

ENVIRONMENTAL FACTORS AND FEMALE ENTREPRENEURSHIP: A QUANTITATIVE STUDY IN SPAIN¹

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Abstract

The main purpose of this research is to analyze the influence of environmental factors on female entrepreneurial activity, using an institutional approach as a theoretical framework. The empirical research uses regression logistic models and data from Global Entrepreneurship Monitor (GEM). The main findings indicate that informal factors (perceived capabilities to start a business, social networks and family role) are more relevant for female entrepreneurship than formal factors (financing, support policies to entrepreneurship and education). The research contributes both theoretically, with regard to advances in the field of female entrepreneurship and practically, for the design of support policies for female entrepreneurial activity.

Keywords: entrepreneurial activity, female entrepreneurship, environmental factors, institutions, institutional economics, GEM, Spain.

1. Introduction

Over the last decade, women have had a great impact on the creation of businesses and business development (Brush et al., 2009; Langowitz and Minniti, 2007). In Spain, the rate of female employment has increased considerably in the last few years. In 1980, only 25 % of women of working age had a paid job, but by 2010, according to information from the National Institute of Statistics, the percentage was 42 %. In this sense, various governments, both European and Spanish, have established measures to promote female entrepreneurship. Examples of this are the policies carried out by the European Commission's Directorate General for Enterprise and Industry, the Directorate General for SME Policies in Spain and the actions of each Autonomous Community. However, despite these efforts, the rates of participation of women in entrepreneurial activities continue to be lower than those for men (Kelley et al, 2010).

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In Spain, between 2000 and 2010, the rate of male entrepreneurship has continued to be higher than the female rate. In the year 2010, for every 100 male entrepreneurs there were only 57 women (Güemes et al, 2011).

On the other hand, academics have shown an increasing interest in this issue, although there is still not much research dedicated to it. A number of authors have investigated the environmental factors which condition the creation of businesses (Gartner, 1985; Gnyawali and Fogel, 1994; Verheul et al, 2001; Busenitz et al, 2003; Steyaert and Hjorth, 2006; Alvarez and Urbano, 2011; among others), though very few of them have used institutional theory to investigate female entrepreneurship from an institutional perspective.

Therefore, the aim of this paper is to analyze the environmental factors which influence the probability of women becoming entrepreneurs in Spain, using the Institutional Economics (North, 1990 and 2005) as a theoretical framework. To this end, logistic regression models are employed, using data from the Global Entrepreneurship Monitor project (GEM).

The most relevant results from the study indicate that informal factors (perception of entrepreneurial skills, social networks and family role) are more relevant for female entrepreneurship than formal factors (financing, non-economic support policies and training).

The research contributes both theoretically, with regard to advances in the field of female entrepreneurship and practically, for the design of support policies for female entrepreneurial activity.

After this brief introduction, the paper is divided into 5 sections. Firstly, the theoretical framework of the investigation is presented, then the methodology employed in the empirical section is explained and the most relevant results of the study are presented. Finally, the article ends with the conclusions and future research lines.

2. Environmental factors and female entrepreneurship

As we mentioned before, the institutional approach and, more specifically, the assumptions made by North (1990 and 2005), comprise the theoretical framework used in this investigation. This theory is based on the concept of institution, which is understood as the limitations (and known as the rules of the game) conceived of by the persons who define the setting in which human interaction occurs. In this sense, the principal function of institutions is to facilitate a stable and, at the same time, evolutionary structure upon which the said interaction can take place. North (1990) makes a distinction between formal institutions (laws, regulations and government procedures) and informal institutions (beliefs, ideas and attitudes – that is, the culture of a society). Furthermore, North points out that the difference between informal and formal institutions is one of degree. As societies increase in complexity, the formalization of said limitations increases as well. Based on North's approaches, human behaviour is conditioned by the institutional environment. Therefore, formal and informal institutions may limit or favour the decisions of individuals and, specifically, the decision to create a business or not. In this context, some authors have applied institutional economic theory to the study of the factors which condition entrepreneurial activity (Aidis et al, 2008; Bruton and Ahlstrom, 2003; Bruton et al, 2010; Stephen et al, 2009; Thornton et al, 2011; Urbano, 2006; Veciana and Urbano, 2008; Welter, 2005; among others), but only a small number have made use of it in the context of the entrepreneurial activity carried out by women (Aidis et al, 2007; Amine and Staub, 2009; Welter and Smalbone, 2008).

For this study, applying institutional economics for the analysis of female entrepreneurship, the formal factors will be the following: a) financing; b) policies and non-economic support programmes for entrepreneurship and c) education. In turn, the informal factors would be: d) perception of women entrepreneurs' skills; e) social networks; and f) family roles.

2.1 Formal factors of female entrepreneurship

With respect to formal factors, financing is one of the aspects which most concern male and female entrepreneurs. It is also the one to which the most attention has been paid by the academic world, due to the problems of credibility faced by women in their negotiations with financial institutions. Authors such as Brush (1992), Carter and Rosa (1998), Hisrich and Brush (1987) and Schwartz (1976) suggest in their studies that it cannot be demonstrated that women receive discriminatory treatment in their dealings with credit institutions, though they do highlight the fact that women entrepreneurs have greater difficulty in accessing financing, pointing out that some of the possible causes could be the reduced size of their businesses, which do not permit them to offer sufficient guarantees, and the more limited knowledge many women entrepreneurs possess of the financial sector. The most recent studies follow this same line, deducing that while the criteria used by financial institutions to make their evaluations may be the same for both women and men, there are, in fact, differences in the negotiation process which may cause the levels of indebtedness to vary or may affect the access which women entrepreneurs have to financing. (Alsos et al, 2006; Carter et al, 2007; Gatewood et al, 2009; Kim, 2006; and Marlow and Patton, 2005). Consequently, the following hypothesis is proposed:

Hypothesis 1: Financing has a positive effect on the probability of being an entrepreneur.

