent variables     |                                                  |                                                                            |
| Market potential (GDP_{it})| Ln(GDP), expressed in millions of dollars of 2010 | World Development Indicators (World Bank)                                  |
| Population (POP_{it})     | Ln(Population)                                   | World Development Indicators (World Bank)                                  |
| Trade costs (TC_{it})     | Ln(bilateral trade costs)                        | ESCAP-World Bank Trade Cost Database                                      |
| Human capital (HC_{it})   | Ln(Index based on a Mincerian transformation of the average years of schooling) | Barro and Lee (2013) and Psacharopoulos (1994)                            |
| Regulatory quality (RQ_{it})| Index ranging from −2.5 (weak) to 2.5 (strong governance performance) | Worldwide Governance Indicators (World Bank)                              |
| Distance (DIST)           | Ln(Great circle distance between capital cities), in kilometres | Centre d’Etudes Prospectives et d’Informations Internationales (CEPii)     |
| Cultural proximity (LANG) | Dummy on common language                          | CEPii                                                                      |

Source: Own elaboration.

See Novy (2013) for the computation of this measure of bilateral trade costs. We consider it is a better proxy for trade costs than the one commonly used in the literature (inverse of the degree of trade openness).
considered as a complement to trade and thus increases if the trade costs are reduced. As for
the export-platform investment, it could be discouraged if trade costs are high in the host coun-
try. Finally, in the case of complex-vertical investment, predictions on the expected sign of the
$TC$ coefficient are less clear-cut because they could depend on the stage of the chain of produc-
tion of the host country (Fugazza & Trentini, 2014). Therefore, we do not expect a priori a
specific sign in the relationship between $TC$ and $FDI$.

4. $HC_{it}$. Human capital is proxied by an index based on a Mincerian transformation of the average
years of schooling, interpolated from Barro and Lee’s (2013) 5-yearly data. This indicator esti-
mates the human capital as a function of the average years of schooling $s$:

$$HC_{it} = e^{\theta(s_t)},$$

where $\theta(s)$ are the Mincerian rates of return to education defined by Psacharopoulos (1994).
Barro and Lee (2013) estimates for average years of schooling are more accurate than alterna-
tive measures (Barro & Lee, 2001; Cohen & Soto, 2007) basically due to the use of informa-
tion on educational attainment from consistent census data and the consideration of differences
in mortality rates by educational level. As Barro and Lee (2013, p. 186) indicate “the assump-
tion of uniform mortality can cause a downward bias in the estimation of the total educational
stock.” We use the average years of schooling for the population aged 15 and over. Although
some studies use the schooling over 25 age population, excluding the 15–25 years old might
underrate the amount of human capital (Inklaar & Timmer, 2013). The expected sign of the
human capital variable is, again, indeterminate. A positive sign is consistent with investment
looking for skilled labour force in the destination country. However, if the investment is search-
ing for cheap unskilled labour, a negative sign of the coefficient would be expected.

5. $RQ_{it}$. Regulatory quality, as an essential dimension of the institutional quality, is included to
account for the impact of regulatory risks on direct investment abroad. It captures perceptions
of the ability of governments to formulate and implement sound policies and regulations that
permit and promote private sector development. It is an index ranging from $-2.5$ (weak gover-
nance performance) to 2.5 (strong).9 In general, direct investment tends to go to countries with
good institutions since they guarantee property rights and minimise transaction costs, thus creat-
ing a favourable climate for investment. Accordingly, a positive sign is expected.

6. $DIST$. Distance between countries, which proxy transport costs, has been proved to be a relevant
determinant of bilateral FDI (e.g., Blonigen et al., 2007; Egger & Pfaffermayr, 2004; Hall & Pet-
roulas, 2008). In our analysis, the distance between Spain and potential host countries is computed
as the great circle distance between capital cities. A priori, distance discourages FDI. Therefore, if
distance captures somehow the costs of investing abroad, we expect a negative sign.

7. $LANG$, as a proxy for cultural proximity. We use a dummy variable taking a value of 1 if the
official language of the host country is Spanish, and 0 otherwise. Strong cultural ties between
home and host countries are likely to increase direct investment flows among them, so a posi-
tive sign is predicted.

Regarding the expected signs of the spatial lags of the dependent variables, we focus our atten-
tion on what Blonigen et al.’s paper says when it comes to defining FDI strategies. To be precise,
the paper distinguishes four FDI strategies, depending on the expected signs of the coefficients of

9To see the variables used in the construction of $RQ_{it}$ please refer to the Worldwide Governance Indicators.
the spatial lag of FDI and the surrounding-market potential variable: horizontal, vertical, export-platform and complex-vertical FDI. Table 5 reports the expected signs.

