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Does foreign direct investment matter for female entrepreneurship? Spatial interaction and business creation

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Spatial interaction and business creation

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Abstract

This study explores the importance of foreign direct investment (FDI) in fueling the rate of female entrepreneurship at the local level. Our study focuses on Spanish data at the provincial level over a complete business cycle (2005–2016). The fostering effect stems from the presence of spatial externalities between FDI stock in a province and the growth rate of women-owned enterprises in that province. Our results not only confirm the positive association between the density of FDI stock and female entrepreneurship, but also provide evidence of the extent to which homophily can strengthen this effect. Finally, the spatial setting enables the quantification of spillover effects both within each spatial unit and across units.

Keywords: Foreign direct investment, Entrepreneurship, Gender, Spatial analysis.

JEL Classification: F23, J16, 052, R11

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1. Introduction

The economics literature has extensively explored the potential impact of foreign direct investment (FDI) on the creation of local businesses in host economies. Such studies are not always conclusive because FDI can produce a crowding-out effect on local entrepreneurship (due to competitive effects) or create synergies with local businesses via spillover effects. However, crowding-out effects appear to be less sizable in the case of female entrepreneurship (Goel, 2018). Understanding the drivers of female entrepreneurship is gaining relevance in the current economic debate. Female self-employment is often seen as a way to accommodate both work and family responsibilities (e.g., Lo et al., 2020, Noseleit, 2014, Peng and She, 2020, Oladipo et al., 2023), but it can also be viewed as a strategy to facilitate women's entry into the labor market, particularly in local contexts and among low- and high-income households in the United States (Conroy at el., 2021). However, female entrepreneurs are likely to face greater cultural, legal, and institutional barriers, such as family laws, inheritance practices, and household responsibilities. These barriers can hamper the potential gains from female entrepreneurship and limit the welfare benefits that society can derive from women's participation in business (Acs et al., 2011). To this end, a study by Noguera et al. (2015) using Spanish data concludes that informal factors, such as the recognition of entrepreneurial careers within female networks, are more relevant to female entrepreneurship than formal factors, such as education or income.

This study aims to bridge the relevance of factors (including informal ones) as drivers of female entrepreneurship within an institutional setting that considers FDI as one of its potential drivers.[2] We approximate female entrepreneurship through female self-employment (Halabisky, 2018). For one thing, we explore the impact that FDI stock, proxied by the number of foreign companies, can have on the creation of new women-owned self-employed activities through an implicit channel, whereby FDI outsources part of its production process to local firms. In our case, a crucial hypothesis is that this mechanism operates primarily through the propensity of foreign companies (MNEs) to subcontract services, a common practice in modern production processes.[3] The relevance of the service sector in reinforcing women's participation in the labor market has been widely discussed in the literature (Olivetti and Petrongolo, 2016; Olivetti et al., 2025). The expansion of the service sector may create jobs or business opportunities whose characteristics, most notably time flexibility, better align with female preferences and household responsibilities.

Our data support the previous argument: in our sample, 66.83% of newly created women-owned self-employment activities were established in the service sector during the period 2005–2016. From this perspective, self-employment represents a suitable proxy for identifying job opportunities that allow women to satisfy these priorities. At the same time, subcontracting practices by foreign companies may generate favorable local conditions, or a business environment, that foster the creation of self-employment opportunities.

Accordingly, our primary objective is to assess the extent to which FDI presence can stimulate female entrepreneurship. Moreover, we explore an indirect channel: the presence of women on corporate boards may generate intangible values within the local economic environment that support female entrepreneurship. This mechanism operates through a potential homophily effect between incumbents and entrants.

The idea of homophily (as introduced by Lazarsfeld and Merton, 1954) suggests that similar individuals are more likely to be linked to each other. According to Jackson (2014), individuals in a network tend to be connected to others who are similar to themselves. The idea of similarity is associated with individual characteristics, and gender is one of them (see Brashear, 2008). From an economic viewpoint, the idea of homophily is associated with concerns about controlling uncertainty and is correlated with risk aversion (Currarini and Mengel, 2016). In this vein, Barrios et al. (2022) confirm that homophily leads firms to favor managers or directors sharing the sociocultural values of the firm's home country as a means of reducing the risk of frictions and lack of cooperation with other board members. Similarly, Zelter (2020) finds that doctors prefer referring to specialists of their own gender. Therefore, gender

[2] Both the settings and the factors shape the potential absorptive capacity of the local environments hosting FDI.
[3] For instance, as discussed by Sass and Fifekova (2011).

homophily may be considered a strategy for coping with risk aversion in business matters.[4] The literature also emphasizes the role of homophily in business creation, as documented by, among others, Phillips et al. (2013) and Farè and Vismara (2026). The mechanism underlying this hypothesis has been widely discussed in the literature. From a theoretical perspective, two main strands of analysis are particularly relevant. The first adopts a behavioral approach, according to which discrimination in interpersonal interactions may be conscious when supported by explicit beliefs or evidence, but also unintentional, as it may arise from implicit attitudes (Bertrand et al., 2005, Beaman et al., 2009, Price and Wolfers, 2010, Glover et al., 2017). This latter dimension has been extensively examined in the psychological literature, where experimental and test-based evidence documents the coexistence of conscious and unconscious biases, particularly with respect to gender and ethnicity. The second strand builds on this behavioral framework by providing a formal theoretical setting for gender discrimination. Aragonès (2026) develops a model of labor market discrimination based on a taste-based approach à la Becker. According to Becker (1957, 1971), male employers may exhibit a preference for male workers or co-workers belonging to the same ethnic or gender group, as they experience disutility from interacting with members of other groups. Such preferences are driven by internalized cognitive schemes that can generate discriminatory behavior even in the absence of conscious intent, with important implications for labor market outcomes, including participation by gender and wage gaps.

Therefore, we propose a quantitative approximation of the potential impact of female CEOs or female members of FDI administrative boards (in businesses that we label as *women-led firms*) on encouraging local female entrepreneurship through the outsourcing of productive activities.

Our research strategy involves exploring the three channels separately. The *first channel* entails exploiting the assumption that FDI outsources production tasks. The *second channel* refers to the potential effect of homophily between incumbent firms and the creation of *new women-owned firms* and then, the *third channel* involves the intersection of the first two channels by examining the potential effect that FDI with a sizable number of women on their administrative boards (to approximate their ability to influence board decisions) may have on the local creation of *women-owned* firms (*third channel*). In conducting our analysis, the territorial dimension proves to be fundamental because we expect spatial proximity to enhance individual interactions.[5]

The spatial dimension emphasizes the importance of one crucial underlying hypothesis of our analysis: individuals located within the same spatial unit (in our case, provinces) are more likely to interact and, consequently, to share business interests.[6]

We develop our analysis using data organized at the provincial level in Spain for the period 2005–2016, thereby covering a complete business cycle. Province size (NUTS3 level, according to the EU classification) is the smallest geographic unit for which we have access to data and at which one may reasonably expect interactions among productive activities to occur. To this end, we construct an original database by merging social security records on the creation of women-owned self-employed firms by year, sector, and province in Spain with data on FDI stock (measured by the number of foreign companies) by year and province. We also include additional statistics on the principal characteristics of newly created women-owned firms and the FDI stock. We complement this information with additional data on various aspects of the economic and demographic environment of each province.

Our proposed research is novel in several ways. First, we perform our analysis using microeconomic data, thereby providing more precise results based on a relatively granular territorial breakdown. Furthermore, unlike earlier studies on this topic (e.g., Braunstein 2002, 2006), we focus on a developed country (Spain) rather than on developing countries. Given our working assumptions, we expect that the influence of FDI on local female entrepreneurship

[4] In this respect, Nekhili et al. (2023) find evidence regarding the effects of gender homophily in French firms. They show that female board members (with monitoring responsibilities) are likely to promote gender diversity in the audit industry.
[5] Del Gatto and Mastinu (2021) offer an illuminating discussion of the extent to which cultural and geographic factors affect the behavior of multinational enterprises.
[6] This is an important assumption of our study, and it is crucial because there are no available data to track the connection between a firm and its corresponding providers. In Section 3, we provide more information on this issue.

results from a combination of environmental factors at the provincial level. In addition, we emphasize the role of the spatial dimension in qualifying the interaction between FDI and new women-owned enterprises through spillover effects. Estimations that explicitly incorporate the spatial dimension assess the existence of positive local spatial spillovers between FDI and the density of new women-owned businesses at the provincial level. However, a spatial competition effect among FDIs appears to take place across provinces. This latter effect suggests that the expected impact of FDI on the creation of women-owned firms is essentially provincial in nature. Hence, the effectiveness of FDI presence in fostering local entrepreneurship appears to be local rather than global.

The rest of this paper is organized as follows. In Section 2, we provide a brief literature review, and in Section 3 we describe the data. In Section 4, we outline our econometric strategy and discuss our estimation results. Finally, we conclude in Section 5. Additional data, statistics, and robustness checks are provided in the Appendix.

2. Literature review

How FDI fuels economic development has been widely studied in the economics literature. FDI is often considered a valuable tool for supporting economic growth during recessions or transition periods by triggering a more efficient allocation of local resources to productive activities. FDI offers several economic advantages for host economies, including increases in employment, technology transfers, wage premiums, and other pecuniary benefits (as discussed in Alfaro et al., 2004).

A less evident effect of incoming FDI involves the survival of domestic companies. On the one hand, incoming multinational enterprises (MNEs) may be more technologically advanced than domestic companies, so their entry may crowd out the less productive incumbent firms (see De Backer et al., 2003). On the other hand, incoming FDI may encourage local entrepreneurship. This outcome is mainly associated with the potential for new domestic firms to become suppliers to incoming MNEs, thereby fostering local entrepreneurship. In the literature, this latter effect has been studied extensively in the context of developing countries. Braunstein (2006) argues that incoming FDI supports female entrepreneurship as well as female entry into the labor market, with wage levels commensurate with their true productivity.[7] The same occurs in transition countries, as in the Czech Republic during 1994–2000, due to the consolidation of positive horizontal spillovers from FDI (Ayyogari and Kosová, 2010). The positive spillover effects on business creation stemming from incoming FDI observed in emerging economies also seem to be connected with better institutional quality. Herrera-Echeverri et al. (2014) conclude that the catalyst effect of FDI on entrepreneurship interacts with the level of governance: strong institutions can create regulatory frameworks that target specific groups of incoming FDI.

Less attention is usually devoted to the effects of incoming FDI in developed countries. However, the available evidence indicates its relevance and justifies further exploring this dimension of incoming FDI. Within this perspective, one of the principal streams of research involves assessing the impact of FDI on local entrepreneurship. Overall, a country is expected to benefit from the positive spillover effects of FDI when there is a strong cultural and policy context that supports entrepreneurial activity. Relatedly, MNEs are more interested in targeting regions where they can specifically take advantage of strategic assets such as information capital and human capital (Terjesen et al., 2007). Using Irish data, Görg et al. (2005) reveal that the relationship between FDI and entrepreneurship in host economies follows a U-shape. The dynamic moves from the dominance of a competitive effect to the consolidation of positive externalities. The turning point occurs when incoming MNEs source the production of intermediate inputs from domestic companies, thereby changing the domestic industrial structure. Another interesting finding of their study is that granting subsidies to attract FDI disrupts the dynamics of spillover effects because MNEs are less likely to build productive networks with domestic companies in host economies. Accordingly, one may conclude that spillover effects are likely to emerge only when incoming FDI originates outside preferential policy schemes. In

[7] In the same stream of literature, the discussion by Lo Bue and Martínez-Zarzoso (2024) regarding the productivity gap between firms managed by men and women in developing countries, largely due to business constraints, also warrants mention.

contrast, Danakol et al. (2016) find that the relationship between FDI (principally in the form of M&As) and domestic companies, especially in manufacturing, is negative across all economies in their cross-country panel of approximately 70 countries. Their argument is that incoming MNEs place technological pressure on dominant incumbent firms, which may fail to adopt superior technologies to improve their productivity. Moreover, positive spillovers may be limited because knowledge diffusion is not sufficiently widespread. Based on their results, these authors suggest that host-country governments should be selective in attracting FDI, favoring investments in local economies that are more likely to absorb potential positive spillovers (e.g., those without significant technological gaps).

The idea of producing the right match between domestic companies and incoming FDI to maximize the absorptive capacity of host economies is a recurrent topic in both the literature and in discussions about policies that could bridge the potential gap between the two types of firms and make spillover effects more effective (Bellak, 2004). Current experience indicates that this difficulty is greater in high-technology sectors, where the degree of coordination between the two types of firms is crucial. This core problem, primarily within a global value chain setting, is discussed in Sun et al. (2017), who use data from South Korea to identify significant positive effects of FDI in both high- and low-tech industries through regional, intra-sectoral, and inter-sectoral channels (mostly at the customer and supplier levels). The idea is that the density of newly created domestic companies in a region is a function of the incoming FDI in that region, classified separately as high- and low-tech. Furthermore, the authors account for the existence of spatial positive autocorrelation as a way to further enhance the catalyst effects of incoming FDI on domestic entrepreneurship.

Consequently, the spatial dimension turns out to be crucial: spatial autocorrelation is an important feature to consider in the transmission of spillover effects.[8] Kugler (2006) performs an empirical analysis using data from Colombia and finds that the relationship among FDI proximity, spillovers, and competition effects for domestic companies strongly depends on the sector of activity. The rivalry between FDI and domestic companies dominates spillover effects when FDI is located close to domestic companies belonging to the same sector of activity (intra-firm), whereas the reverse is true in inter-firm cases. As a result, vertical FDI is more effective in triggering local entrepreneurship when it involves outsourcing to local suppliers; however, there is no consensus in the literature on this result. Damijan et al. (2013) conclude that in transition countries, controlling for the distance between foreign subsidiaries and domestic companies, horizontal spillovers gain importance. In addition, the likelihood of their being effective is positively associated with the productivity and absorptive capacity of firms involved in the process.