Hypothesis 1a: The effect of finance will be greater for female entrepreneurship than for male entrepreneurship.

Another formal factor considered in this paper is non-economic aid policies and programs, to which most studies attribute great importance due to their positive effects on female entrepreneurship (Carter, 2000; Nilsson, 1997). In spite of this, some authors, such as Birley et al. (1987) and Chrisman et al. (1990), propose the elimination of this type of specific policy, arguing that the needs and problems faced by woman entrepreneurs are not so different than those experienced by men. More recently, Baugh et al. (2006) studied the positive impact of specific measures aimed at aiding women in the creation of their own businesses. They also established a relationship between those measures and the country's general promotion of the entrepreneurial spirit and the existing level of equality. The results they obtained showed that the countries with the highest levels of entrepreneurial activity and equality achieved these through aid measures, and also boasted higher levels of female participation in entrepreneurial activity. Therefore, the following hypothesis is proposed:

Hypothesis 2: Non-economic support has a positive effect on the probability of being an entrepreneur.

Hypothesis 2a: The effect of non-economic support will be greater for female entrepreneurship than for male entrepreneurship.

On the other hand, education constitutes one of the most relevant formal factors for female entrepreneurship. There are not many studies which tackle this issue; nor is there any consensus among those that do. Most of the authors propose that education has favourable repercussions for female entrepreneurship (Wilson, 2007; Fairlie and Robb, 2009, among others), but some authors do not agree with this (Grilo and Irigoyen, 2006). On the one hand, Wilson et al. (2007) find, in their paper, a positive relationship between higher levels of education for women and their access to high executive levels, as well as a positive relationship between education and the increase in the number of women entrepreneurs. Along the same lines, Fairlie and Robb (2009) also observe the existence of a positive nexus between educational level, entrepreneurship and the economic results obtained. Grilo and Irigoyen (2006), on the other hand, study the effect of gender and education level on both the latent and the real entrepreneurial spirit, and the result they obtain suggests that entrepreneurship is not affected by the entrepreneur's education level or gender. In spite of different positions of the revised literature, this research considers education to be an important factor in female entrepreneurship, and we thus propose the following hypothesis:

Hypothesis 3: Education has a positive effect on the probability of being an entrepreneur.

Hypothesis 3a: The effect of education will be greater for female entrepreneurship than for male entrepreneurship.

2.2. Informal factors of female entrepreneurship

With reference to informal factors, the literature considers the relevance of the skills perception of women entrepreneurs, from the general perspective of society (as society perceives the entrepreneurial skills of women), and from the point of view of female entrepreneurs. On the one hand, some authors suggest that this factor is quite similar for women and men, although in some cases it appears to be difficult to reach the said conclusion, since the studies focus on sectors where most of the entrepreneurs are male or women possessing typical male attributes (Birley et al, 1987; Catley and Hamilton, 1998; Fischer et al, 1993; Rosa and Dawson, 2006; Schreier, 1973; and Schwartz, 1976). On the other hand, Langowitz and Minnitti (2007) conclude that most women see themselves as less valid than men, and this has negative repercussions for their entrepreneurial activity. Finally, there are studies that relate the start of a business to perceptions of capability. These studies suggest that men create businesses out of a sense of professional frustration or with the aim of improving their financial prospects, while women create businesses in order to distance themselves from an unfavorable or limiting labour situation. Thus, while starting a business may require those who do so to have an accurate level of self perception, women may find this difficult (Brush, 1992; Dolinsky and Caputo, 2003; Goffee and Scase, 1990; Hisrich and Brush, 1987; Ljunggren and Kolvereid, 1996; and Marlow, 1997). In the present study we consider that the decision to start a business requires that persons who do so must perceive themselves to have enterprising capabilities. Thus, the following hypothesis is proposed:

Hypothesis 4: Perceived Capabilities have a positive effect on the probability of being an entrepreneur.

Hypothesis 4a: The effect of perceived capabilities will be greater for female entrepreneurship than for male entrepreneurship

Social and collaborative networks are also a very important informal factor for the female collective when making the final decision to create businesses. Social and collaborative networks are understood to mean those relationships which the female entrepreneur maintains with persons who are external to her business (such as suppliers, customers, service bureaus, or other entrepreneurs) and which, in general, can help her business survive and succeed (Aldrich et al, 1989; and Rosa and Hamilton, 1994). Investigations conducted in the United States, Italy and Northern Ireland indicate that, while the ways in which men and women create networks are quite similar, their respective networks differ considerably. The networks created by women are made up of women, and those created by men are composed mainly of men (Aldrich et al, 1989; Brush, 1992; and Cromie and Birley, 1992). Some of these studies point out that perhaps women's networks are exclusively composed of women because women do not have access to men's networks, which are already established. They also note that the strategic level at which most of the women's relationships operate is lower than that of the men's relationships. Meanwhile, more recent studies demonstrate that women entrepreneurs prefer to use collaborative networks. These studies establish the existence of differences in the way women and men use the said networks in the process of creating a business and observe that women entrepreneurs tend to 'use' the family to a greater extent (Gatewood et al, 2009, Greve and Salaff, 2003; and Sorenson et al, 2008). Therefore:

Hypothesis 5: Social networks have a positive effect on the probability of being an entrepreneur.