Pure horizontal FDI is driven by market access and seeks to avoid trade costs in the host country. As the purpose of horizontal FDI is selling products in the host country, this type of FDI is not associated with either any spatial relationship between FDI into neighbouring markets or the market potential of other countries.

Export-platform FDI takes place when the MNE invests in a host country with the purpose of using this country as a base to export products to other countries. In this case, the FDI spatial lag is expected to be negative because setting up a plant is costly, so more FDI to a third country \( j \) implies less FDI to country \( i \). However, the surrounding-market potential is expected to have a positive effect on FDI since the larger the surrounding markets to country \( i \), the higher the FDI attraction of this country.

With pure vertical FDI, the MNE seeks the lowest cost destination. Therefore, FDI in a country is expected to be detrimental to FDI in neighbouring countries. Besides, given that the affiliate’s output in the host country is shipped back to the parent country, one would expect a non-significant effect of the surrounding-market potential on the host country’s FDI.

Finally, in the case of complex-vertical FDI, the MNE fragments its production process by seeking out suppliers in different countries. A complementarity relationship among these suppliers is expected; thus, a positive sign for the FDI spatial lag. In addition, if the market potential captures agglomeration effects, one would expect a positive sign in the surrounding-market potential.

### Table 5

| FDI strategies          | Sign of FDI spatial lag (\( \rho \)) | Sign of surrounding-market potential (\( \theta \)) |
|------------------------|-------------------------------------|-----------------------------------------------|
| Pure horizontal        | 0                                   | 0                                             |
| Export-platform        | –                                   | +                                             |
| Pure vertical          | –                                   | 0                                             |
| Complex-vertical        | +                                   | 0/+                                           |

*Note:* 0 denotes non-statistical significance.

*Source:* Blonigen et al. (2007).

5 | **MODEL ESTIMATION AND RESULTS**

Prior to showing the results, there are two econometric issues in need of clarification, the potential presence of spatial dependence and, if so, which model better captures it. Then, we first tested for the presence of spatial dependence in the non-spatial versions of Equations (2) and (3); the Lagrange Multiplier (LM) tests revealed, for both periods, that there is spatial dependence, so a spatial approach is needed. Second, we estimated the two versions of the SDM (Equations 2 and 3) and, to ascertain whether these models could be simplified into SAR models or into Spatial Error Models (SEM), computed the corresponding Likelihood Ratio (LR) tests; the results, reported in Table 6, show that the null hypotheses can be rejected both in the pre-crisis and crisis periods. Consequently, we found support for our initial ideas: the existence of spatial dependence makes traditional models no longer appropriate, and it is necessary to combine spatial interdependencies in FDI with those in its determining factors.
Equations (2) and (3) are then estimated (by maximum likelihood because the inclusion of spatial lags causes OLS results to be inconsistent). First, we focus on the outcomes obtained for the pre-crisis period, which are shown in Table 7. Looking at the point estimates of the non-spatially lagged variables in Equation (2), only regulatory quality seems to be statistically significant. Nevertheless, in Equation (3), the results hint at the relevance of the market potential, trade costs and regulatory quality together with the geographical distance and cultural ties in the decision of Spanish firms to engage in investing abroad. Therefore, country fixed effects seem to be somehow capturing the effect of these variables (except regulatory quality) on FDI. If we focus on the coefficients associated to the spatially lagged variables in Equation (2), the direct investment to a particular host country appears to be influenced by the characteristics of its neighbours: namely population, human capital and FDI. When country fixed effects are replaced by DIST and LANG, surrounding-market potential and trade costs turn out to be statistically significant, while population and human capital in nearby countries lose their significance.

However interesting, the point estimates obtained from Equations (2) and (3) are not accurate measures to capture the effect of each explanatory variable on FDI; thanks to the work of LeSage and Pace (2009), we know that they may lead to erroneous conclusions. Accordingly, point estimates are only a preliminary step to obtain direct and indirect effects of the different variables on FDI. Partial derivatives should be used as they provide a better interpretation of parameters in spatial regressions. This is so because, using the Leontief expansion \((I_n - \rho W)^{-1} = I_n + \rho W + \rho^2 W^2 + \ldots\), feedback effects arise as a result of impacts passing through neighbouring countries and back to the country where the changes originated from; therefore, there are global spillovers. So, we compute the average direct and indirect effect estimates (LeSage & Pace, 2009). The direct effect, defined by averaging the own-diagonal elements of the matrix of effect estimates,\(^\text{10}\) measures the average impact on the FDI received in a specific country caused by one per cent change in an explanatory variable of that country. The indirect or spatial spillover effect, computed by averaging the cumulative sum of the cross-diagonal elements, measures the cumulative average effect of the change in an explanatory variable of neighbouring countries on the FDI received in a particular country.