Given the above discussion, and assuming that the probability of interaction between FDI and local enterprises in a host country can be approximated by an appropriate unit of analysis (Gibbons et al., 2015), our research hypotheses are as follows:

H1: The presence of FDI can encourage the creation of women-owned enterprises, primarily in sectors that are likely to provide services to FDI activities.

H2: The interaction between FDI and local entrepreneurs is likely to generate spillover effects that can be direct (within the spatial unit) or indirect (across spatial units).

3. Data

To test the study's hypotheses, we create a novel dataset for all Spanish provinces during the period 2005–2016. This is an interesting period of analysis, as it includes a cycle of expansion (until 2007), a financial and debt crisis (2008–2012), and an economic recovery (2013–2016). Our dataset merges information from two principal microdata sources: the *Muestra Continua de Vidas Laborales* (MCVL; Social Security, 2005–2016), which contains social security administrative data; and the *Sistema de Análisis de Balances Ibéricos* (SABI; Bureau van Dijk, 2019), which

[8] Sutton and Sutton (2024) provide an interesting overview of the value and relevance of capturing spatial dependence to understand economic outputs at the regional level.

contains information on firm activity. We organize the information by aggregating observations by province and sector[9] and then matching them, as in Gómez-Tello and Nicolini (2017).

One important challenge of the methodology we implement is approximating the potential interactions between incumbent firms (foreign companies, *in primis*) and new self-employment activities. To the best of our knowledge, for the Spanish case, there are no complete data linking firms to their providers or clients. Therefore, our analysis relies on an important working hypothesis: the density of firms within a specific spatial area (here, a province) approximates the frequency of their interactions with other economic agents (in the spirit of Hesley and Strange, 2007) through chosen actions. An action chosen by one agent generates externalities because it may affect the actions of other agents through preferences, among others factors (Manski, 2000). Our working hypothesis results from the convergence of two longstanding streams of literature, according to which proximity and density are two key factors shaping interactions among agents and underpinning the generation of positive externalities (in terms of innovation and productivity, among other outcomes; Redding et al., 2007). On the one hand, Gilly and Torre (2000) argue that spatial proximity favors the frequency of interactions among individual agents. In the same vein, Storper and Venables (2004) emphasize the relevance of proximity in facilitating face-to-face interactions; hence, space mediates interactions among individual agents. On the other hand, Duranton and Puga (2020) argue that density (measured as the number of individuals per unit of geographic area) is a highly dynamic concept that is useful for analyzing several spatial issues, including agglomeration processes that rely on direct human interactions and require the computation of density measures at the smallest possible spatial scale.

For implementing our empirical analysis, we first approximate female entrepreneurship in a province by the number of new self-employment activities created by women and recorded in the MCVL (*autónomas*),[10] which we refer to as "*New women-owned firms*." For geographical attribution, we consider the province in which this "unique" owner resides to be the province in which the firm is located. Evidence confirms that for more than 90% of self-employed individuals, the place of residence is in the same province as the location of their productive activity (MCVL).

Second, we calculate the stock of domestic and foreign companies using information from SABI. From information on the composition of shareholders with controlling interests in each firm's equity capital, we identify an MNE as a firm in which foreign investors hold a share of at least 10%.[11] Firms that do not meet this criterion are classified as domestic companies.[12] To obtain a measure comparable to that of self-employment activities, we define the stock of domestic companies in a province as the total number of firms classified as domestic and label this variable *Domestic companies.* Similarly, we measure the stock of foreign companies as the total number of MNEs in a province. Throughout the paper, we label this variable *Foreign companies* and use it as a proxy for FDI stock. Moreover, we are able to track the presence of women on management teams (measured as a percentage of team members) and we exploit this information to operationalize the homophily channel for female entrepreneurship. In the main text, we use a threshold of 33.3% women in management positions to distinguish firms (domestic or foreign) in which women are likely to have decision-making power and, hence, activate the homophily channel for the creation of women-owned firms.

[9] Appendix A presents a map of the Spanish provinces and a table detailing the sectors in the CNAE09 classification (Figure A.1 and Table A.1, respectively).

[10] We follow the discussion proposed by Noseleit (2014), who argues that female self-employment can be a way to reconcile professional and private life. Even if this assumption may be valid in some contexts, it does not appear to hold in the Spanish case. In Spain, more than 50 % of businesses are self-employed entities (specifically, 51.1% in 2015 and 56.2% in 2025; DIRCE, INE). Finally, by focusing on this type of firm, we capture businesses in which women have some degree of decision-making capacity and control, thus providing a measure of entrepreneurial activity.

[11] For the identification of MNEs, we adopt the definition established by the Organisation for Economic Co-operation and Development (OECD, 2025), which is consistent with that implemented by the International Monetary Fund (IMF, 2009). In particular, we classify a subsidiary as foreign-owned if it has an ultimate owner abroad or at least one shareholder located outside Spain that owns 10% or more of the shares.

[12] Thus, domestic companies may include firms with some foreign ownership, provided that no foreign investor holds a share of 10% or more.

Preliminary descriptive statistics paint an interesting picture of our sample composition. Table 1 summarizes the main descriptive statistics.[13]

Table 1: Descriptive statistics

Variables	Obs	Mean	Stand. Dev	Max	Min
New women-owned firms	600	169.7	207.0	7	1325
Domestic companies	600	15469.9	24014.0	1283	148491
Foreign companies (FDI stock)	600	2163.3	3741.9	120	28894
Total companies with women in managerial positions	600	2040.9	3647.7	27	27010
Total companies with mainly men in managerial positions	600	15158.4	23736.6	1434	151751
Foreign companies with women in managerial positions	600	260.3	541.3	1	4785
Foreign companies with mainly men in managerial positions	600	1869.6	3184.3	118	23888

Notes: Variables are measured as counts (individuals or companies). The variable *New women-owned firms* refers to newly self-employed women and is used as a proxy for female entrepreneurship. *Total companies* is the sum of domestic and foreign companies, excluding self-employed individuals. *Women in managerial positions* refers to companies in which women represent at least 33.3% of the management team. As the sample includes 50 provinces over 12 years, the total number of observations is 600. Values represent averages across provinces and years (2005–2016).

Table 1 presents statistics for *Total companies with women in managerial positions*,[14] which refers to the total number of companies in which women represent at least 33.3% of the management team, and for *Total companies with mainly men in managerial positions*, which refers to the total number of companies in which women represent less than 33.3% of the management team. Meanwhile, *Foreign companies (FDI) with women in managerial positions* refers to the number of foreign companies in which women represent at least 33.3% of the management team, whereas *Foreign companies (FDI) with mainly men in managerial positions* refers to the number of foreign companies in which women represent less than 33.3% of the management team.

Considering the entire period (i.e., 2005–2016) and all of Spain, we register the creation of 287,166 self-employed activities, 38.7% of which were women-owned. From a territorial perspective, there is a slight degree of heterogeneity. The province with the highest share of newly created female self-employed activities is La Coruña (44.2%), whereas the province with the lowest share is Cuenca (31%). The information presented in Table 1 reveals that, on average, the new self-employed activities established by women each year represent approximately 1% of the existing stock of domestic companies. Barcelona and Madrid are the most prolific provinces, with a high concentration of new woman-owned firms in service sectors, such as wholesale, financial, and administrative activities, and in non-market services, such as household and health-care services (Table 2).

Table 2: Average number of new women-owned firms by sector and province

Sector	Total (Obs. = 600)	Barcelona (Obs. = 12)	Madrid (Obs. = 12)
Agriculture (A)	4.5	5.8	3.8
Extractive industries and energy (BDE)	0.1	0.8	0.6
Manufacturing (C)	8.1	67.4	31.4
Construction (F)	6.1	36.7	39.9
Services G_J	81.3	413.0	377.8
Financial and professional services (K_N)	32.6	249.9	291.8
Non-market services (O_U)	36.9	235.1	287.4

Notes: Values represent averages across provinces and years (2005–2016). Table A.1 in the Appendix provides a detailed list of sectors in the CNAE09 classification.

[13] In the estimations, we transform these variables into densities to control for spatial-size effects, where density is defined as the ratio of the total number of firms in each province to the total area of the province.

[14] We refer to four positions: board member, chief executive officer (CEO), chief commercial officer (CCO), and chief financial officer (CFO).

Finally, descriptive statistics emphasize that the share of firms with a sizable number of women in managerial positions relative to the total number of firms with mainly men in managerial positions (approximately 13.5%) is slightly lower than the corresponding share for FDI firms (approximately 14%). For greater precision regarding the territorial distribution of companies across provinces, Figures 1 and 2 provide complementary information on the territorial distribution of the density of new women-owned firms relative to the total number of companies in each province and on the spatial distribution of new women-owned firms conditional on FDI density and province type (rural, intermediate, and urban), respectively.[15] The two figures are built using the same setup: the darkest areas correspond to provinces with the highest concentration of the selected type of company (according to the selected group), whereas the lightest areas correspond to provinces with the lowest concentration.

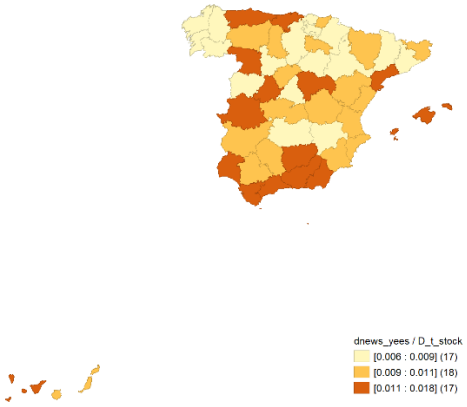
Figure 1 emphasizes that new women-owned firms, as a share of total companies in each province, are mostly concentrated in urban and intermediate provinces. A few urban areas are less dynamic in terms of creating new women-owned firms relative to the total number of firms in the province, whereas some intermediate provinces can be assimilated to urban ones or even outperform them, as is the case for Asturias, Badajoz, Granada, Huelva, and Jaén, among others. The dynamism of intermediate provinces is also reflected in the conditional map in Figure 2, which depicts the spatial distribution of new women-owned firms conditional on FDI stock density and province type. The objective of the conditional map is to identify possible interactions among the variables of interest, taking as the null hypothesis the absence of any interaction. The conditional map appears as a matrix of maps, each referring to a subset of observations, with the conditioning variables represented on the horizontal and vertical axes. Each map shows the spatial distribution of the variable of interest only for those observations that fall into the corresponding categories of the conditioning variables. If interactions exist among the conditioning variables, the maps should reveal systematically high or low values of the variable of interest associated with specific categories of the conditioning variables. Otherwise, all maps would display broadly similar patterns. Referring to Figure 2, intermediate provinces (type 2) are those displaying the most systematic positive interaction between FDI stock density and the creation of new women-owned firms. By contrast, rural and urban provinces lie at opposite ends of the spectrum. Rural provinces generally exhibit weak interactions between FDI stock and the creation of new women-owned firms, whereas a few urban provinces exhibit the highest levels of interaction, with Barcelona, Madrid, and the Canary Islands as the principal outliers. Therefore, the propensity of women to create their own firms appears to be associated with the local entrepreneurial environment at the provincial level. FDI stock contributes to fostering this territorial dynamism and, in this sense, may provide a tangible opportunity for women to create their own business activities.

Another interesting statistic on the spatial distribution of new women-owned firms comes from Exploratory Spatial Data Analysis (ESDA) statistics. Given our key assumption that the likelihood of interaction between FDI and new women-owned firms is related to their location within the same spatial unit (as discussed in Gibbons et al., 2015), Table 3 presents statistics on the potential spatial dependence of our key variables over time. The spatial indicator Geary's C[16] reveals that spatial dependence exists for both new firms created by women and the distribution of women in managerial positions. This pattern remains relatively constant over time. FDI stock is (statistically) spatially dependent as well.

[15] Figure A.2 in Appendix A provides details about the types of provinces in Spain.

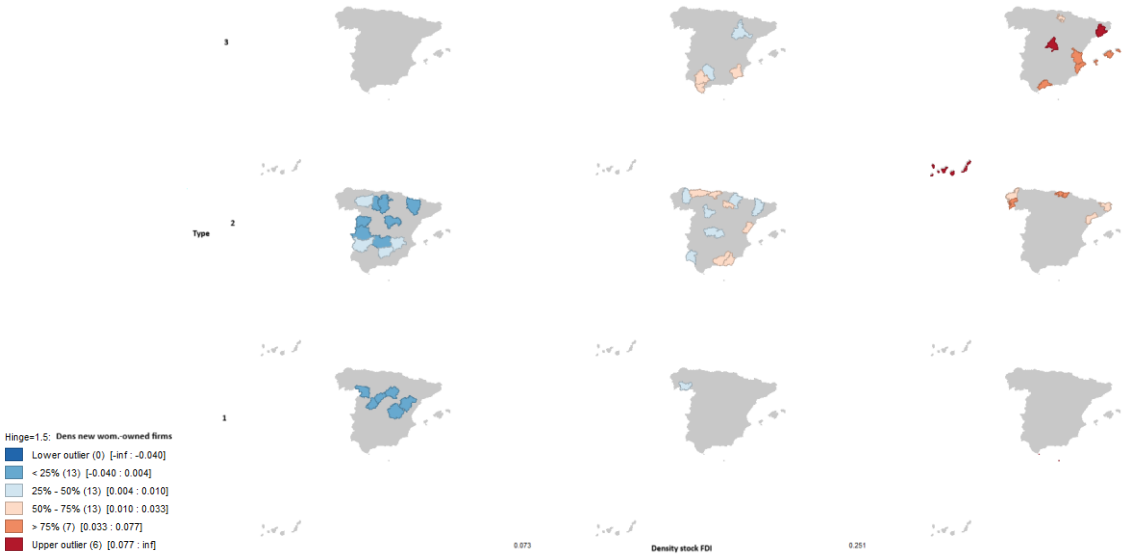
[16] Geary's C is a measure of global spatial autocorrelation. This indicator can detect potential spatial correlations that other spatial indicators (e.g., Moran's I) may fail to identify (Anselin, 2019).