Hypothesis 5a: The effect of a social network may be greater for female entrepreneurship than for male entrepreneurship.

The last formal factor involves the family role. Various authors have dealt with the relationship between the woman entrepreneur and the family (Aldrich and Cliff, 2003; Bruni et al, 2004; Brush et al, 2009; among others). Such studies prove that although most women may work full time outside of the home, the responsibility for doing the main chores at home still falls upon them, thus discouraging female entrepreneurship. At the same time, Baughn et al (2006) and Langowitz and Minniti (2007) observe that in societies where the role of the woman is closely tied to family responsibilities, entrepreneurial activity is perceived as less desirable. William (2004) analyses the relationship between success in the creation of businesses and the time dedicated to children, concluding that looking after children reduced the longevity of businesses, which will impact on the need for policies which reconcile work and family. Consequently:

Hypothesis 6: The family role has a negative effect on the probability of being an entrepreneur.

Hypothesis 6a: The effect of family role will be greater for male entrepreneurship than for female entrepreneurship.

3. Methodology

As stated earlier, this paper analyzes the relationship between environmental factors and female entrepreneurship in Spain. The variables were obtained from the data base maintained by the Spanish Global Entrepreneurship Monitor (GEM) project, for the year 2010. The GEM project is one of the most relevant research projects with respect to the analysis of entrepreneurial activity. The GEM project came about in 1999 as an initiative established by two universities, the London Business School (United Kingdom) and Babson College (USA), in order to facilitate international comparisons of entrepreneurial activity, to analyze the role entrepreneurship plays in the economic growth of countries and to facilitate the design of public policies which promote entrepreneurial activity. In 1999, 10 countries participated in the GEM project, while in 2010, 59 countries participated.

In general terms, each country participating in the GEM project commits to providing a sample of 2000 interviews. Spain, which has participated in the project since 2000, has, however, developed a structure similar to that of the Global Project, which involves 18 regions. This paper makes particular use of the APS (Adult Population Survey) micro-data base of the Spanish GEM project for the year 2010, which holds a sample of 24543 individuals, and complements that data with data from the NES (National Expert Survey) expert data base at the regional level.

Dependent variables. In this article, three dependent variables are used. Firstly, the entrepreneurship binary variable (TEA) is used, which takes the value of 1 when the individual is an entrepreneur and 0 in other cases. The TEA is one of the best known indicators of the GEM project, which defines as entrepreneurs those individuals who are in the process of starting up a business and/or who are currently owners of a new business (established no longer than 3.5 years ago). Next, the female entrepreneurship binary variable is used, which has the value of 1 for women entrepreneurs and 0 in the other case. Finally, and in order to compare results, the male entrepreneurship binary variable is used, which takes the value of 1 for men entrepreneurs and 0 in the other case.

Independent variables. In this paper, as stated earlier, entrepreneurship, and especially female entrepreneurship, is considered to be conditioned by environmental factors, which are classified as formal factors (financing, non-economic aid policies, and training) and informal factors (perception of entrepreneurial skills, social networks, and family role).

With respect to formal factors, the GEM project survey of experts (NES) gathers information regarding the environmental conditions under which entrepreneurial activities are carried out, using 5 or 6 questions which are graded by the experts, who use a Likert scale of 1 (minimum) to 5 (maximum). Next, working from a principal components analysis, the GEM project constructs an indicator for each one of

the environmental conditions. In this paper, the financing variable in particular has been used, in addition to government programs. Furthermore, in order to consider the effect of education, the educational level of the persons interviewed is considered and is classified in 3 levels: primary, secondary and post-secondary (which includes university studies).

Regarding informal factors, the GEM project gathers information on the perception of entrepreneurial abilities, so this variable takes the value of 1 if the individual considers that he/she has the knowledge, skills and experience to start up a business and 0 in the other case. In order to evaluate social networks, another binary variable is used which takes the value of 1 if the individual personally knows someone who has started up their own business in the last few years. Finally, to evaluate the family role, a binary variable is used which takes the value of 1 when the individual (man or woman) dedicates time to housework and 0 in the other case.

Finally, as control variables, this paper makes use of the age of the individual and individual's age squared, family incomes using binary variables for low, middle and high incomes, and the logarithm of the Gross Domestic Product for each autonomous community, taken from the Spanish National Institute of Statistics (INE) data base for the year 2009. Even though binary variables were included for each autonomous community in previous models, they were subsequently eliminated, as these variables were not significant. A summary of the variables used is presented in Table 1.