Table 8 reports direct and indirect effects for the pre-crisis period. There exists a small difference in magnitude between the point estimates associated to the non-spatially lagged variables and the direct effects. It should be highlighted, however, that in the specification with two-way fixed

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\(^{10}\)The matrix of partial derivatives (effect estimates) of the expected value of FDI with respect to the \(k\)th explanatory variable takes the following form: \((I_n - \rho W)^{-1}[\beta_k + W\theta_k]\)
effects (Equation 2), the point estimate of GDP was not statistically significant whereas the direct effect associated to this variable turns out to be significant, which unveils that, as previously mentioned, point estimates would be misleading. In contrast, there are large discrepancies between the point estimates associated to the spatially lagged variables and the corresponding indirect effects, which is in accordance with the literature.

As indicated in the previous section, particular attention should be given to the coefficient of the spatial lag of FDI and the indirect effect associated to GDP (the surrounding-market potential).

| Dependent variable: $FDI_{it}$ | Equation (2) | Equation (3) |
|-------------------------------|-------------|-------------|
| $GDP_{it}$                    | 2.03        | 0.33*       |
|                               | (1.35)      | (0.19)      |
| $POP_{it}$                    | −10.28      | 0.43        |
|                               | (7.34)      | (0.30)      |
| $TC_{it}$                     | 0.97        | −2.74***    |
|                               | (1.00)      | (0.55)      |
| $HC_{it}$                     | 13.82       | 0.53        |
|                               | (3.86)      | (1.20)      |
| $RQ_{it}$                     | 0.95*       | 1.30***     |
|                               | (0.54)      | (0.22)      |
| $\sum_{j} W_{ij} GDP_{jt}$   | 9.10        | 3.59***     |
|                               | (7.75)      | (1.30)      |
| $\sum_{j} W_{ij} POP_{jt}$   | −57.24***   | 0.05        |
|                               | (16.84)     | (1.55)      |
| $\sum_{j} W_{ij} TC_{jt}$    | 1.92        | −17.08***   |
|                               | (7.12)      | (3.66)      |
| $\sum_{j} W_{ij} HC_{jt}$    | 83.61***    | −1.60       |
|                               | (19.78)     | (6.99)      |
| $\sum_{j} W_{ij} RQ_{jt}$    | −0.25       | −3.80       |
|                               | (2.36)      | (3.16)      |
| $\sum_{j} W_{ij} FDI_{jt}$   | 0.30***     | 0.36***     |
|                               | (0.11)      | (0.11)      |
| $DIST$                        |             | −0.55**     |
|                               |             | (0.25)      |
| $LANG$                        |             | 2.41***     |
|                               |             | (0.54)      |
| Time fixed effects            | Yes         | Yes         |
| Country fixed effects         | Yes         | No          |
| Observations                  | 600         | 600         |
| $R$ squared                   | 0.69        | 0.62        |

Notes: Spatial Durbin model. Pre-crisis period (1996–2007).
Standard errors in parentheses: ***significant at 1%; **significant at 5%; *significant at 10%.
Namely, their signs allow us to determine the predominant FDI strategy of Spanish multinational firms. The positive and significant coefficient of the spatial lag of FDI supports geographical clustering of FDI for supply reasons before the crisis; FDI going to a country can be seen as a complement to that going to neighbouring countries, which points to the presence of agglomeration economies in FDI.\textsuperscript{11} Furthermore, the indirect effect associated to GDP results to be positive and statistically significant only in Equation (3); it loses its statistical significance when country fixed effects are included in the model. In any case, regardless of the significance of the indirect effect of GDP, Spanish MNEs seem to follow a complex-vertical FDI strategy. Namely, they set up their vertical chain of production by seeking out suppliers in neighbouring countries. These results are in line with those drawn by Martínez-Martín (2011) for Spanish outward direct investment, but also with those by Garretsen and Peeters (2009) for Dutch outward FDI, and Nwaogu and Ryan (2014) for US outward FDI.