Figure 1: Spatial distribution of new women-owned firms as a share of total companies



Notes: The variable represents the share of newly self-employed women in the stock of total companies. Values are averaged over the period 2005–2016. *Sources:* SABI (Bureau van Dijk) and MCVL (Social Security). The map was created using GeoDa software.

Figure 2: Conditional map



Notes: Horizontal axis: average number of foreign companies over the total area of the province (FDI stock); vertical axis: type of province (1: rural; 2: intermediate; 3: urban). Variable of interest: average number of newly self-employed women over the total area of the province. *Sources:* SABI (Bureau van Dijk) and MCVL (Social Security). The map was created using GeoDa software.

Overall, the empirical evidence supports our outsourcing hypothesis, revealing a positive global spatial correlation between the density of new women-owned firms and the density of foreign companies (used as a proxy for FDI stock) in Spanish provinces. To detect potential local spatial correlation, we employ Local Indicators of Spatial Association (LISA) to gain further insights.[17] We construct this index using a contiguity matrix to capture the likelihood that neighboring provinces exhibit positive spatial correlation.

[17] A LISA map is based on the local Moran's I statistic, which measures the spatial autocorrelation at the level of each observation to identify spatial patterns that may be hidden in global statistics. Whereas global Moran's I detects the overall spatial correlation of the data, LISA identifies clusters (i.e., areas where high or low values are surrounded by similar values) and spatial outliers

In Figure 3, we depict the local spatial association between new women-owned firms and the stock of foreign companies (used as a proxy for FDI stock) at the provincial level. The LISA statistics identify provinces in which the density of new women-owned firms is significantly associated with the density of FDI in the same province and/or in neighboring provinces.

LISA statistics underscore the statistically significant concentration of clusters of new women-owned firms (especially in Málaga) given the FDI stock. On average, these areas exhibit very strong positive spatial autocorrelation, understood as a positive association among variables in neighboring spatial units. The dynamics of new firm creation are associated with significant positive spatial dependence among observations. The reverse holds true for a couple of provinces in Galicia, where spatial dependence contributes to consolidating the low rates of new firm creation.

Table 3: Spatial dependence tests (Geary's C, 2005 and 2016)

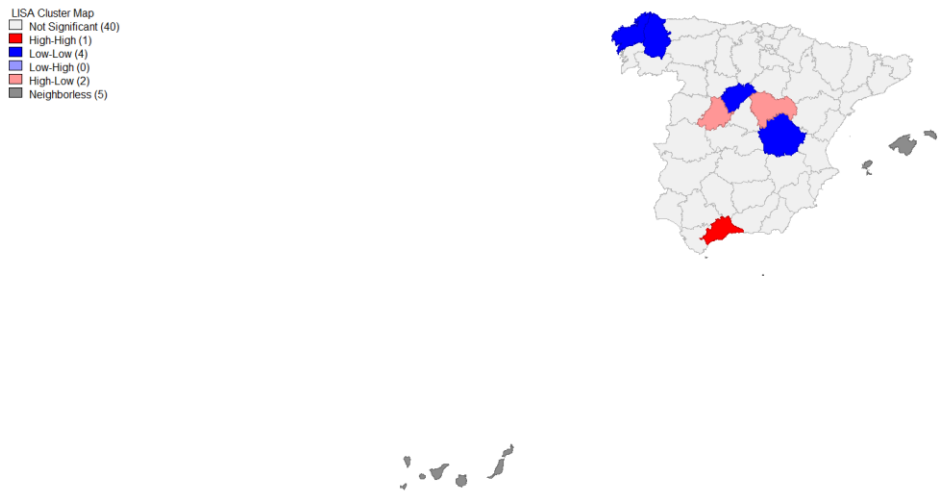
	Year 2005		**Year 2016**	
Variable	***Geary's C***	***p-value***	***Geary's C***	***p-value***
ln density new women-owned firms	0.607	0.000	0.551	0.000
ln density stock domestic companies	0.830	0.003	0.857	0.012
ln density stock foreign companies (FDI stock)	0.827	0.028	0.844	0.027
ln density stock total companies with women in managerial positions	0.917	0.199	1.001	0.493
ln density stock total companies with mainly men in managerial positions	0.828	0.003	0.825	0.005
ln density stock foreign companies with women in managerial positions	0.924	0.267	1.064	0.287
ln density stock foreign companies with mainly men in managerial positions	0.817	0.025	0.789	0.008

Notes: Variables are measured as the natural logarithms of the number of firms per unit area. Geary's C measures global spatial autocorrelation. The null hypothesis is the existence of spatial independence. A spectral-standardized contiguity matrix is used. Dimension: 50x50.

However, one could argue that this pattern may also characterize the relationship between new women-owned firms and the stock of domestic companies. We replicate the previous exercise by replacing the density of foreign companies (used as a proxy for FDI stock) with the density of domestic companies. The results are presented in Figure 4.

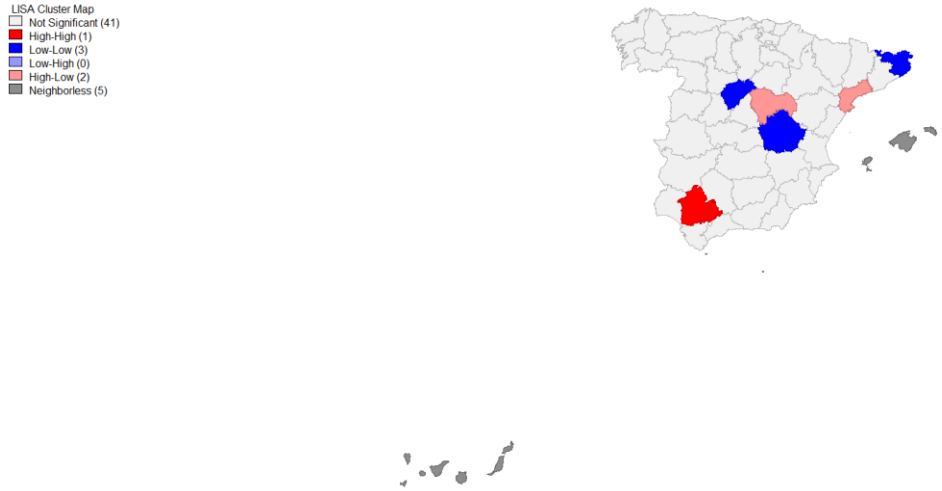
(i.e., areas with values that differ from those of neighboring areas). The map visualizes these patterns by highlighting four types of combinations: high–high, low–low, high–low, and low–high agglomerations.

Figure 3: LISA cluster map: New women-owned firms and foreign companies (FDI stock)



Notes: Statistics are computed using the average values for each province over the period 2005–2016, a contiguity matrix W, and the default GEODA setting (999 permutations; p=0.05). *Sources:* SABI (Bureau van Dijk) and MCVL (Social Security).

Figure 4: LISA Cluster map: New women-owned firms and domestic companies



Notes: Statistics are computed using the average values for each province over the period 2005–2016, a contiguity matrix W, and the default GEODA setting (999 permutations; p=0.05). *Sources:* SABI (Bureau van Dijk) and MCVL (Social Security).

The LISA clustering map for new women-owned firms and domestic companies does not exactly replicate the corresponding map for FDI. There is still a spatial unit exhibiting a positive spatial association between the two variables, but it is located in a different province. However, we cannot exclude the possibility that some local interaction effects also stem from domestic companies. If so, it is useful to distinguish the relative importance of domestic companies and MNEs in fostering female entrepreneurship.

4. Empirical strategy

Our empirical analysis is built to disentangle the potential spillover effects of MNEs on female entrepreneurship at the provincial level. To achieve this objective, our working hypothesis (*H1*) posits that FDI is expected to catalyze an increase in local entrepreneurship through the implementation of outsourcing strategies that may provide an incentive for women to start their own business, given the flexibility (in terms of working time) that self-employment

can offer. Of course, the strength of this effect is expected to be associated with the absorptive capacity of the host economy.

This connection can be reinforced through a second channel: the creation of new firms by women may be associated with homophily effects, as women take advantage of the presence of women on the management boards of incoming FDI firms. Thus, given the existence of clear spatial dependence over time in the location of new women-owned firms and the identified channels, we aim to capture the spatial spillover effects of FDI stock on local female entrepreneurship at the provincial level (*H2*).

Our reference setting follows the model structure proposed by Sun et al. (2017). We estimate the density of newly created women-owned firms at the provincial level as a function of company density in the province, both overall disaggregated by domestic companies, MNEs, and gender. In our analysis, we introduce gender as a criterion for distinguishing among incumbent domestic firms and MNEs by referring to the composition of their management boards. Furthermore, to limit endogeneity concerns arising from the simultaneous relationship between the dependent variable and the regressors, we include all regressors with a one-period lag, corresponding to the previous year. Moreover, expressing the selected variables in terms of density controls for size effects associated with the geographical dimensions of Spanish provinces.[18]

On the basis of the above information, our baseline equation is estimated as:

$$\ln DNWF_{p,t} = \alpha_0 + \alpha_1 \ln DSDC_{p,t-1} + \alpha_2 \ln DSFC_{p,t-1} + \boldsymbol{\beta}' \boldsymbol{X_{p,t-1}} + \theta_t + \delta_p + \varepsilon_{p,t} \quad (1)$$

Our dependent variable is the density of total new self-employment activities created by women ($lnDNWC_{p,t}$; *natural logarithm of the Density of new women-owned firms*) in province p in year t. The regressor $lnDSDC_{p,t-1}$ (*Natural logarithm of the Density of stock domestic companies*) captures the density of the total stock of domestic companies in province p in year *t-1*, whereas $lnDSFC_{p,t-1}$, (*Natural logarithm of the Density of stock foreign companies*) captures the density of the total stock of foreign companies (FDI stock) in province p in year *t-1*.

The vector $\boldsymbol{X}_{p,t-1}$, includes different types of control variables, all measured in province p in year $t-1$, aimed at capturing the local business environment, including employment levels (three variables), competitiveness (trade openness), and the importance of services.[19] First, we include a measure of employment in a province as an indicator of the level of economic activity (and, indirectly, firm dynamism) and labor market conditions. We approximate it using three measures (expressed in natural logarithms): *Density of total employment*, *Density of employees*, and *Density of female employees*.[20] The last measure, the density of female employees in a province, is expected to capture women's participation in the labor market. Indirectly, this indicator helps q embed in our estimation the local propensity for women to be an active part of the labor force[21] and thus represents the degree to which the local environment nurtures women's entrepreneurship. Due to the high collinearity among these three proxies, we introduce them into the regression separately. Beyond that, we also include an indicator of the competitiveness of firms in a province by examining their degree of internationalization. More competitive firms are expected to be exporters; thus, following the literature, we include the *trade-openness index*, represented by the ratio of total trade flows in a province (i.e., imports plus exports) to the province's total GDP. Finally, returning to the idea discussed in Sections 1 and 2, namely that the association between FDI and local female entrepreneurship is more likely to occur in the service sector, we approximate a territory's potential economic attractiveness through *the relative importance of services*, calculated as the share of services (in terms of value added) in total provincial GDP. Apart from the control variables, our baseline specification includes time fixed effects (θ_t) and province fixed effects (δ_p).

[18] Larger provinces are likely to host proportionally more firms simply due to their size. Therefore, we normalize the absolute number of firms (domestic or foreign) by the total area (in km2) of the corresponding province.
[19] Table A.2 in Appendix A provides the sources and the main descriptive statistics of the control variables.
[20] The variable *Employment* refers to the total number of employed individuals in a province, including employees and self-employed individuals, whereas the variable *Employee* refers to individuals hired to perform work tasks for an employer.
[21] In line with the discussion proposed by Li et al. (2025).

The latter allows us to control for time-invariant provincial characteristics that reflect socioeconomic conditions and, more generally, local public policies or legal frameworks that contribute to the business environment and may differ across provinces. Finally, we cluster standard errors at the provincial level.

Our empirical strategy for estimating Equation (1) is developed according to the three channels identified in Section 1. First, in Table 4, we begin by focusing on the direct relationship between FDI and female entrepreneurship (according to our *first channel* exploiting the assumption that FDI outsources production tasks). Then, given our interest in homophily as a possible mechanism through which FDI can foster the creation of local women-owned firms (s*econd channel*), we modify the structure of Equation (1) and focus our attention on Equation (2):

$$\ln DNWF_{p,t} = \alpha_0 + \alpha_1 \ln DSTCW_{p,t-1} + \alpha_2 \ln DSTCM_{p,t-1} + \boldsymbol{\beta}' \boldsymbol{X_{p,t-1}} + \theta_t + \delta_p + \varepsilon_{p,t} \quad (2)$$

In Equation (2), we introduce as regressors the variable *lnDSTCW*$_{p,t-1}$ (*Natural logarithm of the Density stock of total companies with women in managerial positions*, in province *p* in year *t-1*), which refers to the density of the stock of companies in which women represent at least 33.3% of the management team, and the variable *lnDSTCM*$_{p,t-1}$ (*Natural logarithm of the Density stock of total companies with mainly men in managerial positions*, in province *p* in year *t-1*), which refers to the density of the stock of companies in which women represent less than 33.3% of the management team. These two regressors aim to capture the existence of any homophily effect, which is expected to be associated with the presence of a minimum number of women on firms' management boards and the creation of women-owned firms.[22] The control variables ($\boldsymbol{X}_{p,t-1}$) and the fixed effects are the same as those used in Equation (1). Estimations for Equation (2) appear in Table 5.