Table 1. Description of the variables of the study

	Variable	Description	Source
Dependent Variables	Entrepreneurship (TEA)	Binary variable which takes the value of 1 when the individual is an entrepreneur and 0 in the other case.	APS 2010
	Female Entrepreneurship	Binary variable which takes the value of 1 for women entrepreneurs and 0 in the other case.	APS 2010
	Male Entrepreneurship	Binary variable, which takes the value of 1 for men entrepreneurs and 0 in the other case.	APS 2010
Formal factors	Financing	Availability of financial resources for new and growing businesses. The values range from 1 (min.) to 5 (max.)	NES 2010
	Non-economic policies	Government policies favorable to new and growing businesses. The values range from 1 (min.) to 5 (max.)	NES 2010
	Education	Binary variables for educational level of the individual, classified as primary, secondary and post-secondary.	APS 2010
Informal factors	Perception of skills	Binary variable which takes the value of 1 if the individual considers that he/she has the knowledge, skills and experience to start up a business and 0 in the other case.	APS 2010
	Social networks	Binary variable which takes the value of 1 if the individual personally knows someone who has started up their own business in the last 2 years and 0 in the other case.	APS 2010
	Family role	Binary variable which takes the value of 1 when the individual (men and women) dedicates time to housework and 0 in the other case.	APS 2010
Control variables	ln(GDP)	Natural logarithm of the Gross Domestic Product for each autonomous community, for the year 2009.	INE 2009
	Age	Age of individual	APS 2010
	Incomes	Binary variable for the family incomes of the individual, classified as low, middle and high incomes	APS 2010

Given the binary nature of the dependent variables, the effect of environmental factors on female entrepreneurship is estimated using models of logistic regression, also known as probabilities models, so that the probability that the event occurs is estimated. The model may be expressed as:

$$P(E_i = 1) = \delta_1 FF_i + \delta_2 FI_i + \beta_1 X_i + \mu_i \quad (1)$$

Where:

FF_i information about the formal factors,
 FI_i information about the informal factors,
 X_i information about the control variables,
 μ_i random disturbance

4. Results and discussion

Table 2 presents the mean, the standard deviation and the matrix of correlations for the variables of interest. Considering that some correlations are particularly high, the multi-collinearity was verified using the variance inflation factor (VIF). The results indicate VIFs of less than 3.5 for the variables, except, as is to be expected, for age and for age squared. Furthermore, with the aim of correcting the heteroscedasticity and the problems of auto-correlation between the observations which pertain to the same country, corrected standard errors are estimated by autonomous community (White, 1980).

Likewise, Table 3 presents the results of the logistic regression models for the environmental factors, distinguishing between entrepreneurship in general, and female and male entrepreneurship. Two models are presented for each one of these dependent variables. The first model includes all the variables, and a second model which only presents the significant variables. The results indicate that all the models are significant, that the pseudo-R² is superior to 0.10, and the percentage of correct answers is superior to 96% in all the cases.

To analyze the results, the formal factors were initially considered, then the informal factors and finally the control variables.

With respect to the formal factors, hypotheses 1, 2 and 3 suggest that financing as well as non-economic aid policies and education levels have a positive effect on the probability of being an entrepreneur. However, the results indicate that none of the variables considered for the formal factors are significant.

Also, hypotheses 1, 2 and 3 propose that effects of finance, non-economic support and education will be greater for female entrepreneurship than for male entrepreneurship. Although the coefficients are not significant in all cases they are higher for female than male entrepreneurship.

While the literature offers ample documentation of the importance of financing (Gnyawali and Fogel, 1994; van Gelderen et al., 2005), non-economic aid policies (Baugh et al., 2006) and training for entrepreneurship (Davidsson and Honig, 2003; De Clercq and Arenius, 2006), the results obtained in this study can be explained by the minimal variation of said variables in the sample considered. This indicates, as may be expected, a certain homogeneity among formal factors (financing, aid policies and education level) for the different Spanish regions considered, as these factors for the most part are conditioned by policies at the national level. Therefore, hypotheses 1, 1a, 2, 2a, 3 and 3a are rejected.

Table 2. Descriptive statistics and correlation matrix

	Mean	Std. Dev.	1.	2.	3.	4.	5.	6.
1. Entrepreneurial activity	0.04	0.19	1.00					
2. Female entrepreneurship	0.01	0.15	0.59***	1.00				
3. Male entrepreneurship	0.02	0.11	0.80***	-0.02**	1.00			
4. Financing	2.20	0.19	-0.01	0.00	-0.01	1.00		
5. Non-Economic policies	2.98	0.27	-0.00	0.00	-0.01	0.31***	1.00	
6. Education level (secondary)	0.45	0.50	-0.03***	-0.01	-0.03***	-0.04***	0.03***	1.00
7. Post secondary	0.45	0.50	0.05***	0.02***	0.04***	0.03***	-0.04***	-0.82***
8. Perception of skills	0.49	0.50	0.17***	0.10***	0.01***	-0.01	0.01*	-0.08***
9. Social networks	0.30	0.46	0.11***	0.05***	0.10***	-0.01*	0.001	-0.05***
10. Family role	0.12	0.32	-0.07***	-0.03***	-0.06***	0.01	-0.02**	0.09***
11. Ln(PIB)	17.70	1.07	0.02*	0.01	0.02	-0.11***	-0.10***	-0.01*
12. Age	44.34	12.29	-0.07***	-0.04***	-0.05***	0.04***	-0.01	0.03***
13. Age2	2117.15	1053.36	-0.07***	-0.04***	-0.06***	0.04***	-0.01	0.04***
14. Middle incomes	0.21	0.21	-0.02***	-0.02**	-0.02**	-0.03***	0.04***	0.07***
15. High incomes	0.31	0.31	0.03***	0.00	0.03***	0.05***	-0.00	-0.12***
	7.	8.	9.	10.	11.	12.	13.	14.
7. Post-secondary	1.00							
8. Perception of skills	0.14***	1.00						
9. Social networks	0.10***	0.21***	1.00					
10. Family role	-0.18***	-0.14***	-0.09***	1.00				
11. Ln(PIB)	0.01	0.01	-0.00	-0.01	1.00			
12. Age	-0.15***	-0.05***	-0.14***	0.20***	-0.01	1.00		
13. Age2	-0.17***	-0.07***	-0.15***	0.20***	-0.01	0.10***	1.00	
14. Middle incomes	-0.09***	-0.02**	-0.01	0.02**	-0.02**	0.01	0.01	1.00
15. High incomes	0.19***	0.09***	0.07***	-0.11***	-0.02***	-0.01*	-0.03***	-0.35***