Apart from the identification of the strategy, some additional results are worth mentioning. As expected, the direct effect of GDP always discloses a positive and significant relationship between the market potential of the host country and the investment flows received, which is in agreement with Blonigen et al. (2007), Garretsen and Peeters (2009) and Martínez-Martín (2011). We also find a negative and significant indirect effect for the host population in Equation (2), which is also in line with previous literature. As regards trade costs, when country fixed effects are excluded from the model (Equation 3), there are negative and significant direct effects as well as spillover effects on the attraction of FDI flows. This outcome seems to reveal that any host country would be more prone to receive Spanish direct investment if its trade costs with Spain are low and if it is surrounded by countries with low trade costs. Additionally, the direct effect of human capital is positive and statistically significant, which indicates that Spanish direct investment abroad has sought out skilled labour force in the destination country. As for the level of human capital in

\begin{table}[h]
\centering
\caption{Effect estimates}
\begin{tabular}{|l|cc|cc|}
\hline
Dependent variable: \( FDI_{it} \) & \multicolumn{2}{c|}{Equation (2)} & \multicolumn{2}{c|}{Equation (3)} \\
\cline{2-5}
 & Direct effect & Indirect effect & Direct effect & Indirect effect \\
\hline
\( GDP_{it} \) & 2.23* & 6.59 & 0.24*** & 5.69*** \\
 & (1.35) & (6.36) & (0.08) & (2.03) \\
\( POP_{it} \) & -9.55 & -42.00*** & 0.44 & 0.41 \\
 & (6.82) & (13.10) & (0.33) & (2.56) \\
\( TC_{it} \) & 0.97 & 0.94 & -3.17*** & -29.18*** \\
 & (0.93) & (5.55) & (0.56) & (9.01) \\
\( HC_{it} \) & 12.64*** & 62.04*** & 0.56** & -1.86 \\
 & (3.75) & (14.82) & (0.26) & (11.92) \\
\( RQ_{it} \) & 0.98* & -0.46 & 1.22*** & -5.36 \\
 & (0.56) & (1.85) & (0.23) & (4.12) \\
\hline
\end{tabular}
\end{table}

Notes: Spatial Durbin model. Pre-crisis period (1996–2007).
Equation (2) includes two-way fixed effects and Equation (3), time fixed effects.
Standard errors in parentheses: ***Significant at 1%; **Significant at 5%; *Significant at 10%.

\textsuperscript{11}A discussion on the spillover effects and agglomeration economies arising in FDI can be found in Blomström and Kokko (1998).
neighbouring countries, it only positively influences the attractiveness of the recipient country in Equation (2), when country fixed effects are included. As regards the regulatory quality, it does seem to be a driving force for FDI; consistently with former literature, countries with a favourable environment for investment seem to receive more Spanish investment. There are no spillover effects though. Furthermore, as expected, distance discourages FDI, while cultural ties (sharing a common language) promote it (Barrios & Benito-Ostolaza, 2010).

Turning our attention to the crisis period, Tables 9 and 10 display the results. We focus on direct and indirect effects since, as already noted, point estimates are not accurate. Relevant differences emerge in relation to the previous period. On the one hand, the spatial lag of FDI loses its explanatory power. It seems that Spanish investors no longer agglomerate in host countries; in other words, the decision of Spanish firms to engage in FDI in a specific country is not influenced by the FDI going to other countries. On the other, the surrounding-market potential does not seem to be a factor driving FDI anymore; as can be seen, the indirect effect of GDP is statistically non-significant. These results point to pure horizontal (or market-seeking) FDI. Thus, the strategy of Spanish MNEs changed with the outbreak of the financial crisis: Spanish investors seem to perform horizontal, rather than complex-vertical direct investment.

Concerning the rest of FDI drivers during the crisis, the direct effect linked to the GDP is positive and statistically significant, which provides evidence of Spanish investors looking for a large market in the host country. Notwithstanding, one has to notice that Spanish FDI seeks out a broader market in the host country than before the economic downturn (a 1% increase in the market potential of the host country enhances FDI to that country by 3.45% rather than 2.23%), probably due to the business cycle situation. As regards population, positive and significant spillovers emerge when country fixed effects are included, which tends to convey the idea that if neighbouring countries to any host country gain population, investment towards this country will increase; this reinforces the fact that FDI moves towards wealthy countries. Trade costs do not seem to affect Spanish investment during this period. Considering human capital, the results reveal a non-statistically significant direct effect, which might indicate that FDI during this period goes to low-technological branches. Moreover, there exists a negative and significant indirect effect upon FDI only when country fixed effects are included (Equation 2). Additionally, it seems that Spanish outward FDI is linked, during the recession period, to high regulatory quality in the host country. Finally, the negative (positive) effect of distance (sharing a language) is in line with the evidence found in the previous period.