However, *H1* calls for identifying possible homophily effects stemming from FDI. Therefore, we estimate a version of Equation (2) in which we consider the presence of women on the management boards of foreign companies in province *p* in year *t-1 (third channel)*. In this respect, this specific effect is examined by estimating Equation (3), which is derived from Equation (2):

$$\ln DNWF_{p,t} = \alpha_0 + \alpha_1 \ln DSFCW_{p,t-1} + \alpha_2 \ln DSFCM_{p,t-1} + \boldsymbol{\beta}' \boldsymbol{X_{p,t-1}} + \theta_t + \delta_p + \varepsilon_{p,t} \quad (3)$$

where the variable *lnDSFCW*$_{p,t-1}$ (*Natural logarithm of the Density stock of foreign companies with women in managerial positions,* in province *p* in year *t-1*) refers to the density of foreign companies (FDI stock) in which women represent at least 33.3% of the management team, whereas the variable *lnDSFCM*$_{p,t-1}$ (*Natural logarithm of the Density stock of foreign companies with mainly men in managerial positions* in province *p* in year *t-1*) refers to the density of foreign companies (FDI stock) in which women represent less than 33.3% of the management team. The control variables ($\boldsymbol{X}_{p,t-1}$) and the fixed effects are the same as those used in Equation (1). Estimations for Equation (3) appear in Table 6.

[22]In this framework, our main results are built upon the assumption that 33.3% is a sufficient share of women on the management board for homophily effects to influence the decision-making process. For a robustness check, we also perform the analysis using alternative thresholds, namely one woman and 50% women in managerial positions. The results are confirmed (see Appendix C), and we also detect a progressive increase in the potential homophily effects as women's representation on the management board increases. Specifically, the estimated coefficient becomes larger as we move from only one woman to 50% women.

Table 4
Dependent variable: Log density new women-owned firms (2005–2016)
Econometric model: Panel fixed effects

Dependent variable: *Log DNWF$_{p,t}$*		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln*DSDC$_{p,t-1}$*	ln density stock domestic companies	-0.0120	-0.0077	-0.0475*	-0.047**	-0.046**	-0.0113	-0.0069	-0.0470*
		(0.0216)	(0.0213)	(0.0241)	(0.0204)	(0.0211)	(0.0217)	(0.0213)	(0.0244)
ln*DSFC$_{p,t-1}$*	ln density stock foreign companies (FDI stock)	0.0652***	0.0659***	0.0724***	0.0704***	0.0717***	0.0656***	0.0663***	0.0727***
		(0.0156)	(0.0160)	(0.0179)	(0.0142)	(0.0138)	(0.0156)	(0.0161)	(0.0177)
ln*X$_{p,t-1}$*	ln density total employment	-0.501***					-0.502***		
		(0.0706)					(0.0705)		
	ln density employees		-0.5503***					-0.5522***	
			(0.0668)					(0.0666)	
	ln density total female employment			0.0159*					0.0159*
				(0.0085)					(0.0085)
	Index of openness to trade				-0.0072				
					(0.0050)				
	Relative importance services					-0.0019	0.0072	0.0084	0.0061
						(0.0213)	(0.0151)	(0.0143)	(0.0189)
	Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Observations	600	600	550	600	600	600	600	550
	R2 (within)	0.6686	0.6781	0.5873	0.6128	0.6110	0.6687	0.6783	0.5874

Note: Constant included. The explanatory variables are lagged one year. Robust standard errors clustered by province are reported in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01.

Table 5
Dependent variable: ln density new women-owned firms (2005–2016)
Econometric model: Panel fixed effects

Dependent variable: *Log DNWF$_{p,t}$*		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln*DSTCW$_{p,t-1}$*	ln density stock total companies with women in management positions	0.0345**	0.0364***	0.0346**	0.0312**	0.0323**	0.0345**	0.0364***	0.0346**
		(0.0134)	(0.0132)	(0.0167)	(0.0136)	(0.0135)	(0.0134)	(0.0133)	(0.0168)
ln*DSTCM$_{p,t-1}$*	ln density stock total companies with men in management positions	-0.0108	-0.0062	-0.0630*	-0.0652*	-0.0642*	-0.0108	-0.0061	-0.0629*
		(0.0252)	(0.0241)	(0.0362)	(0.0357)	(0.0364)	(0.0256)	(0.0246)	(0.0368)
ln*X$_{p,t-1}$*	ln density total employment	-0.7064***					-0.7065***		
		(0.0902)					(0.0881)		
	ln density employees		-0.7593***					-0.7597***	
			(0.0865)					(0.0848)	
	ln density total female employment			0.0129					0.0129
				(0.0077)					(0.0077)
	Index of openness to trade				-0.0115				
					(0.0079)				
	Relative importance services					-0.0135	0.0007	0.0019	0.0024
						(0.0403)	(0.0228)	(0.0214)	(0.0327)
	Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Observations	600	600	550	600	600	600	600	550
	R2 (within)	0.6079	0.6241	0.4734	0.4808	0.4766	0.6079	0.6241	0.4734

Note: Constant included. The explanatory variables are lagged one year. The variable *Stock of total firms with women in managerial positions* refers to the number of companies in which women represent at least 33.3% of the management team, whereas the variable *Stock of total firms with mainly men in managerial positions* refers to the number of companies in which women represent less than 33.3% of the management team. Robust standard errors clustered by province are reported in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01.

This first set of estimations delivers a few basic results. As one might expect, the density of FDI stock at the provincial level has a statistically significant positive impact on firm creation (Table 4), even after controlling for the previously defined fixed effects. Female entrepreneurship is driven by the stock of foreign companies in the same province (but not domestic companies), and it is positively associated with the density of other women-led firms (Table 5). There appears to be no effect from FDI firms with a sizable number of women in managerial positions on the creation of women-owned firms. Rather, this effect stems from FDI firms with mainly men in managerial positions (Table 6). Regarding this first set of estimations, the magnitude of the estimated coefficients for the stock of foreign companies is statistically significant whereas the one for the domestic companies is not, providing evidence that the impact on local entrepreneurship is more strongly associated with incoming FDI.

Table 6
Dependent variable: ln density new women-owned firms (2005–2016)
Econometric model: Panel fixed effects

Dependent variable: *Log DNWF$_{p,t}$*		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln*DSFCW$_{p,t-1}$*	ln density stock foreign companies (FDI stock) with women in management positions	0.0265 (0.0344)	0.0292 (0.0331)	0.0450 (0.0418)	0.0317 (0.0438)	0.0319 (0.0436)	0.0262 (0.0347)	0.0290 (0.0334)	0.0449 (0.0419)
ln*DSFCM$_{p,t-1}$*	ln density stock foreign companies (FDI stock) with men in management positions	0.0738** (0.0318)	0.0707** (0.0301)	0.0988** (0.0424)	0.0999** (0.0423)	0.1005** (0.0425)	0.0742** (0.0321)	0.0711** (0.0305)	0.0990** (0.0429)
ln*X$_{p,t-1}$*	ln density total employment	-0.5014*** (0.0589)					-0.5009*** (0.0585)		
	ln density salaried workers		-0.5419*** (0.0549)					-0.5413*** (0.0544)	
	ln density total female employment			0.0107 (0.0077)					0.0108 (0.0076)
	Index of openness to trade				-0.0035 (0.0053)				
	Relative importance services					0.0143 (0.0173)	0.0121 (0.0155)	0.0117 (0.0152)	0.0192 (0.0171)
	Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Observations	600	600	550	600	600	600	600	550
	R2 (within)	0.6832	0.6928	0.5944	0.6150	0.6151	0.6836	0.6932	0.5954

Note: Constant included. The explanatory variables are lagged one year. The variable *Stock of foreign companies with women in managerial positions* refers to the number of foreign companies in which women represent at least 33.3% of the management team, whereas the variable *Stock of foreign companies with mainly men in managerial positions* refers to the number of foreign companies in which women represent less than 33.3% of the management team. Robust standard errors clustered by province are reported in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01.

In all specifications, the control variables serving as proxies for employment levels indicate a negative relationship between employment and the creation of women-owned firms. In this sense, at the provincial level, female entrepreneurship appears to be a substitute for employment in local firms or FDI companies. However, the positive correlation between female employment and female entrepreneurship (Table 4) underscores that a sizable presence of women in the local labor market reflects the active participation of women in the local economy and, hence, a supportive environment in which women-owned enterprises can grow. Finally, the estimated coefficients for trade openness and the relative importance of the service sector in the host economy are not statistically significant. This result suggests that women-owned firms are not always market-oriented, especially in international markets, and indirectly confirms the local orientation of these firms.

All in all, the most robust result in this first set of estimations is the gender-based association between new women-owned firms and FDI stock in each province, irrespective of whether these firms have women in managerial positions. Several arguments may help explain this result. From this perspective, the presence of FDI stock in a province is likely to reflect the existence of a tacit business culture that favors the outsourcing of services to self-employment firms. In this view, the tendency to rely on this organizational choice may be associated with perceptions regarding female productivity and women's capacity to provide subcontracted services efficiently (Bohnet, 2016), a feature that is particularly relevant in the production processes of globally competing MNEs. Second, the stock of domestic companies does not appear to create an environment that catalyzes local female entrepreneurship. This finding supports *H1* concerning the potential impact of MNEs on local entrepreneurship through outsourcing strategies.

Furthermore, the preliminary descriptive analysis emphasizes the relevance of the spatial dimension in explaining the distribution of new firms created by women; therefore, spatial autocorrelation is an important feature to incorporate into the analysis. To address this issue, we augment the setting presented in Equation (1) with spatial features. According to the likelihood ratio (LR) tests, the SLX (*spatial lag of X*) framework proves to be the statistically preferred specification.[23] We therefore rely on the SLX model to identify the possible existence of direct

[23] Table B.1 in Appendix B presents the results of the LR tests. On the one hand, when OLS and SLX models are compared, the null hypothesis $\mu = 0$ is rejected, indicating that the SLX model is more appropriate. On the other, when SLX and Spatial Durbin models (SDM) are compared, the null hypothesis $\rho = 0$ cannot be rejected, indicating that including the spatial lag of the dependent variable is unnecessary. In substantive terms, identifying the SLX model as the most appropriate specification implies that positive spillovers stem solely from the spatial autocorrelation of independent variables, also known as exogenous spillovers, as discussed by Elhorst (2014).

(within-province) and indirect (across-province) spillover effects. This framework allows us to assess the extent to which FDI stock exerts a positive impact on female entrepreneurship within the same province or across provinces (*H2*).

We model our framework by limiting the analysis to neighboring provinces and considering the spatial weight matrix as a first-order contiguity matrix (**W**) among provinces.[24] The empirical framework for the spatial analysis is an augmented version of Equation (1), which is now specified as Equation (4):

$$\begin{aligned}\ln DNWF_{p,t} = {} & \alpha_0 + \alpha_1 \ln DSDC_{p,t-1} + \alpha_2 \ln DSFC_{p,t-1} + \boldsymbol{\beta}' \boldsymbol{X_{p,t-1}} \\ & + \boldsymbol{W}\left[\mu_1 \ln DSDC_{p,t-1} + \mu_2 \ln DSFC_{p,t-1} + \boldsymbol{\gamma}' \boldsymbol{X_{p,t-1}}\right] + \theta_t + \delta_p + \varepsilon_{p,t}\end{aligned} \tag{4}$$

Similarly, the spatial analysis of Equation (2) is specified as Equation (5):

$$\begin{aligned}\ln DNWF_{p,t} = {} & \alpha_0 + \alpha_1 \ln DSTCW_{p,t-1} + \alpha_2 \ln DSTCM_{p,t-1} + \boldsymbol{\beta}' \boldsymbol{X_{p,t-1}} \\ & + \boldsymbol{W}\left[\mu_1 \ln DSTCW_{p,t-1} + \mu_2 \ln DSTCM_{p,t-1} + \boldsymbol{\gamma}' \boldsymbol{X_{p,t-1}}\right] + \theta_t + \delta_p + \varepsilon_{p,t}\end{aligned} \tag{5}$$

Similarly, the spatial version of Equation (3) is specified as Equation (6):

$$\begin{aligned}\ln DNWF_{p,t} = {} & \alpha_0 + \alpha_1 \ln DSFCW_{p,t-1} + \alpha_2 \ln DSFCM_{p,t-1} + \boldsymbol{\beta}' \boldsymbol{X_{p,t-1}} \\ & + \boldsymbol{W}\left[\mu_1 \ln DSFCW_{p,t-1} + \mu_2 \ln DSFCM_{p,t-1} + \boldsymbol{\gamma}' \boldsymbol{X_{p,t-1}}\right] + \theta_t + \delta_p + \varepsilon_{p,t}\end{aligned} \tag{6}$$

Estimation of Equations (4), (5), and (6) by maximum likelihood allows us to identify the effects of the selected covariates on the dependent variable, thereby enabling the identification of direct, indirect, and total effects (Tables 7, 8, and 9). As a robustness check, we perform the analysis exclusively for the service sectors: wholesale, accommodation, and communication (G–J); financial and professional services (K–N); and education, health, entertainment, and household services (O–U) (Appendix B, Tables B.2, B.3, and B.4).

The selected spatial model proves effective in detecting the spatial dependence of observations, particularly with respect to the potential homophily channel associating female entrepreneurship with the presence of women in managerial positions. By considering the spatial dimension, we find that women in managerial positions have a positive influence on the creation of local women-owned enterprises, but only within and not across provinces (Table 8). This result delivers an important insight: the homophily channel is effective if and only if we are able to construct a setting that accounts for direct interactions between agents or, at least, the probability that agents interact. The spatial analysis allows us precisely to capture this mechanism. The results are quite clear. Positive effects emerge only within and not across provinces. Thus, the positive externalities on entrepreneurship stemming from homophily appear to be largely self-contained provincial effects, given their networking dimension. Better-connected individuals tend to exhibit more complementary behaviors, and this effect is enhanced by spatial proximity (Jackson, 2014). Furthermore, a competition effect seems to arise across provinces between firms established within a province and those located in neighboring provinces. The tendency for female entrepreneurship to be positively associated with FDI within each spatial unit is likely to generate competition among provinces. Each province benefits directly from the presence of FDI within its territory, thereby limiting the potential positive spillovers that FDI could otherwise generate across provinces (Table 7).