Note: ***p < .001, **p < .01, *p < .05

Table 3. Logit results

	Model 1. Entrepreneurial activity		Model 2. Entrepreneurial activity		Model 3. Female entrepreneurship		Model 4. Female entrepreneurship		Model 5. Male entrepreneurship		Model 6. Male entrepreneurship	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
Formal factors												
Financing	-0.072	(0.185)			0.103	(0.297)			-0.169	(0.228)		
Non-economic policies	-0.012	(0.138)			0.156	(0.225)			-0.104	(0.169)		
Education level												
Secondary	0.087	(0.170)			0.419	(0.294)			-0.097	(0.202)		
Post-secondary	-0.087	(0.170)			0.395	(0.291)			-0.082	(0.202)		
Informal factors												
Perception skills	2.157***	(0.119)	2.077***	(0.148)	2.207***	(0.199)	2.217***	(0.199)	2.078***	(0.148)	2.077***	(0.148)
Social networks	0.656***	(0.070)	0.783***	(0.087)	0.366***	(0.114)	0.367***	(0.114)	0.785***	(0.087)	0.783***	(0.087)
Family role	-2.011*	(0.338)	-3.717*	(1.002)	-1.105***	(0.362)	-1.121***	(0.361)	-3.722*	(1.003)	-3.717*	(1.003)
Control variables												
Ln(GDP)	0.080*	(0.035)	0.101**	(0.045)	0.049	(0.054)			0.092	(0.026)	0.101*	(0.044)
Age	0.169***	(0.022)	0.146**	(0.026)	0.197***	(0.037)	0.127***	(0.040)	0.147*	(0.028)	0.146*	(0.026)
Age2	-0.002***	(0.000)	0.002***	(0.000)	-0.003***	(0.000)	-0.002***	(0.000)	-0.002***	(0.000)	-0.002***	(0.000)
Incomes												
Middle	-0.341***	(0.101)			-0.578***	(0.166)	-0.575***	(0.166)	-0.176	(0.124)		
High	-0.052*	(0.078)	-0.198**	(0.087)	-0.400***	(0.130)	-0.385***	(0.128)	0.150	(0.096)	0.198**	(0.087)
constant	-8.952***	(0.959)	-9.621***	(0.940)	-11.016***	(1.477)	-9.039***	(0.732)	-8.662***	(1.209)	-9.621***	(0.940)
Number of obs	24543		24543		24543		24543		24543		24543	
Pseudo R-squared	0.1466		0.1397		0.1104		0.1094		0.1403		0.1397	
Log pseudolikelihood	-3312.4527		-2368.276		-1537.3709		-1530.1701		-2366.4188		-2368.2763	
Percent correctly predicted	96.30%		97.63%		98.68%		98.68%		97.63%		97.63%	
AIC	6650.905		4752.553		3100.742		3094.34		4758.838		4752.553	
BIC ^c	6756.312		4817.418		3206.148		3159.206		4864.244		4817.418	

Note: *** significant at $p \leq 0.001$; ** significant at $p \leq 0.01$; *significant at $p \leq 0.05$. In brackets it present the standar errors corrected for the autonomous communities.AIC: Akaike Information Criteria, BIC: Bayesian information criterion or Schwarz Criterion.The reference categories are: primary studies and low incomes.

Regarding the informal factors, hypothesis 4 proposes that the perception of entrepreneurial skills has a positive effect on the probability of being an entrepreneur. As can be seen in Table 3, the said variable has a positive and significant impact upon the probability of being an entrepreneur, and the said impact is superior in the case of the female entrepreneur. Specifically, the odds ratios indicate that the perception of entrepreneurial skills increases the probability of being an entrepreneur by 9.09 times for women, versus 7.99 times for men. Therefore, hypotheses 4 and 4a are not rejected.

These results are in agreement with those offered in Rosa and Dawson (2006) and Fisher et al. (1993), and which are reaffirmed in later studies where the influence of society on the perception of entrepreneurial skills according to the gender of the entrepreneur is analysed (Brush et al., 2009; Fairlie and Robb, 2009).