Overall, our findings seem to indicate that during the pre-crisis period, Spanish firms adopted complex integration strategies to set up their production processes abroad. However, this strategy seems to have changed over the crisis period. Spanish direct investment to any host country in this period is no longer a complement for that to another third country. Spanish markets were severely hit by the 2008 financial crisis and subsequent global recession, which significantly reduced Spanish firms’ business opportunities. This, together with the fall in the Spanish internal demand, forced Spanish MNEs to search for foreign markets and engage in market-seeking (horizontal) FDI.

6 | ROBUSTNESS CHECK

In this section, we provide a robustness analysis. First, we run regressions for Spanish direct investment abroad just for the industry and service sectors, as they concentrate the bulk of FDI flows, to check whether the results using aggregate FDI are maintained. Second, we change the
specification of the spatial weight matrix. As, according to the $R^2$ squared, the model presented in Equation (2) displays a higher goodness-of-fit, here and for the sake of simplicity, only this equation is estimated.

The results at sectoral level are displayed in Tables 11 and 12 in which we only show the point estimate for the spatial lag of FDI and the direct and indirect effects for the rest of explanatory variables. FDI in the pre-crisis period seems to exhibit a complex-vertical FDI strategy in both sectors; notwithstanding, the complementarity in FDI among neighbouring countries is much stronger

| Dependent variable: $FDI_{it}$ | Equation (2) | Equation (3) |
|--------------------------------|--------------|--------------|
| $GDP_{it}$                     | 3.01**       | 0.88***      |
|                                | (1.43)       | (0.26)       |
| $POP_{it}$                     | −1.51        | 0.17         |
|                                | (7.45)       | (0.25)       |
| $TC_{it}$                      | −0.26        | −0.37        |
|                                | (0.49)       | (0.40)       |
| $HC_{it}$                      | −9.00        | −0.43        |
|                                | (6.53)       | (1.62)       |
| $RQ_{it}$                      | −1.05        | 0.68***      |
|                                | (0.94)       | (0.23)       |
| $\sum_j W_{ij} GDP_{jt}$       | −15.43       | 2.53         |
|                                | (10.28)      | (1.81)       |
| $\sum_j W_{ij} POP_{jt}$       | 191.19***    | −3.80        |
|                                | (47.98)      | (2.71)       |
| $\sum_j W_{ij} TC_{jt}$        | −1.76        | −1.49        |
|                                | (3.51)       | (2.22)       |
| $\sum_j W_{ij} HC_{jt}$        | −163.49***   | −3.85        |
|                                | (57.30)      | (11.11)      |
| $\sum_j W_{ij} RQ_{jt}$        | 17.93***     | −5.39***     |
|                                | (5.84)       | (1.69)       |
| $\sum_j W_{ij} FDI_{jt}$       | −0.33        | 0.12         |
|                                | (0.20)       | (0.13)       |
| $DIST$                         |              | −0.88**      |
|                                |              | (0.36)       |
| $LANG$                         |              | 1.62*        |
|                                |              | (0.77)       |

Time fixed effects          Yes    | Yes
Country fixed effects       Yes    | No
Observations                350    | 350
$R^2$                       0.56   | 0.50

Notes: Spatial Durbin model. Crisis period (2008–14).
Standard errors in parentheses: ***significant at 1%; **significant at 5%; *significant at 10%.
in services. Additionally, the effect of population is higher in services. Furthermore, the findings reveal that trade costs matter only for Spanish FDI in the service sector. Besides, only FDI in the industry sector looks for qualified labour force while a high level of human capital in neighbouring host countries is a significant driver for FDI in both sectors. Finally, a strong regulatory quality in the host country seems to attract more Spanish investment in both sectors.

Concerning the crisis period, FDI appears to be market-seeking in industry and services, which is also in agreement with the aggregate results; in other words, the spatial lag of FDI and the indirect effect of GDP turn out to be non-significant. Moreover, the positive and significant direct effect of GDP supports the market-seeking motives of FDI. However, a strong regulatory quality only attracts FDI for the service sector.

Coming back to the aggregate analysis, and as in some cases the results may critically depend on the spatial weight matrix employed, the second robustness check consists of changing the weighting scheme. Specifically, we use the inverse square distance matrix (which imposes a higher penalty to distance than the inverse distance matrix) and the exponential distance matrix (in which the penalty to distance is even greater). Then, both matrices give more weight than before to the closest markets to the host country, so that the weight of countries belonging to a different continent is now almost negligible. The results of the estimation, reported in Tables 13 and 14, mainly reinforce previous findings, especially those regarding investment strategies. In the pre-crisis period, Spanish direct investment abroad seems to follow a complex-vertical pattern, although the strength of agglomeration economies in FDI when using the exponential distance matrix is a bit lower. Once again, the outbreak of the economic crisis has triggered a change in Spanish outward FDI strategy towards horizontal or market-seeking motives.