In addition, the spatial dimension reveals the positive statistical significance regarding the effect of women in managerial positions within foreign companies (MNEs) on the creation of women-owned firms (Table 9). The presence of mainly men in managerial positions has a positive direct effect within provinces but a negative indirect effect across provinces, resulting in a statistically insignificant total effect. In contrast, the presence of women in managerial positions often generates positive effects both within and across provinces, resulting in a positive and statistically significant total effect.[25] This outcome is likely associated with the sizable gender imbalance in

[24] Stakhovych and Bijmolt (2009) discuss the value of selecting a contiguity matrix in spatial analysis.

[25] This result is even stronger when we use a stricter threshold to define women-led firms (50% rather than 33.3%; see Table C.4).

managerial positions, with the number of men in managerial positions being approximately three times larger than the number of women (see Table 1). Therefore, for the homophily effect associated with women in managerial positions within FDI firms to be effective, a critical mass of such women appears to be required. In this respect, direct and indirect effects appear to be complementary rather than substitutive.[26]

As anticipated, we also estimate the same spatial framework for women-owned firms operating only in selected service areas (Appendix B, Tables B.2, B.3, and B.4). The previous results are confirmed, although the estimated effects of FDI and the homophily proxy on the creation of new women-owned businesses are even larger. In the case of FDI stock, the negative indirect effect across provinces is offset by the positive direct effect within provinces, resulting in a positive and statistically significant total effect. This result is consistent with our underlying assumption that one channel through which FDI affects female entrepreneurship is the outsourcing of service activities that women may be more likely to perform as self-employed entrepreneurs.

The spatial effects associated with female entrepreneurship and FDI stock are largely local (within provinces) when our estimations do not explicitly account for the homophily channel (Table 7). Positive spillovers from neighboring provinces are limited and are observed primarily when we consider FDI firms with a sizable number of women in managerial positions (Table 9), whereas they appear as negative effects when referring to the stock of total firms (Table 8). In Table 9, it is the stock of foreign companies with women in managerial positions that has the strongest positive direct impact on the female entrepreneurship rate within the province, whereas the stock of foreign companies with mainly men in managerial positions negatively affects this rate. Female entrepreneurship is positively associated with FDI stock when a sizable number of women are represented on the management team; it also benefits from positive spillovers generated by similar FDI firms in neighboring provinces. Consequently, the total effect is positive and statistically significant. The opposite pattern holds for companies with mainly men in managerial positions, where the indirect effect is negative and the total effect is not significant. In the case of business-oriented services, particularly with high-skill professional services, this effect may be driven by the outsourcing of production or administrative tasks to local firms that have greater knowledge of local institutions and administrative procedures. By contrast, growth in female entrepreneurship in less business-oriented sectors may reflect the demand for complementary services generated by highly skilled employees working in MNEs and not necessarily linked to the firms' core business activities.[27]

Another interesting feature of these estimations is the consistent statistical relevance of the proxies for the local economic environment across provinces, particularly in terms of indirect effects. Spillover effects associated with local labor-market size may have a dual interpretation. First, local employment may generate positive spillovers for female entrepreneurship only once a minimum scale is achieved, a threshold that may not be reached within a single province. Second, high employment levels in geographically proximate provinces may signal the presence of domestic companies or FDI firms that can become potential clients or markets for newly created firms in neighboring provinces.

[26] The effect differs from that detected for overall FDI stock (Table 7), for which a significant competition effect appears across spatial units, as reflected by the negative coefficients associated with the indirect spillover effects and the stronger direct effects associated with FDI stock within each spatial unit (i.e., province).

[27] For instance, household services may be required by the managers of both domestic and foreign companies because their specialized tasks generate substantial opportunity costs, making it efficient to delegate personal tasks or duties.

Table 7

Dependent variable: ln density new women-owned firms (2005–2016)
Econometric model: SLX Panel fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Direct effect								
ln density stock domestic companies	-0.0105	-0.0066	-0.0505***	-0.0446***	-0.0466***	-0.0125	-0.0084	-0.0518***
	(0.0084)	(0.0083)	(0.0093)	(0.0082)	(0.0084)	(0.0085)	(0.0085)	(0.0095)
ln density stock foreign companies (FDI stock)	0.0611***	0.0621***	0.0627***	0.0630***	0.0663***	0.0632***	0.0641***	0.0640***
	(0.0056)	(0.0055)	(0.0074)	(0.0060)	(0.0061)	(0.0057)	(0.0056)	(0.0075)
ln density total employment	-0.4697***					-0.477***		
	(0.0520)					(0.0520)		
ln density employees		-0.5173***					-0.526***	
		(0.0523)					(0.0524)	
ln density total female employment			0.0115**					0.0116**
			(0.0058)					(0.0058)
Index of openness to trade				-0.0053				
				(0.0044)				
Relative importance services					-0.0001	0.0035	0.0042	0.0033
					(0.0161)	(0.0149)	(0.0147)	(0.0169)
Indirect effect								
ln density stock domestic companies	0.0020	-0.0022	0.0216	0.0354**	0.0510***	0.0098	0.0060	0.0275
	(0.0141)	(0.0141)	(0.0163)	(0.0144)	(0.0138)	(0.0147)	(0.0147)	(0.0174)
ln density stock foreign companies (FDI stock)	-0.0343***	-0.0362***	-0.0340**	-0.0255*	-0.0269**	-0.0413***	-0.0430***	-0.0360**
	(0.0124)	(0.0121)	(0.0166)	(0.0131)	(0.0135)	(0.0129)	(0.0126)	(0.0169)
ln density total employment	0.3572**					0.3164*		
	(0.1649)					(0.1662)		
ln density employees		0.3805**					0.3277*	
		(0.1699)					(0.1720)	
ln density total female employment			0.0440***					0.0418***
			(0.0098)					(0.0100)
Index of openness to trade				-0.0148				
				(0.0099)				
Relative importance services					0.0263	0.0305*	0.0303*	0.0181
					(0.0174)	(0.0159)	(0.0158)	(0.0193)
Total effect								
ln density stock domestic companies	-0.0085	-0.0088	-0.0289	-0.0091	0.0044	-0.0027	-0.0024	-0.0242
	(0.0154)	(0.0154)	(0.0187)	(0.0161)	(0.0155)	(0.0159)	(0.0159)	(0.0195)
ln density stock foreign companies (FDI stock)	0.0268*	0.0259*	0.0287	0.0375**	0.0393***	0.0219	0.0211	0.0280
	(0.0141)	(0.0138)	(0.0183)	(0.0149)	(0.0150)	(0.0144)	(0.0159)	(0.0185)
ln density total employment	-0.1126					-0.1608		
	(0.1798)					(0.1516)		
ln density employees		-0.1369					-0.1980	
		(0.1851)					(0.1878)	
ln density total female employment			0.0555***					0.0534***
			(0.0114)					(0.0116)
Index of openness to trade				-0.0201*			0.0345	
				(0.0105)			(0.0215)	
Relative importance services					0.0262	0.0340	0.3164*	0.0215
					(0.0232)	(0.0217)	(0.1662)	(0.0260)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	600	550	600	600	600	600	550
Log likelihood	2220.89	2228.46	1991.75	2179.63	2178.78	2222.75	2230.34	1992.21
AIC	-4405.77	-4420.91	-3947.51	-4323.26	-4321.57	-4405.50	-4420.68	-3946.42
BIC	-4326.63	-4341.77	-3869.93	-4244.11	-4242.42	-4317.56	-4332.74	-3864.53

Note: Maximum likelihood estimation. Constant included. The explanatory variables are lagged one year. Standard errors are reported in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01. A standardized contiguity matrix is used. Dimension: 50x50. Normalization method: spectral (the matrix is normalized so that its largest eigenvalue equals 1).

Table 8

Dependent variable: ln density new women-owned firms (2005–2016)
Econometric model: SLX Panel fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Direct effect								
ln density stock total companies with women in management positions	0.0318*** (0.0040)	0.0335*** (0.0040)	0.0282*** (0.0055)	0.0269*** (0.0046)	0.0287*** (0.0046)	0.0320*** (0.0041)	0.0337*** (0.0040)	0.0287*** (0.0055)
ln density stock total companies with men in management positions	-0.0144* (0.0084)	-0.0100 (0.0083)	-0.0653*** (0.0091)	-0.0633*** (0.0083)	-0.0558*** (0.0088)	-0.0110 (0.0086)	-0.0068 (0.0085)	-0.0581*** (0.0096)
ln density total employment	-0.6323*** (0.0528)					-0.6204*** (0.0533)		
ln density employees		-0.6862*** (0.0528)					-0.6743*** (0.0534)	
ln density total female employment			0.0054 (0.0064)					0.0051 (0.0064)
Index of openness to trade				-0.0092* (0.0050)				
Relative importance services					-0.0043 (0.0179)	0.0010 (0.0160)	0.0018 (0.0157)	0.0064 (0.0185)
Indirect effects								
ln density stock total companies with women in management positions	-0.0235** (0.0091)	-0.0243*** (0.0089)	-0.0077 (0.0125)	-0.0174* (0.0104)	-0.0056 (0.0104)	-0.0197** (0.0094)	-0.0206** (0.0092)	-0.0037 (0.0126)
ln density stock total companies with mainly men in management positions	0.0231 (0.0145)	0.0204 (0.0144)	0.0740*** (0.0159)	0.0661*** (0.0151)	0.0662*** (0.0144)	0.0165 (0.0151)	0.0136 (0.0151)	0.0591*** (0.0173)
ln density total employment	0.2909 (0.1784)					0.3170* (0.1799)		
ln density employees		0.2663 (0.1837)					0.3015 (0.1862)	
ln density total female employment			0.0297*** (0.0108)					0.0350*** (0.0110)
Index of openness to trade				-0.0158 (0.0111)				
Relative importance services					-0.0484*** (0.0180)	-0.0263 (0.0162)	-0.0255 (0.0160)	-0.0463** (0.0202)
Total effect								
ln density stock total companies with women in management positions	0.0083 (0.0102)	0.0092 (0.0099)	0.0205 (0.0139)	0.0095 (0.012)	0.0231** (0.0116)	0.0123 (0.0104)	0.0131 (0.0102)	0.0249* (0.0140)
ln density stock total companies with mainly men in management positions	0.0087 (0.0156)	0.0104 (0.0155)	0.0086 (0.0185)	0.0028 (0.0164)	0.0104 (0.0156)	0.0044 (0.0104)	0.0069 (0.0159)	0.0010 (0.0189)
ln density total employment	-0.3415* (0.1931)					-0.3034 (0.1956)		
ln density employees		-0.4199** (0.1983)					-0.3728* (0.2020)	
ln density total female employment			0.0351*** (0.0125)					0.0401*** (0.0127)
Index of openness to trade				-0.0250** (0.0118)				
Relative importance services					-0.0527** (0.0250)	-0.0254 (0.0226)	-0.0236 (0.0223)	-0.0399 (0.0276)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	600	550	600	600	600	600	550
Log likelihood	2179.94	2189.72	1941.40	2114.76	2115.44	2181.26	2190.99	1944.10
AIC	-4323.89	-4343.43	-3848.79	-4193.53	-4194.87	-4322.52	-4341.99	-3850.21
BIC	-4244.74	-4264.29	-3775.52	-4114.38	-4115.73	-4234.58	-4254.05	-3768.32

Note: Maximum likelihood estimation. Constant included. The explanatory variables are lagged one year. The variable *Firms with women in managerial positions* refers to the number of companies in which women represent at least 33.3% of the management team, whereas the variable *Firms with mainly men in managerial positions* refers to the number of companies in which women represent less than 33.3% of the management team. Standard errors are reported in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01. A standardized contiguity matrix is used. Dimension: 50x50. Normalization method: spectral (the matrix is normalized so that its largest eigenvalue equals 1).

Table 9

Dependent variable: ln density new women-owned firms (2005–2016)
Econometric model: SLX Panel fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Direct effects								
ln density stock foreign companies (FDI) with	0.0288***	0.0308***	0.0385***	0.0316***	0.0351***	0.0251**	0.0271***	0.0398***
women in management positions	(0.0098)	(0.0096)	(0.0116)	(0.0108)	(0.0111)	(0.0100)	(0.0098)	(0.0119)
ln density stock foreign companies (FDI) with	0.0673***	0.0651***	0.0944***	0.0900***	0.0895***	0.0723***	0.0701***	0.0921***
mainly man in management positions	(0.0073)	(0.0073)	(0.0089)	(0.0077)	(0.0086)	(0.0079)	(0.0078)	(0.0098)
ln density total employment	-0.4666***					-0.4793***		
	(0.0458)					(0.0463)		
ln density employees		-0.5053***					-0.5185***	
		(0.0457)					(0.0462)	
ln density total female employment			0.0072					0.0071
			(0.0056)					(0.0056)
Index of openness to trade				-0.0022				
				(0.0044)				
Relative importance services					0.0106	0.0061	0.0057	0.0130
					(0.0160)	(0.0143)	(0.0141)	(0.0167)
Indirect effect								
ln density stock foreign companies (FDI) with	0.0565**	0.0581**	0.0536*	0.0267	0.0376	0.0615**	0.0632**	0.0505
women in management positions	(0.0.0269)	(0.0265)	(0.0314)	(0.0297)	(0.0295)	(0.0271)	(0.0267)	(0.0316)
ln density stock foreign companies (FDI) with	-0.0722***	-0.0740***	-0.0974***	-0.0712***	-0.0777***	-0.0853***	-0.0875***	-0.0901***
mainly man in management positions	(0.0198)	(0.0195)	(0.0247)	(0.0222)	(0.0238)	(0.0215)	(0.0211)	(0.0269)
ln density total employment	0.4300***					0.4355***		
	(0.1440)					(0.1439)		
ln density employees		0.4317***					0.4339***	
		(0.1469)					(0.1468)	
ln density total female employment			0.0416***					0.0417***
			(0.0093)					(0.0094)
Index of openness to trade				-0.0234**				
				(0.0093)				
Relative importance services					-0.0084	0.0250	0.0257*	-0.0106
					(0.0170)	(0.0155)	(0.0153)	(0.0186)
Total effect								
ln density stock foreign companies (FDI) with	0.0853***	0.0889***	0.0921***	0.0583*	0.0727**	0.0865***	0.0903***	0.0903***
women in management positions	(0.0290)	(0.0285)	(0.0336)	(0.0322)	(0.0317)	(0.2899)	(0.0285)	(0.0336)
ln density stock foreign companies (FDI) with	-0.0049	-0.0088	-0.0030	0.0187	0.0118	-0.0130	-0.0173	0.0021
mainly man in management positions	(0.0223)	(0.0219)	(0.0274)	(0.0247)	(0.0252)	(0.0229)	(0.0225)	(0.0282)
ln density total employment	-0.0366					-0.0438		
	(0.1606)					(0.1604)		
ln density employees		-0.0737					-0.0847	
		(0.1635)					(0.1633)	
ln density total female employment			0.0487***					0.0488***
			(0.0104)					(0.0104)
Index of openness to trade				-0.0257***				
				(0.0099)				
Relative importance services					0.0022	0.0311	0.0314	0.0024
					(0.0232)	(0.0210)	(0.0207)	(0.0250)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	600	550	600	600	600	600	550
Log likelihood	2234.33	2242.50	1991.53	2178.21	2175.09	2235.73	2244.01	1992.00
AIC	-4432.66	-4449.00	-3949.01	-4320.41	-4314.18	-4431.46	-4448.02	-3946.00
BIC	-4353.51	-4369.86	-3875.79	-4241.27	-4235.04	-4343.52	-4360.08	-3864.11

Note: Maximum likelihood estimation. Constant included. The explanatory variables are lagged one year. The variable *Stock of foreign companies with women in managerial positions* refers to the number of foreign companies in which women represent at least 33.3% of the management team, whereas the variable *Stock of foreign companies with mainly men in managerial positions* refers to the number of foreign companies in which women represent less than 33.3% of the management team. Standard errors are reported in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01. A standardized contiguity matrix is used. Dimension: 50x50. Normalization method: spectral (the matrix is normalized so that its largest eigenvalue equals 1).