Likewise, hypothesis 5 suggests that social networks can also have a positive effect upon the probability of being an entrepreneur. The coefficients of this variable are positive and significant, and, therefore, hypothesis 5 is not rejected. Furthermore, the results indicate that the said effect is greater in the case of male entrepreneurship. In fact, the odds ratios indicate that social networks increase the probability of being an entrepreneur by 2.19 times for men versus 1.44 times for women. Thus, hypothesis 5a is rejected. This result is consistent with the papers published by Aldrich et al. (1989), Rosa and Hamilton (1994), Sorenson et al. (2008) and Gatewood et al. (2009), where the preference or need entrepreneurs have for using social networks is analyzed, while at the same time it is observed, as Greve and Salaff (2003) also indicate, that in the case of women entrepreneurs these networks consist basically of family.

With respect to family role, the results indicate that dedicating one's time to housework decreases the probability of being an entrepreneur, an effect which is especially important in the case of women. Therefore, hypothesis 6 is not rejected. The odds ratios demonstrate that being a woman and having family responsibilities reduces the probability of being an entrepreneur by 33.1%, while in the case of men the said reduction is only 2.4%, thus hypothesis 6a is rejected. This result indicates that dedicating one's time to housework is only ever likely to be an interim situation for men who, thanks to their professional mobility, can re-insert themselves into the world of work as entrepreneurs. However, women tend to lack such mobility, and dedicating their time to housework considerably decreases the probability of being an entrepreneur. These last results agree with those obtained by Baughn et al. (2006) or Langowitz and Minniti (2007), where it is indicated that in a society where the role of the woman is closely tied to family responsibilities, the idea that entrepreneurial activity is less desirable is implicitly instilled in her. Authors such as Kantor (2002) observe the existence of family roles which exclusively limit female entrepreneurship but not male entrepreneurship ('women exclusive constraints'), while at the same time indicating the existence of other family roles which limit male entrepreneurship as much as female entrepreneurship, though the latter is limited in a more relevant manner ('women intensive constraints').

Finally, with regard to the control variables, the literature indicates that the level of economic development is a key factor to explain entrepreneurial activity (Wennekers et al., 2005; Carree et al., 2007). The results for the Spanish regions indicate that the above-mentioned relationship is valid when explaining male entrepreneurship principally, but that economic development has no significant effect on female entrepreneurship. On the other hand, the coefficients of age and age squared indicate a quadratic relationship between entrepreneurship and age, and as such the probability of being an entrepreneur increases with age until reaching a maximum, after which that probability begins to decrease (Levesque and Minniti, 2006). Apart from this, no major differences are observed between men and women entrepreneurs. Likewise, the coefficients from Table 3 indicate that having middle or high family incomes lowers the probability of female entrepreneurship by 56% and 67% respectively. However, in the case of male entrepreneurship, middle family incomes decrease the said probability by 84%, while high family incomes increase that probability by 1.16 times. These results would suggest that, in the case of middle or low family incomes, men decide to start their own business as much as women, but in the case of high family incomes, women do not start their own businesses, while men do.

5. Conclusions

In this study, a quantitative analysis of the environmental factors which condition female entrepreneurial activity in Spain has been presented. The principal results indicate that the informal factors (perception of entrepreneurial skills, social networks and family role) can have a significant effect on the probability of being an entrepreneur, while the formal factors (financing, non-economic support policies and training) tend to have no effect. Thus, it can be affirmed that the informal factors are more relevant for female entrepreneurship than the formal factors, a generic approach that can be deduced from previous studies (Welter, 2005; Aidis et al, 2007; Welter and Smallbone, 2008).

Likewise, these results allow for advances in the analysis of entrepreneurial activity from an institutional point of view (Aldrich and Zimmer, 1986; Berger, 1991; Shapero and Sokol, 1982; Steyaert and Katz, 2004; among others), offering greater robustness to the environmental factors as determinants for the creation of businesses (Aidis et al, 2008; Alvarez et al, 2011; Veciana and Urbano, 2008; Welter, 2005; Thornton et al., 2011) especially in the case of women entrepreneurs. Therefore, this paper contributes as much from a theoretical perspective (advanced in the models which analyze the relationship between environmental factors and female entrepreneurial activity), as from a practical perspective (related to the design of governmental policies which aid women entrepreneurs).

With regard to future lines of research, we hope to broaden the period of analysis, comparing our results with those from other countries, while deepening the regional analysis within Spain. With the purpose of improving the explanatory capacity of the proposed model, it is anticipated that some other independent variables, such as role models, could be usefully incorporated in future research.