As for the FDI determinants, the results obtained in the pre-crisis period (Table 13) support the positive influence of the host market potential, human capital and regulatory quality. Besides, the spillovers on population, trade costs and human capital are robust to specification of the spatial weight matrix. Considering the crisis period (Table 14), the results reinforce the positive direct effect of market potential, the positive spillover effect of population and the negative spillover effect of human capital.

### Table 10  Effect estimates

| Dependent variable: FDI_{it} | Equation (2) | Equation (3) |
|-----------------------------|--------------|--------------|
|                             | Direct effect | Indirect effect | Direct effect | Indirect effect |
| GDP_{it}                    | 3.45*        | -11.49       | 0.88***       | 2.54          |
|                             | (2.08)       | (8.20)       | (0.25)        | (1.99)        |
| POP_{it}                    | -4.15        | 149.99***    | 0.17          | -3.88         |
|                             | (7.39)       | (40.22)      | (0.26)        | (2.98)        |
| TC_{it}                     | -0.22        | -1.43        | -0.36         | -1.66         |
|                             | (0.46)       | (2.62)       | (0.37)        | (2.54)        |
| HC_{it}                     | -6.97        | -124.78***   | -1.15         | -3.36         |
|                             | (6.56)       | (45.24)      | (1.66)        | (12.41)       |
| RQ_{it}                     | -1.28        | 14.21***     | 0.67***       | -5.70***      |
|                             | (0.96)       | (4.69)       | (0.23)        | (2.15)        |

Notes: Spatial Durbin model. Crisis period (2008–14). Equation (2) includes two-way fixed effects and Equation (3), time fixed effects. Standard errors in parentheses: ***significant at 1%; **significant at 5%; *significant at 10%.
## Table 11: Sector-level foreign direct investment regressions

| Industry         | Point estimate | Direct effect | Indirect effect | Services       | Point estimate | Direct effect | Indirect effect |
|------------------|----------------|---------------|-----------------|----------------|----------------|---------------|-----------------|
| GDP$_{it}$       | 0.62           | 5.42          |                 | 1.53           | 12.29          |               |                 |
|                  | (2.24)         | (10.63)       |                 | (1.55)         | (9.40)         |               |                 |
| POP$_{it}$       | −1.15          | −51.71***     |                 | −11.72***      | −79.98***      |               |                 |
|                  | (6.19)         | (21.90)       |                 | (4.27)         | (20.02)        |               |                 |
| TC$_{it}$        | −1.74          | −6.99         |                 | 1.82*          | 23.93***       |               |                 |
|                  | (1.56)         | (9.44)        |                 | (1.10)         | (8.35)         |               |                 |
| HC$_{it}$        | 11.04*         | 4.54*         | 4.92            | 70.67***       |               |               |                 |
|                  | (6.32)         | (2.52)        | (4.34)          | (21.63)        |               |               |                 |
| RQ$_{it}$        | 1.72*          | −1.79         |                 | 1.37**         | 1.63           |               |                 |
|                  | (0.93)         | (3.10)        |                 | (0.64)         | (2.66)         |               |                 |
| $\sum_{j}W_{ij}FDI_{jt}$ | 0.27* | 0.35**        |                 |               |               |               |                 |
|                  | (0.16)         | (0.16)        |                 |               |               |               |                 |
| $R$ squared      | 0.58           |               |                 | 0.43           |               |               |                 |

Notes: Spatial Durbin model. Pre-crisis period (1996–2007). Two-way fixed effects are included. Standard errors in parentheses: ***significant at 1%; **significant at 5%; *significant at 10%.