5. Conclusion

In this study, we present novel quantitative evidence on the local spatial dependence between the rate of female entrepreneurship and FDI stock. Our analysis relies on a primary underlying hypothesis according to which spatial proximity increases the likelihood of interaction among economic agents. Consequently, the presence of MNEs can trigger the creation of local businesses, most notably through outsourcing, as evidence supports the idea that MNEs frequently outsource service activities linked to their core business. Given the absence of complete data tracking direct client–provider relationships, we develop an *ad-hoc* empirical strategy to model the likelihood of interaction between new women-owned firms (self-employment) and MNEs. Specifically, this potential interaction is modeled

using the spatial density of both types of economic agents within Spanish provinces, with *provinces* representing the smallest spatial unit available in our dataset. We assume that a higher density of local businesses and MNEs increases the probability of interaction due to a higher frequency of potential contacts. Furthermore, we hypothesize that the intensity of this interaction benefits from a homophily component along gender lines; specifically, MNEs with a sizable proportion of women on their management boards may exert positive spillover effects on the creation of women-owned firms. Identifying this dimension is particularly relevant, as female self-employment can serve as an effective mechanism for integrating women into the labor market and driving local economic growth.

Our results highlight the importance of the spatial dimension in shaping potential interaction effects between new women-owned enterprises and local economies. Focusing on the period 2005–2016 in Spain, we find that the emergence of new women-owned firms associated with MNE presence is most pronounced in urban and intermediate provinces, exhibiting sizable spillover effects in models that incorporate the gender homophily dimension. This outcome leads to two key considerations. First, the territorial dimension confirms our working hypothesis: our estimates show that the positive association between MNEs with strong female board representation and the creation of new women-owned firms occurs both within the same province and across neighboring provinces. Second, from a policy perspective, this result underscores the need for local administrations to implement coordinated, place-based policies to foster a conducive business environment and nurture entrepreneurship.

Nevertheless, the lack of transaction-level data on client–provider relationships prevents us from drawing definitive conclusions regarding the precise mechanisms linking the local business environment to female entrepreneurship. Given access to more detailed data on inter-firm connections, a promising avenue for future research would be to examine potential contagion effects in the creation of women-owned firms that extend beyond geographic proximity to neighboring provinces. Explicitly tracking business relationships would allow us to accurately identify suppliers and clients, providing a more precise diagnosis of territorial linkages and a more comprehensive identification of the drivers of local entrepreneurship.

In addition, another key assumption of this study is the approximation of the geographical boundaries of the market (for a new women-owned firm) with the province in which a firm is located (and in almost all the cases it coincides with the place of residence of the owner). Access to granular microdata would overcome this limitation, enabling future studies to determine the actual market reach of these firms and assess commuting patterns among business owners. Clarifying these two dimensions would help evaluate both the localized economic impact of these firms and the extent to which self-employment facilitates women's entry into regions where their labor market participation remains underdeveloped, thereby improving our understanding of their contribution to long-term regional growth.

Finally, it is worth noting that our findings reflect a short-term perspective, as we do not track the long-term survival or consolidation of these firms. Therefore, an important next step is to assess quantitatively whether the survival of FDI-driven female entrepreneurship fosters a more inclusive growth pattern. As suggested by Galor (2005), such a condition should positively influence local growth by increasing productivity through higher female employment, reinforced by consolidated territorial spillover effects both within and across provinces.

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Appendix

Appendix A: Data

Figure A.1: Map of Spanish provinces (52)



Authors: Gómez-Fernández, E., Javi C.S., and Mol, D. (2021); Creative Commons License CC BY-SA 3.0.

Table A.1: CNAE09 Classification

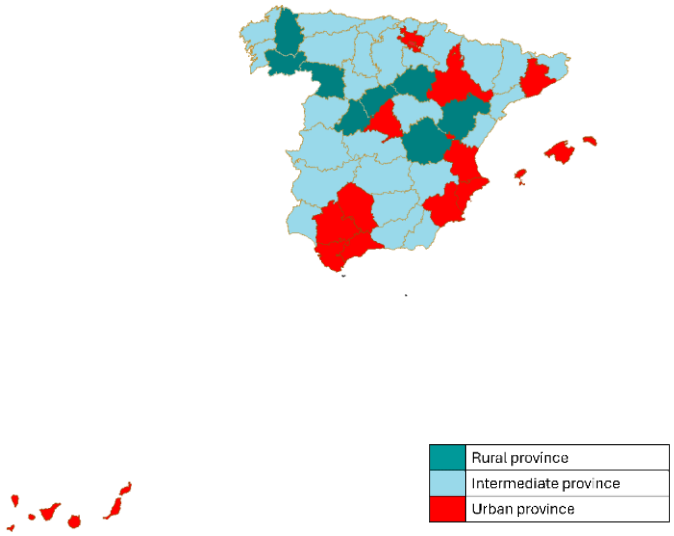
CNAE09 Code	Description
A	Agriculture, forestry, and fishing
B	Extractive industries
C	Manufacturing
D	Electricity, gas, steam, and air conditioning supply
E	Waste collection, treatment, and disposal activities; materials recovery
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific, and technical activities
N	Administrative and support service activities
O	Public administration and defense; compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment, and recreation
S	Other service activities
T	Household services
U	Activities of extraterritorial organizations and bodies

Table A.2: Control variables

Variables	Source	Units	Obs[3]	Mean	Stand. Dev	Max	Min
Employment[1]	EUROSTAT	Thousand	600	386.0	550.7	37.7	3448.1
Employees	EUROSTAT	Thousand	600	329.0	491.5	30.3	3109.3
Women employees	INE	Thousand	550	141.7	212.7	12.2	1293.5
Index of openness to trade[2]	DataComex EUROSTAT	Ratio	600	0.3667	0.2857	0.0473	1.8701
Relative importance services	INE	Ratio	600	0.6646	0.0783	0.5011	0.8621

Note: [1]According to the definition provided by EUROSTAT, the category *Employment* includes both employees and self-employed persons. [2]This index is calculated as the ratio between the total trade flows (exports plus imports) and the total GDP. [3]As we consider 50 provinces and 12 years (2004-2015), the total number of observations is 600, except for the variable *employment woman*, where there is not information for year 2004.

Figure A.2: Rural and Urban provinces



This map has been built by applying the EU definition (EU2019/1130, 2 July 2019), we are able to identify the rural and urban provinces in Spain. The definition introduced by the EU is:

1) Mostly *rural* province: At least 50% of the population lives in rural grid cells.
2) Mostly *intermediate* province: More than 50 % but less than 80 % of the population lives in urban agglomerations.
3) Mostly *urban* province: At least 80% of the population lives in urban agglomerations.

By applying the previous definition:

- *Urban* provinces are: Alicante, Álava, Illes Balears, Barcelona, Cádiz, Córdoba, Madrid, Málaga, Murcia, Las Palmas, Santa Cruz de Tenerife, Sevilla, Valencia, and Zaragoza.
- *Intermediate* provinces are: Albacete, Almería, Asturias, Badajoz, Bizkaia, Burgos, Cáceres, Cantabria, Castellón, Ciudad Real, A Coruña, Gipuzkoa, Girona, Granada, Guadalajara. Huelva, Huesca, Jaén, León, Lleida, Navarra, Palencia, Pontevedra, La Rioja, Salamanca, Tarragona, Toledo, and Valladolid.
- *Rural* provinces are: Ávila, Cuenca, Lugo, Ourense, Segovia, Soria, Teruel, and Zamora.

Appendix B: Spatial models selections and Robustness checks

Table B.1

LR tests to select the spatial model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Table 7								
OLS versus SLX	30.44	29.45	48.50	33.50	34.33	33.94	32.91	49.29
$(H_0: \mu = 0)$	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
SLX versus SDM	2.09	2.43	0.57	0.11	0.16	1.98	2.28	0.53
$(H_0: \rho = 0)$	[0.1487]	[0.1188]	[0.4503]	[0.7377]	[0.6923]	[0.1596]	[0.1312]	[0.4676]
Table 8								
OLS versus SLX	41.03	37.39	62.67	65.09	70.83	43.66	39.93	75.07
$(H_0: \mu = 0)$	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
SLX versus SDM	0.87	0.99	0.01	0.06	0.05	0.92	1.07	0.00
$(H_0: \rho = 0)$	[0.3518]	[0.3192]	[0.9372]	[0.8036]	[0.8169]	[0.3372]	[0.3007]	[0.9950]
Table 9								
OLS versus SLX	32.49	31.89	39.41	27.44	21.06	34.61	34.26	39.11
$(H_0: \mu = 0)$	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0001]	[0.0000]	[0.0000]	[0.0000]
SLX versus SDM	0.69	0.76	0.09	0.01	0.00	0.55	0.60	0.11
$(H_0: \rho = 0)$	[0.4052]	[0.3847]	[0.7641]	[0.9355]	[0.9487]	[0.4570]	[0.4401]	[0.7367]

Notes: Ordinary least square (OLS), spatial lag of X model (SLX), and spatial Durbin model (SDM). p values are in square brackets

Table B.2

Dependent variable: ln density new women firms (2005-2016) (Service sectors)
Econometric model: SLX Panel fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Direct effect								
ln density stock domestic companies	-0.0142*	-0.0106	-0.0475***	-0.0451***	-0.0467***	-0.0160**	-0.0122	-0.0485***
	(0.0078)	(0.0077)	(0.0085)	(0.0076)	(0.0077)	(0.0079)	(0.0079)	(0.0087)
ln density stock foreign companies (FDI stock)	0.0652***	0.0661***	0.0684***	0.0668***	0.0702***	0.0672***	0.0681***	0.0696***
	(0.0052)	(0.0051)	(0.0068)	(0.0055)	(0.0056)	(0.0053)	(0.0052)	(0.0069)
ln density total employment	-0.4253***					-0.4326***		
	(0.0482)					(0.0482)		
ln density salaried workers		-0.4697***					-0.4779***	
		(0.0486)					(0.0486)	
ln density total female employment			0.0112**					0.0113**
			(0.0053)					(0.0053)
Index of openness to trade				-0.0063				
				(0.0041)				
Relative importance services					0.0007	0.0045	0.0052	0.0048
					(0.0148)	(0.0138)	(0.0137)	(0.0154)
Indirect effect								
ln density stock domestic companies	-0.0002	-0.0041	0.0154	0.0261**	0.0418***	0.0072	0.0039	0.0208
	(0.0131)	(0.0131)	(0.0148)	(0.0132)	(0.0127)	(0.0136)	(0.0136)	(0.0159)
ln density stock foreign companies (FDI stock)	-0.0353***	-0.0368***	-0.0349**	-0.0273**	-0.0280**	-0.0419***	-0.0433***	-0.0364**
	(0.0115)	(0.0137)	(0.0151)	(0.0121)	(0.0124)	(0.0120)	(0.0117)	(0.0154)
ln density total employment	0.2614*					0.2216		
	(0.1530)					(0.1542)		
ln density salaried workers		0.2814*					0.2297	
		(0.1577)					(0.1596)	
ln density total female employment			0.0370***					0.0351***
			(0.0089)					(0.0091)
Index of openness to trade				-0.0151*				
				(0.0091)				
Relative importance services					0.0244	0.0289*	0.0289**	0.0157
					(0.0158)	(0.0148)	(0.0146)	(0.0176)
Total effect								
ln density stock domestic companies	-0.0145	-0.0146	-0.0321*	-0.0190	-0.0049	-0.0088	-0.0083	-0.0277
	(0.0143)	(0.0143)	(0.0170)	(0.0148)	(0.0143)	(0.0147)	(0.0147)	(0.0177)
ln density stock foreign companies (FDI stock)	0.0299**	0.0292**	0.0335**	0.0395***	0.0422***	0.0253*	0.0248*	0.0463**
	(0.0131)	(0.0128)	(0.0166)	(0.0138)	(0.0138)	(0.0134)	(0.0130)	(0.0168)
ln density total employment	-0.1639					-0.2110		
	(0.1668)					(0.1684)		
ln density salaried workers		-0.1883					-0.2482	
		(0.1717)					(0.1742)	
ln density total female employment			0.0483***					0.0463***
			(0.0104)					(0.0106)
Index of openness to trade				-0.0213**				
				(0.0096)				
Relative importance services					0.0251	0.0334*	0.0341*	0.0205
					(0.0214)	(0.0202)	(0.0200)	(0.0237)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	600	550	600	600	600	600	550
Log likelihood	2262.17	2269.58	2038.48	2224.71	2223.11	2264.13	2271.60	2038.91
AIC	-4488.33	-4503.16	-4042.95	-4413.42	-4410.22	-4488.26	-4503.20	-4039.83
BIC	-4409.18	-4424.02	-3969.68	-4334.27	-4331.07	-4400.32	-4415.26	-3957.94

Note: The service sectors include wholesale, accommodation, and communication (G–J); financial and professional services (K–N); and education, health, entertainment, and household services (O–U). Maximum likelihood estimation. Constant included. The explanatory variables are lagged one year. Standard errors are in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01. A standardized contiguity matrix is used. Dimension 50x50. Normalization method: spectral (the matrix will be normalized so that its largest eigenvalue is 1).