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References

- Aidis, R., Estrin, S., Mickiewicz, T.: Institutions and entrepreneurship development in Russia: A comparative perspective. *Journal of Business Venturing*, 23(6), 656-672 (2008)
- Aldrich, H., Reese P., Dubini, P.: Women on the verge of a breakthrough: networking among entrepreneurs in the United States and Italy, *Entrepreneurship & Regional Development*, 1(4), 339-356 (1989)
- Aldrich, H., Cliff, J.: The pervasive effects of family on entrepreneurship: Toward a family embeddedness perspective. *Journal of Business Venturing*, 18, 573-596 (2003)
- Aldrich, H.E., Zimmer, C.: Entrepreneurship through social networks. In: Sexton, D. y Smilor, R. (eds), *The Art and Science of Entrepreneurship*. New York: Ballinger, 3-23 (1986)
- Alsos, G.H., Isaksen, E., Ljunggren, E.: New Venture Financing and Subsequent Business Growth in Men- and Women-Led Businesses. *Entrepreneurship Theory & Practice*, 30(5), 667-686 (2006)
- Alvarez, C., Urbano, D.: Una década de investigación sobre el GEM: logros y retos. *Academia Revista Latinoamericana de Administración*, 46, 16-37 (2011)
- Amine, L.S., Staub, K.M.: Women entrepreneurs in sub-Saharan Africa. An institutional theory analysis from a social marketing point of view. *Entrepreneurship and Regional Development*, 21(2), 183-211 (2009)
- Baughn, C.C., Chua B., Neupert K.E.: The Normative Context for Women's Participation in Entrepreneurship: A Multicountry Study. *Entrepreneurship Theory & Practice*, 30(5), 687-708 (2006)
- Berger, B.: *The culture of entrepreneurship*. San Francisco: ICS Press (1991)
- Birley, S., Moss, C., Saunders, P.: Do Women Entrepreneurs require different training?. *American Journal of Small Business*, 12(1), 27-35 (1987)
- Brush, C.: Research on women business owners: past trends, a new perspective and future directions. *Entrepreneurship: Theory & Practice*, 16(4), 5-30 (1992)
- Brush, C., de Bruin, A., Welter F.: A gender-aware framework for women's entrepreneurship. *International Journal of Gender and Entrepreneurship*, 1(1), 8-24 (2009)

- Busenitz, L.W., West, G.P. III., Shepherd, D., Nelson, T., Chandler, G.N., Zacharakis, A.: Entrepreneurship research in emergence: Past trends and future directions. *Journal of Management*, 29(3), 285-308 (2003)
- Carree, M.A., Van Stel, A., Thurik, R., Wennekers, S.: The relationship between economic development and business ownership revisited. *Entrepreneurship & Regional Development*, 19(3), 281-291 (2007)
- Carter, S.: Improving the numbers and performance of women-owned business. Some implications for training and advisory services. *Education and training*, 42 (4-5), 326-334 (2000)
- Carter, S., Rosa, P.: The financing of male -and female- owned business. *Entrepreneurship & Regional Development*, 10(3), 225-241 (1998)
- Carter, S., Shaw E., Lam W., Wilson F.: Gender, Entrepreneurship, and Bank Lending: The Criteria and Processes Used by Bank Loan Officers in Assessing Applications. *Entrepreneurship Theory & Practice*, 31(3), 427-444 (2007)
- Catley, S., Hamilton R.T.: Small business development and gender of owner. *Journal of Management Development*, 17(1), 75-82 (1998)
- Chrisman, J., Carsrud, A., De Castro J., Herron L.: A comparison of assistance needs of male and female pre-venture entrepreneurs. *Journal of Business Venturing*, 5(4), 235-248 (1990)
- Cromie, S., Birley, S.: Networking by female business owners in Northern Ireland. *Journal of Business Venturing*, 7(3), 237-251 (1992)
- Davidsson, P., Honig B.: The role of social and human capital among nascent entrepreneurs. *Journal of Business Venturing*, 18(3), 301-331 (2003)
- De Clercq, D., Arenius, P.: The role of knowledge in business start-up activity. *International Small Business Journal*, 24(4), 339-358 (2006)
- Dolinsky, A.L., Caputo, R.K.: Health and female self-employment. *Journal of Small Business Management*, 41(3), 233-241 (2003)
- Fairlie, R.W., Robb, A.M.: Gender differences in business performance: evidence from the Characteristics of Business Owners survey. *Small Business Economics*. Dordrecht, 33(4), 375-395 (2009)
- Fischer, E., Reuber A.R., Dyke L.S.: A theoretical overview and extension of research on sex, gender, and entrepreneurship. *Journal of Business Venturing*, 8(2), 151-168 (1993)
- Gartner, W.B.: A conceptual framework for describing the phenomenon of new venture creation. *Academy of Management Review*, 10(4), 696-706 (1985)
- GEM (Global Entrepreneurship Monitor): Informe Ejecutivo GEM España. <http://www.ie.edu/gem> (2010)
- Gatewood, E.J., Brush, C., Carter, N., Greene, P., Hart, M.: Diana: a symbol of women entrepreneurs' hunt for knowledge, money, and the rewards of entrepreneurship, *Small Business Economics*, 32(2), 129-145 (2009)
- Gnyawali, D.R., Fogel, D.S.: Environments for entrepreneurship development: key dimensions and research implications. *Entrepreneurship: Theory & Practice*, 18(4), 43-62 (1994)
- Goffee, R., Scase, R.: Women in management: towards a research agenda, *International Journal of Human Resources Management*, 1(1), 107-125 (1990)
- Greve, A., Salaff, J.W.: Social networks and entrepreneurship. *Entrepreneurship Theory & Practice*, 28(1), 1-22 (2003)
- Grilo, I., Irigoyen, J.M.: Entrepreneurship in the EU: To Wish and not to be. *Small Business Economics*, 26(4), 305-318 (2006)
- Hisrich, R., Brush, C.: Women entrepreneurs: A longitudinal study. In Churchill, N., Hornaday, J., Kirchoff, B., Krasner, O.J and Vesper, K. (ed.). *Frontiers of entrepreneurship research*, Wellesley, MA: Babson College; 187-199 (1987)
- Kantor, P.: Gender, microenterprise success and cultural context: The case of south Asia. *Entrepreneurship Theory and Practice*, 26(4), 131-143 (2002)
- Kim, G.O.: Do Equally Owned Small Businesses Have Equal Access to Credit?. *Small Business Economics*, 27(4-5), 369-386 (2006)
- Langowitz, N., Minniti, M.: The Entrepreneurial Propensity of Women. *Entrepreneurship Theory & Practice*, 31(3), 341-364 (2007)
- Levesque, M., Minniti, M. (2006). The effect of aging on entrepreneurial behavior. *Journal of Business Venturing*, 21(2), 177-194.
- Ljunggren, E., Kolvereid, L.: New business formation: does gender make a difference?. *Women in Management Review*, 11(4), 3-12 (1996)
- Marlow, S.: Self-employed women - New opportunities, old challenges?. *Entrepreneurship & Regional Development*, 9(3), 199-210 (1997)
- Marlow, S., Patton D.: All Credit to Men? *Entrepreneurship, Finance, and Gender*. *Entrepreneurship Theory & Practice*, 29(6), 717-735 (2005)
- Morris, M., Miyasaki, N., Watters, C., Coombes, S.: The Dilemma of Growth: Understanding Venture Size Choices of Women Entrepreneurs. *Journal of Small Business Management*, 44(2), 221-244 (2006)
- Nilsson, P.: Business counseling services directed towards female entrepreneurs - some legitimacy dilemmas. *Entrepreneurship & Regional Development*, 9(3), 239-258 (1997)
- North, D.C.: *Institutions, institutional change and economic performance*. Cambridge: Cambridge University Press (1990)
- North, D.C.: *Understanding the process of economic change*, Princeton: Princeton University Press (2005)
- Rosa, P., Dawson, A. Gender and the commercialization of university science: academic founders of spinout companies. *Entrepreneurship & Regional Development*, 18(4), 341-366 (2006)