## Table 12: Sector-level foreign direct investment regressions

| Industry         | Point estimate | Direct effect | Indirect effect | Services       | Point estimate | Direct effect | Indirect effect |
|------------------|----------------|---------------|-----------------|----------------|----------------|---------------|-----------------|
| GDP$_{it}$       | 4.15**         | −15.55        |                 | 3.83**         | −27.91         |               |                 |
|                  | (1.88)         | (18.09)       |                 | (1.66)         | (19.93)        |               |                 |
| POP$_{it}$       | −8.74          | 157.60***     |                 | 4.96           | 129.94***      |               |                 |
|                  | (11.86)        | (56.28)       |                 | (8.96)         | (39.93)        |               |                 |
| TC$_{it}$        | −0.87          | −10.45        |                 | 0.74           | 5.47           |               |                 |
|                  | (0.73)         | (7.46)        |                 | (0.56)         | (4.20)         |               |                 |
| HC$_{it}$        | −22.18         | −73.69        |                 | −5.25          | −124.90        |               |                 |
|                  | (17.06)        | (74.26)       |                 | (7.89)         | (89.21)        |               |                 |
| RQ$_{it}$        | −3.20**        | 2.13          |                 | 0.67*          | 14.52***       |               |                 |
|                  | (1.53)         | (7.81)        |                 | (0.37)         | (5.06)         |               |                 |
| $\sum_{j}W_{ij}FDI_{jt}$ | −0.23 | −0.50         |                 |               |               |               |                 |
|                  | (0.19)         | (0.38)        |                 |               |               |               |                 |
| $R$ squared      | 0.54           |               |                 | 0.49           |               |               |                 |

Notes: Spatial Durbin model. Crisis period (2008–14). Two-way fixed effects are included. Standard errors in parentheses: ***significant at 1%; **significant at 5%; *significant at 10%.
### TABLE 13: Alternative spatial weight matrices

|                          | Inverse square distance matrix | Exponential distance matrix |
|--------------------------|--------------------------------|-----------------------------|
|                          | Point estimate | Direct effect | Indirect effect | Point estimate | Direct effect | Indirect effect |
| \( GDP_{it} \)          | 2.17*          | 3.12           |                | 2.79**         | 2.52           |
|                          | (1.20)         | (3.43)         |                | (1.39)         | (2.02)         |
| \( POP_{it} \)          | −9.95          | −21.47***      |                | −9.61          | −11.92*        |
|                          | (7.65)         | (6.52)         |                | (6.86)         | (6.24)         |
| \( TC_{it} \)           | 0.78           | −3.37*         |                | 0.73           | −6.85**        |
|                          | (0.93)         | (1.87)         |                | (0.94)         | (2.75)         |
| \( HC_{it} \)           | 11.29***       | 24.78***       |                | 10.07***       | 26.10***       |
|                          | (3.72)         | (6.49)         |                | (3.76)         | (9.44)         |
| \( RQ_{it} \)           | 0.91*          | 0.00           |                | 0.83*          | −0.00          |
|                          | (0.50)         | (0.94)         |                | (0.48)         | (0.86)         |
| \( \sum W_{ij} FDI_{jt} \) | 0.32***       |                |                | 0.25**         |                |
|                          | (0.14)         |                |                | (0.11)         |                |
| R squared                | 0.65           |                |                | 0.62           |                |

Notes: Spatial Durbin model. Pre-crisis period (1996–2007). Two-way fixed effects are included. Standard errors in parentheses: ***significant at 1%; **significant at 5%; *significant at 10%.

### TABLE 14: Alternative spatial weight matrices

|                          | Inverse square distance matrix | Exponential distance matrix |
|--------------------------|--------------------------------|-----------------------------|
|                          | Point estimate | Direct effect | Indirect effect | Point estimate | Direct effect | Indirect effect |
| \( GDP_{it} \)          | 4.51**         | −8.94          |                | 4.07**         | −5.52          |
|                          | (2.05)         | (6.87)         |                | (2.06)         | (3.47)         |
| \( POP_{it} \)          | −7.55          | 69.76***       |                | −10.44         | 43.93***       |
|                          | (7.31)         | (17.46)        |                | (7.59)         | (14.83)        |
| \( TC_{it} \)           | −0.08          | 0.10           |                | 0.06           | 0.41           |
|                          | (0.45)         | (1.25)         |                | (0.45)         | (2.58)         |
| \( HC_{it} \)           | −7.65          | −59.27**       |                | −6.15          | −55.89         |
|                          | (6.44)         | (21.60)        |                | (6.50)         | (21.34)        |
| \( RQ_{it} \)           | −1.24          | 4.74**         |                | −0.70          | 4.89**         |
|                          | (0.95)         | (2.35)         |                | (0.93)         | (2.38)         |
| \( \sum W_{ij} FDI_{jt} \) | −0.13          |                |                | −0.12          |                |
|                          | (0.09)         |                |                | (0.09)         |                |
| R squared                | 0.53           |                |                | 0.51           |                |

Notes: Spatial Durbin model. Crisis period (2008–14). Two-way fixed effects are included. Standard errors in parentheses: ***significant at 1%; **significant at 5%; *significant at 10%.
effect of human capital on FDI. Finally, strong regulatory quality in neighbouring host countries seems to encourage FDI to a particular country.