Table B.3

Dependent variable: ln density new women firms (2005-2016) (Service sectors)
Econometric model: SLX Panel fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Direct effect								
ln density stock total companies with	0.0319***	0.0335***	0.0293***	0.0271***	0.0291***	0.0320***	0.0337***	0.0298***
women in manag. positions	(0.0039)	(0.0038)	(0.0051)	(0.0044)	(0.0043)	(0.0039)	(0.0038)	(0.0051)
ln density stock total companies with	-0.0208***	-0.0165**	-0.0665***	-0.0670***	-0.0588***	-0.0168**	-0.0128	-0.0586***
mainly men in manag. positions	(0.0080)	(0.0079)	(0.0086)	(0.0079)	(0.0083)	(0.0083)	(0.0082)	(0.0090)
ln density total employment	-0.5978***					-0.5839***		
	(0.0505)					(0.0509)		
ln density salaried workers		-0.6488***					-0.6349***	
		(0.0505)					(0.0510)	
ln density total female employment			0.0051					0.0048
			(0.0060)					(0.0060)
Index of openness to trade				-0.0104**				
				(0.0047)				
Relative importance services					-0.0046	0.0012	0.0021	0.0069
					(0.0170)	(0.0153)	(0.0150)	(0.0173)
Indirect effect								
ln density stock total companies with	-0.0248***	-0.0253***	-0.0085	-0.0194*	-0.0067	-0.0203**	-0.0210**	-0.0043
women in manag. positions	(0.0087)	(0.0085)	(0.0117)	(0.0099)	(0.0099)	(0.0090)	(0.0088)	(0.0118)
ln density stock total companies with	0.0234*	0.0211	0.0701***	0.0590***	0.0588***	0.0157	0.0132	0.0539***
mainly men in manag. positions	(0.0139)	(0.0138)	(0.0149)	(0.0143)	(0.0137)	(0.0144)	(0.0144)	(0.0162)
ln density total employment	0.1842					0.2147		
	(0.1706)					(0.1718)		
ln density salaried workers		0.1532					0.1942	
		(0.1757)					(0.1779)	
ln density total female employment			0.0225**					0.0282***
			(0.0101)					(0.0103)
Index of openness to trade				-0.0159				
				(0.0106)				
Relative importance services					-0.0520***	-0.0307**	-0.0297*	-0.0503***
					(0.0171)	(0.0155)	(0.0153)	(0.0188)
Total effect								
ln density stock total companies with	0.0070	0.0082	0.0208	0.0078	0.0225**	0.0117	0.0127	0.0255*
women in manag. positions	(0.0097)	(0.0095)	(0.0130)	(0.0111)	(0.0110)	(0.0100)	(0.0097)	(0.0131)
ln density stock total companies with	0.0026	0.0046	0.0036	-0.0080	-0.0000	-0.0012	0.0005	-0.0047
mainly men in manag. positions	(0.0149)	(0.0149)	(0.0173)	(0.0156)	(0.0148)	(0.0152)	(0.0151)	(0.0177)
ln density total employment	-0.4136**					-0.2581**		
	(0.1846)					(0.1868)		
ln density salaried workers		-0.4956***					-0.4407**	
		(0.1897)					(0.1930)	
ln density total female employment			0.0276**					0.0330***
			(0.0117)					(0.0118)
Index of openness to trade				0.0263**				
				(0.0112)				
Relative importance services					-0.0566**	-0.0295**	-0.0276	-0.0435*
					(0.0238)	(0.0216)	(0.0213)	(0.0259)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	600	550	600	600	600	600	550
Log likelihood	2204.61	2214.17	1973.95	2142.99	2143.76	2206.58	2216.07	1977.59
AIC	-4373.23	-4392.35	-3913.89	-4249.98	-4251.52	-4373.16	-4392.13	-3917.18
BIC	-4294.08	-4313.20	-3840.62	-4170.84	-4172.38	-4285.23	-4304.190	-3835.29

Note: The service sectors include wholesale, accommodation, and communication (G–J); financial and professional services (K–N); and education, health, entertainment, and household services (O–U). Maximum likelihood estimation. Constant included. The explanatory variables are lagged one year. The variable *Stock of total companies with women in managerial positions* refers to the number of companies in which women represent at least 33.3% of the management team, whereas the variable *Stock of total companies with mainly men in managerial positions* refers to the number of companies in which women represent less than 33.3% of the management team. Standard errors are in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01. A standardized contiguity matrix is used. Dimension 50x50. Normalization method: spectral (the matrix will be normalized so that its largest eigenvalue is 1).

Table B.4

Dependent variable: ln density new women firms (2005-2016) (Service sectors)
Econometric model: SLX Panel fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Direct effect								
ln density stock foreign companies (FDI)	0.0225**	0.0245***	0.0328***	0.0250**	0.0278***	0.0186**	0.0205**	0.0336***
with women in manag. positions	(0.0090)	(0.0089)	(0.0106)	(0.0100)	(0.0102)	(0.0092)	(0.0091)	(0.0108)
ln density stock foreign companies (FDI)	0.0774***	0.0753***	0.1020***	0.0983***	0.0988***	0.0827***	0.0807***	0.1006***
with mainly men in manag. positions	(0.0068)	(0.0067)	(0.0080)	(0.0071)	(0.0079)	(0.0073)	(0.0072)	(0.0089)
ln density total employment	-0.4302***					-0.4435***		
	(0.0423)					(0.0428)		
ln density salaried workers		-0.4658***					-0.4796***	
		(0.0423)					(0.0427)	
ln density total female employment			0.0065					0.0065
			(0.0051)					(0.0051)
Index of openness to trade				-0.0029				
				(0.0041)				
Relative importance services					0.0126	0.0088	0.0085	0.0146
					(0.0147)	(0.0132)	(0.0130)	(0.0151)
Indirect effect								
ln density stock foreign companies (FDI)	0.0586**	0.0602**	0.0593**	0.0337	0.0449*	0.0636**	0.0652***	0.0568**
with women in manag. positions	(0.0249)	(0.0245)	(0.0285)	(0.0273)	(0.0272)	(0.0251)	(0.0247)	(0.0287)
ln density stock foreign companies (FDI)	-0.0737***	-0.0749***	-0.0959***	-0.0711***	-0.0791***	-0.0873***	-0.0890***	-0.0906***
with mainly men in manag. positions	(0.0183)	(0.0180)	(0.0224)	(0.0205)	(0.0219)	(0.0199)	(0.0195)	(0.0244)
ln density total employment	0.3180**					0.3224**		
	(0.1332)					(0.1330)		
ln density salaried workers		0.3184**					0.3192**	
		(0.1359)					(0.0270)	
ln density total female employment			0.0346***					0.0346***
			(0.0085)					(0.0085)
Index of openness to trade				-0.0214**				
				(0.0085)				
Relative importance services					-0.0040	0.0262*	0.0270*	-0.0068
					(0.0156)	(0.0143)	(0.0141)	(0.0168)
Total effect								
ln density stock foreign companies (FDI)	0.0812***	0.0847***	0.0921***	0.0586**	0.0727**	0.0822***	0.0858***	0.0904***
with women in manag. positions	(0.0268)	(0.0264)	(0.0305)	(0.0296)	(0.0291)	(0.0268)	(0.0263)	(0.0305)
ln density stock foreign companies (FDI)	0.0037	0.0004	0.0061	0.0272	0.0197	-0.0046	-0.0083	0.0101
with mainly men in manag. positions	(0.0206)	(0.0203)	(0.0249)	(0.0227)	(0.0231)	(0.0212)	(0.0208)	(0.0256)
ln density total employment	-0.1123					-0.1211		
	(0.1485)					(0.1481)		
ln density salaried workers		-0.1474					-0.1604	
		(0.1512)					(0.1509)	
ln density total female employment			0.0411***					0.0411***
			(0.0094)					(0.0094)
Index of openness to trade				-0.0243***				
				(0.0091)				
Relative importance services					0.0086	0.0351*	0.0355*	0.0078
					(0.0214)	(0.0194)	(0.0191)	(0.0226)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	600	550	600	600	600	600	550
Log likelihood	2277.39	2285.43	2040.31	2224.18	2221.00	2279.30	2287.49	2040.86
AIC	-4519.78	-4534.87	-4046.61	-4412.37	-4405.99	-4518.60	-4534.98	-4041.71
BIC	-4439.63	-4455.72	-3973.35	-4333.22	-4326.85	-4430.66	-4447.04	-3955.51

Note: The service sectors include wholesale, accommodation, and communication (G–J); financial and professional services (K–N); and education, health, entertainment, and household services (O–U). Maximum likelihood estimation. Constant included. The explanatory variables are lagged one year. The variable *Stock of foreign firms with women in managerial positions* refers to the number of foreign companies in which women represent at least 33.3% of the management team, whereas the variable *Stock of foreign firms with mainly men in managerial positions* refers to the number of foreign companies in which women represent less than 33.3% of the management team. Standard errors are in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01. A standardized contiguity matrix is used. Dimension 50x50. Normalization method: spectral (the matrix will be normalized so that its largest eigenvalue is 1).

Appendix C: Additional robustness checks

In this Appendix, we implement empirical estimations using alternative thresholds to define women-led firms. Specifically, we consider a flexible threshold that requires at least one woman on the management team, and a stricter threshold under which women represent at least 50% of the management team. First, we replicate the results from Table 8: Table C.1 applies the flexible threshold, while Table C.2 applies the stricter threshold.

Table C.1: Table 8 with a flexible threshold to define women-led companies

Dependent variable: ln density new women firms (2005-2016)
Econometric model: SLX Panel fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Direct effect								
ln density stock total companies with	0.0325***	0.0340***	0.0296***	0.0281***	0.0298***	0.0326***	0.0342***	0.0301***
women in manag. positions	(0.0039)	(0.0038)	(0.0053)	(0.0044)	(0.0044)	(0.0039)	(0.0038)	(0.0053)
ln density stock total companies with	-0.0091	-0.0050	-0.0569***	-0.0559***	-0.0487***	-0.0060	-0.0020	-0.0500***
mainly men in manag. positions	(0.0082)	(0.0081)	(0.0090)	(0.0082)	(0.0086)	(0.0085)	(0.0083)	(0.0095)
ln density total employment	-0.6287***					-0.6177***		
	(0.0524)					(0.0529)		
ln density salaried workers		-0.6821***					-0.6712***	
		(0.0523)					(0.0529)	
ln density total female employment			0.0050					0.0047
			(0.0064)					(0.0063)
Index of openness to trade				-0.0086*				
				(0.0049)				
Relative importance services					-0.0022	0.0028	0.0037	0.0081
					(0.0178)	(0.0159)	(0.0156)	(0.0184)
Indirect effect								
ln density stock total companies with	-0.0221**	-0.0229***	-0.0075	-0.0155	-0.0050	-0.0188**	-0.0198**	-0.0042
women in manag. positions	(0.0085)	(0.0084)	(0.0118)	(0.0098)	(0.0098)	(0.0088)	(0.0086)	(0.0119)
ln density stock total companies with	0.0215	0.0189	0.0705***	0.0635***	0.0634***	0.0155	0.0128	0.0567***
mainly men in manag. positions	(0.0142)	(0.0141)	(0.0155)	(0.0147)	(0.0141)	(0.0148)	(0.0147)	(0.0168)
ln density total employment	0.2882					0.3130*		
	(0.1792)					(0.1809)		
ln density salaried workers		0.2632					0.2960	
		(0.1843)					(0.1870)	
ln density total female employment			0.0281***					0.0330***
			(0.0107)					(0.0109)
Index of openness to trade				-0.0148				
				(0.0110)				
Relative importance services					-0.0465***	-0.0246	-0.0236	-0.0447**
					(0.0179)	(0.0161)	(0.0159)	(0.0201)
Total effect								
ln density stock total companies with	0.0103	0.0111	0.0221*	-0.0126	0.0247**	0.0138	0.0144	0.0259*
women in manag. positions	(0.0096)	(0.0093)	(0.0131)	(0.0111)	(0.0109)	(0.0098)	(0.0096)	(0.0132)
ln density stock total companies with	0.0124	0.0139	0.0136	0.0076	0.0146	0.0094	0.0108	0.0066
mainly men in manag. positions	(0.0153)	(0.0152)	(0.0180)	(0.0161)	(0.0153)	(0.0156)	(0.0156)	(0.0185)
ln density total employment	-0.3405*					-0.3047		
	(0.1942)					(0.1969)		
ln density salaried workers		-0.4188**					-0.3752*	
		(0.1992)					(0.2032)	
ln density total female employment			0.0332***					0.0378***
			(0.0124)					(0.0125)
Index of openness to trade				-0.0235*				
				(0.0117)				
Relative importance services					-0.0488*	-0.0218	-0.0200	-0.0366
					(0.0249)	(0.0225)	(0.0222)	(0.0275)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	600	550	600	600	600	600	550
Log likelihood	2184.52	2194.44	1943.92	2118.55	2119.27	2185.69	2195.57	1946.51
AIC	-4333.04	-4352.88	-3853.85	-4201.09	-4202.53	-4331.39	-4351.14	-3855.03
BIC	-4253.90	-4273.74	-3780.58	-4121.95	-4123.39	-4243.45	-4263.20	-3773.14

Note: Maximum likelihood estimation. Constant included. The explanatory variables are lagged one year. The variable *Stock of total companies with women in managerial positions* refers to the number of companies with at least one woman in the management team, whereas the variable *Stock of total companies without women in managerial positions* refers to the number of companies without women in the management team. Standard errors are in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01. A standardized contiguity matrix is used. Dimension 50x50. Normalization method: spectral (the matrix will be normalized so that its largest eigenvalue is 1).