- Rosa, P., Hamilton, D.: Gender and ownership in UK small firms. *Entrepreneurship Theory and Practice*, 18(3), 11- 28 (1994)
- Schindehutte, M., Morris M., Brennan C.: Entrepreneurs and motherhood: Impacts on their children in South Africa and the United States. *Journal of Small Business Management*, 41(1), 94-107 (2003)
- Schreier, J.: *The Female Entrepreneur: A Pilot Study*, Milwaukee, Wis: Centre for Venture Management (1973)
- Schwartz, E.B.: Entrepreneurship: a new female frontier. *Journal of Contemporary Business*, Winter, 47-76 (1976)
- Shapiro, A., Sokol, L.: The social dimensions of entrepreneurship. In Kent, C.A., Sexton, D.L., y Vesper, K.H. (Eds.): *Encyclopedia of Entrepreneurship*, Englewood Cliffs, N.J: Prentice-Hall. Inc., 72-90 (1982)
- Sorenson, R.L., Folker C., Brigham K.H.: The collaborative network orientation: Achieving Business success through Collaborative relationship. *Entrepreneurship Theory and Practice*, 32(4), 615-634 (2008)
- Stephen, F.H., Urbano, D., Van Hemmen, S.: The responsiveness of entrepreneurs to working time regulations. *Small Business Economics*, 32(3), 259-276 (2009)
- Steyaert, C., Hjorth, D.: Entrepreneurship as social change. A third new movements in entrepreneurship, book Edward Elgar (2006)
- Steyaert, C., Katz, J.: Reclaiming the space of entrepreneurship in society: Geographical, discursive and social dimensions. *Entrepreneurship & Regional Development*, 16(3), 179-196 (2004)
- Thornton, P.H., Ribeiro-Soriano, D., Urbano, D.: Socio-cultural factors and entrepreneurial activity: An overview. *International Small Business Journal*, 29(2), 105-118 (2011)
- Urbano, D.: *La creació de empreses en Catalunya. Organismes de suport i actituds envers la activitat emprenedora*, Barcelona: Col·lecció d'estudis CIDEM (2006)
- Van Gelderen, M., Thurik, R., Bosma, N.: Success and risk factors in the pre-startup phase. *Small Business Economics*, 24(4), 365-380 (2005)
- Veciana, J.M., Urbano, D.: The institutional approach to entrepreneurship research: Introduction. *International Entrepreneurship and Management Journal*, 4(4), 365-379 (2008)
- Verheul, I., Thurik, R.: Start-up capital: 'does gender matter?'. *Small Business Economics*, 16(4), 329-345 (2001)
- Welter, F.: Entrepreneurial behavior in differing environments. In Audretsch, D.B., Grimm, H. y Wessner, C.W. (Eds.): *Local Heroes in the Global Village: Globalization and the New Entrepreneurship Policies*, International Studies in Entrepreneurship. New York: Springer, 93-112 (2005)
- Wennekers, S., Van Stel, A., Thurik, R., Reynolds, P.: Nascent entrepreneurship and the level of economic development. *Small Business Economics*, 24(3), 293-309 (2005)
- White H.: A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48, 817-830 (1980)
- William, D.R.: Effects of Childcare Activities on the Duration of Self-Employment in Europe. *Entrepreneurship Theory & Practice*, 28(5), 467-485 (2004)
- Wilson, F., Kickul J., Marlino D.: Gender, Entrepreneurial Self-Efficacy, and Entrepreneurial Career Intentions: Implications for Entrepreneurship Education. *Entrepreneurship Theory & Practice*, 31(3), 387-406 (2007)