

## **Family-owned and non family-owned SMEs: empirical evidence of survival determinants**

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### **Abstract**

Using probit regressions and on the basis of two research samples: 1589 family-owned SMEs and 485 non family-owned SMEs, this paper analyzes if there are significant differences between family-owned SMEs and non family-owned SMEs for determinants of survival. The empirical evidence obtained shows the existence of significant differences between these two types of firms for the determinants of survival. In the context of family-owned SMEs, the empirical evidence obtained allows us to conclude that: size, age and R&D expenditure are neither positive nor restrictive determinants of survival; cash flow and labour productivity are positive determinants of survival; and, debt, interest paid and risk are restrictive determinants of survival. In the case of non family-owned SMEs, size, age, cash flow, debt and R&D expenditure are positive determinants of survival, with interest paid, risk and labour productivity being neither positive nor restrictive determinants of survival.

*Keywords:* family-owned SMEs, non family-owned SMEs, panel data, probit regressions, survival

*JEL Classification Codes:* C23, G32, L21, L26

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### **1. Introduction**

SMEs are, particularly, important in European economies for stimulating employment and economic growth (IAPMEI, 2008). In general, family-owned firms have special importance in European countries, because these firms represent an important share of the total number of firms, and, are, consequently, of great importance for increased employment and economic growth in these countries as a whole (Nordqvist, 2012).

Various studies (Agarwal and Audretsch, 2001; Cabral and Mata, 2003; Esteve-Pérez and Mañez-Castillejo, 2008; Siriopoulos and Lalountas, 2008; Holmes et al., 2010; Vaona, 2010;

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Giovannetti et al., 2011; Maças Nunes and Serrasqueiro, 2012) have analyzed the factors influencing firm survival. However, the specific approach focusing on the determinants factors of the survival of family-owned firms, in general, and family-owned SMEs, in particular, has been neglected in the literature.

Considering the importance of family-owned SMEs, in developed countries, this paper intends to contribute to fill the knowledge gap, in empirical studies that have specifically analyzed the survival determinants of these firms. Additionally, the survival determinants of family-owned SMEs will be compared with those of non family-owned SMEs.

Seeking to reach that objective, we select two samples of SMEs: 1) 1589 family-owned SMEs; and 2) 485 non family-owned SMEs. We use probit regressions as the estimation method. The dependent variable is a dummy variable with the value of 1 if firms are present in the market, and the value of 0 if they have leaved the market. As independent variables, we use various survival determinants used in the literature<sup>1</sup>: 1) size; 2) age; 3) cash flow; 4) debt; 5) interest paid; 6) R&D expenditure; 7) risk; and 8) labour productivity.

This paper contributes to the literature by showing that the survival determinants of family-owned SMEs are considerably different from those of non family-owned SMEs. The survival of family-owned SMEs is increased particularly by cash flow and labour productivity, and, it is, especially, restricted by debt, interest paid and risk. The survival of non family-owned SMEs is increased by size, age, debt, R&D expenditure and cash flow. However, cash flow has less importance for the survival of non family-owned SMEs than for that of family-owned SMEs.

After this introduction, the paper is structured as follows: 1) section 2 presents the methodology used, namely the database, variables and estimation method; 2) section 3 presents the results; and finally 3) section 4 presents the conclusions and implications.

## 2. Methodology

### 2.1. Database

This study uses the SABI (Analysis System of Iberian Balance Sheets) database from Bureau van Dijks for the period 2000-2009.

As our subject of analysis is SMEs, we select firms based on the European Union recommendation L124/36, (2003/361/CE). According to this recommendation, a firm is considered an SME when it meets two of the following three criteria: 1) fewer than 250 employees; 2) annual total assets under 43 million Euros; and 3) business turnover under 50 million Euros.

Given that our objective is to analyze the determinants of SME survival, we consider SMEs surviving in the market during the period of analysis (2000-2009) and SMEs leaving the market during that period (2000-2009). Additionally, we also consider SMEs that enter the market during the period (2000-2009).

As stated by López-Gracia & Sánchez-Andújar (2007), there is no consensus about the criteria for defining a family firm. Various criteria are used: 1) based on the people who effectively manage firms or who have effective decision-making authority (Filbeck & Lee, 2000); 2) based on the people who own the firm capital (Donckels & Lambrecht, 1999; Littunen & Hyrsky, 2000); and 3) based on the possibility of transferring business ownership to next generation (McConaughy & Phillips, 1999).