7 | CONCLUSIONS

Understanding the factors that determine FDI activity has attracted the interest of academics and policymakers over the last decades. This paper adds to the discussion by investigating the drivers behind Spanish direct investment abroad and unveiling its dominant strategy. Specifically, the main aim of the paper is to find out whether the FDI strategy has varied over the business cycle. To reach this goal, it estimates a panel spatial Durbin model, which offers key advantages over the conventional approach. Furthermore, partial derivatives are computed to obtain accurate results. Additionally, the paper develops the analysis at both aggregate and sectoral levels, this way avoiding the potential mask of heterogeneous patterns among sectors.

The empirical analysis points to relevant findings. There exist agglomeration economies concerning outward Spanish investments from 1996 until the crisis outbreak. Complex-vertical FDI motives prevail. Specifically, the results point out to a geographical clustering of Spanish direct investment abroad for supply reasons, which is in line with Martínez-Martín (2011). However, this strategy seems to have changed in the aftermath of the crisis, as demand factors gained importance; Spanish firms seem to have opted instead for primarily undertaking horizontal or market-seeking FDI. Thereby, direct investment in one host country did no longer seem to be influenced by the one going to neighbouring countries.

This change of strategy, which is robust to the use of disaggregated data (analysis at sectoral level) and alternative specifications of the spatial weight matrix, can be understood by analysing what happened with the fixed costs of outsourcing at a particular stage. If firms can sell abroad on a large scale, those fixed costs are worthwhile because firms are saving on their variable costs. However, after the outburst of the global economic crisis, the demand went down and firms sold on a smaller scale. Therefore, those fixed costs were no longer offset and MNEs shifted towards more market-seeking FDI strategies.

Additional and tentative findings can be gleaned from our analysis if, as mentioned in the Introduction, we also pay attention to the literature on FDI entry modes, and specifically, to the MNEs’ choice of the investment and ownership modes. Following the line of reasoning presented in the first section, the change in the strategy of Spanish MNEs from complex-vertical to horizontal FDI probably led MNEs to mostly perform M&As and joint ventures over the crisis period. There is also an additional reason supporting this cautious conclusion: the higher investment risk derived from the economic downturn. As Aizenman and Marion (2004) conclude, horizontal FDI is likely to predominate over vertical FDI in times of uncertainty, and it is obvious that M&A and joint ventures involve less risk than greenfield investment and wholly owned subsidiaries, respectively.

What have we learned from this? Mainly that Spanish MNEs reacted quickly to the change in demand and did not confine their direct investment strategy abroad (nor the investment and ownership modes, likely) to the dominant one in the years previous to the Great Recession. Thus, Spanish MNEs seem to be somewhat resilient to adverse shocks such as the fall in demand over the crisis period. But, what about other countries? Although we do not believe this feature is specific to the Spanish MNEs, we have to admit that drawing a general lesson about the influence of the business cycle on the MNEs’ FDI strategy from a single case study turns out to be impossible. Needless to say, it would need a meta-analysis that integrates the results of as many case studies...
as possible. This paper could be the first in a series of case studies to corroborate, or qualify, our findings.

Finally, which policy implications can be drawn from this paper? Our results show that the strategy followed by Spanish direct investment abroad changed over the crisis from complex-vertical to horizontal FDI. But it is well-known that the positive effects of outward FDI on the Spanish economy are higher if FDI follows a complex-vertical rather than a horizontal strategy. Under complex-vertical FDI, MNEs set up their vertical chain of production process across multiple countries to benefit from their comparative advantages. Thus, their competitiveness could increase. Besides, productive activities in the new locations might require an increase of the activities developed in the home country. Therefore, complex-vertical FDI could promote employment and exports in Spain. On the contrary, in the case of horizontal FDI, foreign affiliates serve the local market in the host country and substitute previous exports from the home country, which could reduce production and employment in Spain (Myro, 2014). Consequently, policy initiatives in times of recession in Spain should be focused on assisting MNEs through direct financial support to make the fixed costs of outsourcing, even with the decrease in demand, affordable. This type of policies could avoid the change in FDI strategy and therefore benefit the whole Spanish economy.

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**APPENDIX A**

**List of countries considered in the analysis**

Algeria, Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Cuba, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Finland, France, Germany, Greece, Guatemala, Hungary, India, Ireland, Italy, Japan, Luxembourg, Malaysia, Mexico, Morocco, Namibia, Netherlands, Norway, Panama, Peru, Poland, Portugal, Romania, Russia, South Africa, Sweden, Switzerland, Tunisia, Turkey, United Kingdom, United States, Uruguay and Venezuela.