Table C.2: Table 8 with a stricter threshold to define women-led companies

Dependent variable: ln density new women firms (2005-2016)
Econometric model: SLX Panel fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Direct effect								
ln density stock total companies with	0.0315***	0.0334***	0.0272***	0.0264***	0.0282***	0.0316***	0.0335***	0.0277***
women in manag. positions	(0.0042)	(0.0042)	(0.0057)	(0.0048)	(0.0047)	(0.0042)	(0.0042)	(0.0056)
ln density stock total companies with	-0.0205**	-0.0158*	-0.0747***	-0.0717***	-0.0639***	-0.0168*	-0.0123	-0.0671***
mainly men in manag. positions	(0.0086)	(0.0085)	(0.0092)	(0.0084)	(0.0089)	(0.0089)	(0.0088)	(0.0098)
ln density total employment	-0.6298***					-0.6171***		
	(0.0533)					(0.0538)		
ln density salaried workers		-0.6841***					-0.6713***	
		(0.0534)					(0.0539)	
ln density total female employment			0.0061					0.0059
			(0.0064)					(0.0064)
Index of openness to trade				-0.0097*				
				(0.0050)				
Relative importance services					-0.0064	-0.0010	-0.0001	0.0048
					(0.0179)	(0.0161)	(0.0158)	(0.0185)
Indirect effect								
ln density stock total companies with	-0.0254***	-0.0261***	-0.0085	-0.0198*	-0.0068	-0.0209**	-0.0218**	-0.0042
women in manag. positions	(0.0097)	(0.0095)	(0.0133)	(0.0110)	(0.0111)	(0.0101)	(0.0098)	(0.0134)
ln density stock total companies with	0.0248*	0.0220*	0.0772***	0.0687***	0.0692***	0.0176	0.0146	0.0617***
mainly men in manag. positions	(0.0149)	(0.0148)	(0.0163)	(0.0155)	(0.0148)	(0.0155)	(0.0155)	(0.0177)
ln density total employment	0.2949*					0.3220*		
	(0.1782)					(0.1795)		
ln density salaried workers		0.2700					0.3073*	
		(0.1837)					(0.1859)	
ln density total female employment			0.0311***					0.0363***
			(0.0108)					(0.0110)
Index of openness to trade				-0.0164*				
				(0.0111)				
Relative importance services					-0.0490****	-0.0278*	-0.0271*	-0.0462**
					(0.0180)	(0.0162)	(0.0160)	(0.0201)
Total effect								
ln density stock total companies with	0.0061	0.0073	0.1875	0.0066	0.0215*	0.0108	0.0117	0.0235
women in manag. positions	(0.0109)	(0.0106)	(0.0147)	(0.0124)	(0.0124)	(0.0112)	(0.0109)	(0.0148)
ln density stock total companies with	0.0043	0.0061	0.0025	-0.0030	0.0054	0.0008	0.0023	-0.0054
mainly men in manag. positions	(0.0160)	(0.0159)	(0.0190)	(0.0168)	(0.0160)	(0.0162)	(0.0162)	(0.0194)
ln density total employment	-0.23349*					-0.2951		
	(0.1927)					(0.1949)		
ln density salaried workers		-0.4141**					-0.3640*	
		(0.1982)					(0.2016)	
ln density total female employment			0.0372***					0.0422***
			(0.0125)					(0.0127)
Index of openness to trade				-0.0261**				
				(0.0118)				
Relative importance services					-0.0554**	-0.0288	-0.0272	-0.0414
					(0.0250)	(0.0227)	(0.0224)	(0.0276)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	600	550	600	600	600	600	550
Log likelihood	2176.50	2185.99	1940.98	2113.37	2113.92	2177.97	2187.42	1943.66
AIC	-4317.00	-4335.97	-3847.96	-4190.74	-4191.84	-4315.94	-4334.85	-3849.31
BIC	-4237.86	-4256.83	-3774.69	-4111.59	-4112.69	-4228.00	-4246.91	-3767.43

Note: Maximum likelihood estimation. Constant included. The explanatory variables are lagged one year. The variable *Stock of foreign companies with women in managerial positions* refers to the number of companies in which women represent at least 50% of the management team, whereas the variable *Stock of foreign companies with mainly men in managerial positions* refers to the number of companies in which women represent less than 50% of the management team. Standard errors are in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01. A standardized contiguity matrix is used. Dimension 50x50. Normalization method: spectral (the matrix will be normalized so that its largest eigenvalue is 1).

Now, we repeat the results of table 9, table C.3 considers the flexible threshold and C.4 the stricter one.

Table C.3: Table 9 with a flexible threshold to define women-led companies

Dependent variable: ln density new women-led firms (2005–2016)
Econometric model: SLX Panel fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Direct effect								
ln density stock foreign companies (FDI)	0.0359***	0.0370***	0.0485***	0.0428***	0.0471***	0.0333***	0.0343***	0.0506***
with women in manag. positions	(0.0085)	(0.0083)	(0.0100)	(0.0094)	(0.0096)	(0.0087)	(0.0085)	(0.0102)
ln density stock foreign companies (FDI)	0.0629***	0.0610***	0.0875***	0.0831***	0.0808***	0.0670***	0.0652***	0.0834***
with mainly man in manag. positions	(0.0073)	(0.0072)	(0.0089)	(0.0077)	(0.0086)	(0.0079)	(0.0078)	(0.0100)
ln density total employment	-0.4636***					-0.4743***		
	(0.0456)					(0.0463)		
ln density employees		-0.5028***					-0.5141***	
		(0.0455)					(0.0462)	
ln density total female employment			0.0072					0.0070
			(0.0056)					(0.0056)
Index of openness to trade				-0.0020				
				(0.0044)				
Relative importance services					0.0105	0.0059	0.0057	0.0135
					(0.0159)	(0.0143)	(0.0141)	(0.0166)
Direct effect								
ln density stock foreign companies (FDI)	0.0423*	0.0433**	0.0332	0.0176	0.0246	0.0445**	0.0456**	0.0303
with women in manag. positions	(0.0222)	(0.0218)	(0.0255)	(0.0242)	(0.0240)	(0.0223)	(0.0219)	(0.0255)
ln density stock foreign companies (FDI)	-0.0680***	-0.0695***	-0.0891***	-0.0690***	-0.0705***	-0.0778***	-0.0799***	-0.0780***
with mainly men in manag. positions	(0.0189)	(0.0185)	(0.0235)	(0.0211)	(0.0227)	(0.0205)	(0.0202)	(0.0256)
ln density total employment	0.4345***					0.4382***		
	(0.1436)					(0.1437)		
ln density employees		0.4333***					0.4345***	
		(0.1465)					(0.1465)	
ln density total female employment			0.0393***					0.0397***
			(0.0093)					(0.0093)
Index of openness to trade				-0.0231**				
				(0.0092)				
Relative importance services					-0.0155	0.0198	0.0207	-0.0180
					(0.0170)	(0.0155)	(0.0153)	(0.0185)
Total effect								
ln density stock foreign companies (FDI)	0.0782***	0.0803***	0.0817***	0.0604**	0.0717***	0.0778***	0.0799***	0.0808***
with women in manag. positions	(0.0240)	(0.0236)	(0.0274)	(0.0264)	(0.0260)	(0.0240)	(0.0236)	(0.0273)
ln density stock foreign companies (FDI)	-0.0051	-0.0085	-0.0016	0.0141	0.0104	-0.0108	-0.0146	0.0054
with mainly men in manag. positions	(0.0213)	(0.0210)	(0.0263)	(0.0236)	(0.0240)	(0.0219)	(0.0215)	(0.0269)
ln density total employment	-0.0291					-0.0361		
	(0.1601)					(0.1600)		
ln density employees		-0.0695					-0.0796	
		(0.1629)					(0.1629)	
ln density total female employment			0.0465***					0.0397***
			(0.0104)					(0.0093)
Index of openness to trade				-0.0252**				
				(0.0098)				
Relative importance services					-0.0050	0.0257	0.0264	-0.0180
					(0.0231)	(0.0210)	(0.0206)	(0.0185)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	600	550	600	600	600	600	550
Log likelihood	2235.60	2243.85	1992.65	2179.59	2176.84	2236.50	2244.86	1993.45
AIC	-4435.19	-4451.70	-3951.29	-4323.17	-4317.69	-4433.00	-4449.72	-3948.89
BIC	-4356.05	-4372.55	-3878.03	-4244.03	-4238.54	-4345.07	-4361.78	-3867.01

Note: Maximum likelihood estimation. Constant included. The explanatory variables are lagged one year. The variable *Stock of foreign companies with women in managerial positions* refers to the number of foreign companies with at least one woman in the management team, whereas the variable *Stock of foreign companies with mainly men in managerial positions* refers to the number of foreign companies without women in the management team. Standard errors are in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01. A standardized contiguity matrix is used. Dimension 50x50. Normalization method: spectral (the matrix will be normalized so that its largest eigenvalue is 1).

Table C.4: Table 9 with a stricter threshold to define women-led companies

Dependent variable: ln density new women-led firms (2005–2016)
Econometric model: SLX Panel fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Direct effect								
ln density stock foreign companies with	0.0292***	0.0315***	0.0397***	0.0317***	0.0355***	0.0249**	0.0272**	0.0411***
women in manag. positions	(0.0110)	(0.0108)	(0.0131)	(0.0122)	(0.0125)	(0.0112)	(0.0111)	(0.0134)
ln density stock foreign companies with	0.0667***	0.0645***	0.0933***	0.0892***	0.0889***	0.0718***	0.0696***	0.0912***
mainly men in manag. positions	(0.0074)	(0.0073)	(0.0089)	(0.0077)	(0.0086)	(0.0079)	(0.0079)	(0.0099)
ln density total employment	-0.4687***					-0.4815***		
	(0.0458)					(0.0464)		
ln density employees		-0.5075***					-0.5208***	
		(0.0458)					(0.0463)	
ln density total female employment								
			0.0071					0.0070
Index of openness to trade			(0.0056)					(0.0056)
Relative importance services				-0.0023				
				(0.0044)				
Indirect effect								
ln density stock foreign companies with	0.0648**	0.0671**	0.0661*	0.0327	0.0440	0.0706**	0.0729**	0.0626*
women in manag. positions	(0.0303)	(0.0299)	(0.0356)	(0.0335)	(0.0334)	(0.0306)	(0.0301)	(0.0358)
ln density stock foreign companies with	-0.0725***	-0.0743***	-0.0997***	-0.0719***	-0.0779***	-0.0855***	-0.0878***	-0.0927***
mainly men in manag. positions	(0.0199)	(0.0195)	(0.0247)	(0.0222)	(0.0238)	(0.0215)	(0.0211)	(0.0268)
ln density total employment	0.4230***					0.4280***		
	(0.1443)					(0.1442)		
ln density employees		0.4252***					0.4270***	
		(0.1472)					(0.1471)	
ln density total female employment			0.0419***					
			(0.0094)					
Index of openness to trade				-0.0235**				0.0420***
				(0.0093)				(0.0094)
Relative importance services					-0.0082	0.0252	0.0260*	-0.0103
					(0.0170)	(0.0155)	(0.0153)	(0.0186)
Total effect								
ln density stock foreign companies with	0.0940***	0.0986***	0.1057***	0.0644*	0.0795**	0.0955***	0.1001***	0.1038***
women in manag. positions	(0.0328)	(0.0323)	(0.0381)	(0.0364)	(0.0360)	(0.0328)	(0.0323)	(0.0382)
ln density stock foreign companies with	-0.0058	-0.0098	-0.0063	0.0174	0.0110	-0.0138	-0.0182	-0.0015
mainly men in manag. positions	(0.0224)	(0.0220)	(0.0275)	(0.0247)	(0.0252)	(0.0230)	(0.0226)	(0.0282)
ln density total employment	-0.0458					-0.0535		
	(0.1609)					(0.1607)		
ln density employees		-0.0823					-0.0939	
		(0.1638)					(0.1636)	
ln density total female employment			0.0490***					
			(0.0104)					
Index of openness to trade				-0.0258***				0.0491***
				(0.0099)				(0.0104)
Relative importance services					0.0022	0.0310	0.0315	0.0024
					(0.0233)	(0.0210)	(0.0207)	(0.0250)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	600	550	600	600	600	600	550
Log likelihood	2233.48	2241.70	1991.00	2177.36	2174.19	2234.89	2243.22	1991.44
AIC	-4430.96	-4447.39	-3948.00	-4318.71	-4312.37	-4429.77	-4446.44	-3944.88
BIC	-4351.82	-4368.25	-3874.73	-4239.57	-4233.23	-4341.84	-4358.50	-3862.99

Note: Maximum likelihood estimation. Constant included. The explanatory variables are lagged one year. The variable *Stock of foreign companies with women in managerial positions* refers to the number of foreign companies in which women represent at least 50% of the management team, whereas the variable *Stock of foreign companies with mainly men in managerial positions* refers to the number of foreign companies in which women represent less than 50% of the management team. Standard errors are in parentheses. Coefficients are statistically significant at * p<0.1, ** p<0.05, and *** p<0.01. A standardized contiguity matrix is used. Dimension 50x50. Normalization method: spectral (the matrix will be normalized so that its largest eigenvalue is 1).