For the selection of family firms, we are limited by the information available on the database used (SABI). To classify firms, we follow the criterion of López-Gracia & Sánchez-

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<sup>1</sup> As, for example, in: Cabral & Mata (2003), Holmes et al. (2010), Giovannetti et al. (2011), Maças Nunes & Serrasqueiro (2012).

Andújar (2007), based on the ownership firm. We consider as family-owned firms the firms with a shareholder who may be an individual or family, owning more than 50% of the total shares, and the remaining shares being relatively diluted. Consequently, the remaining firms of the research sample are considered as non family-owned firms. The adoption of that criterion, while used in the literature, has the disadvantage of not considering important criteria in classifying family-owned and non family-owned firms, such as those associated with firm management and succession. According to Chua et al. (1999), the characteristics related to firm management, ownership control and intended succession should, simultaneously, be considered to define family firms. For these authors, when only adopting the criterion of ownership control, firms must be classified as family-owned firms and non family-owned firms instead of family firms and non-family firms. Use of this criterion implies a limitation for the current paper, given that the results are suitable for family-owned firms and non family-owned firms, but they cannot be generalized to family firms and non-family firms.

After applying the criteria described above, the following samples of family-owned and non family-owned SMEs were selected: 1) 1589 family-owned SMEs, corresponding to 11874 observations; and 2) 485 non family-owned SMEs, corresponding to 3596 observations.

The final sample composition is presented in the following table.

**Table 1: Sample structure**

	Total SMEs		Family-Owned SMEs		Non Family-Owned SMEs	
	Firms	Observations	Firms	Observations	Firms	Observations
Incumbent Firms in all period 2000 – 2009	1246	11214	960	8640	286	2574
Firms entering in the period 2000 –2009	458	2327	356	1811	102	516
Firms exiting in the period 2000-2009	370	1929	273	1423	97	506
Total Number of Firms	2074		1589		485	
Total Number of Observations		15470		11874		3596

## 2.2. Variables

As dependent variable, we consider a dummy variable with the value of 1 if SMEs are in the market, and the value of 0 if they have leaved the market. As independent variables, we use variables measuring firm characteristics, namely size, age, cash flow, debt, interest paid, expenditure on research and development, risk and labour productivity. The following table presents the variables used, together with their corresponding measures<sup>2</sup>.

<sup>2</sup> Monetary variables are deflated according to inflation in Portugal. We construct a price index from 2000 to 2009. 2009 is taken as the base year.

**Table 2: Variables and Measurement**

Variables	Measurement
<i>Dependent variable</i>	
Survival ( $\delta_{i,t}$ )	Dummy variable which takes on the value of 1 if the SME is in the market and the value of 0 if it left the market.
<i>Independent variables</i>	
Size ( $SIZE_{i,t}$ )	Logarithm to business turnover
Age ( $AGE_{i,t}$ )	Logarithm of age at a certain time i.e. the number of years of firm
Cash Flow ( $CF_{i,t}$ )	Ratio of earnings after tax plus depreciations to total assets
Debt ( $LEV_{i,t}$ )	Ratio between total liabilities to total assets
Interest Pay ( $IP_{i,t}$ )	Ratio between and total interests and total debt
Research and Development ( $R\&D_{i,t}$ )	Ratio between research and development expanses to sales
Risk ( $EVOL_{i,t}$ )	Absolute value of percentage change of earnings before interest, taxes and depreciations
Labour Productivity ( $L.PROD_{i,t}$ )	Ratio between VAG (Value Added Gross) and number of employees

### 2.3. Estimation Methods

We use probit regressions to estimate the relationships between the determinants and survival of family-owned SMEs and non family-owned SMEs. The regressions to estimate can be presented as follows:

$$\Pr(\delta_{i,t}) = \alpha_0 + \beta_1 SIZE_{i,t} + \beta_2 AGE_{i,t} + \beta_3 CF_{i,t} + \beta_4 LEV_{i,t} + \beta_5 IP_{i,t} + \beta_6 R \& D_{i,t} + \beta_7 EVOL_{i,t} + \beta_8 L.PROD_{i,t} + S_s + d_t + z_{i,t} \quad (1)$$

where:  $S_s$  are sector dummy variables<sup>3</sup>;  $d_t$  are annual dummy variables; and  $z_{i,t}$  is the error.

Seeking to test the possible differences between family-owned SMEs and non family-owned SMEs for the determinants of survival, we use a methodology similar to that of Watson & Westin (1975) and Patuelli et al. (2010). Initially, we estimate a probit regression with all family-owned SMEs and non family-owned SMEs and all independent variables, this being the unrestricted model. Then, we estimate a probit regression with all family-owned and non family-owned SMEs, with two dummy variables with the values of 1 and 0 for family-owned SMEs and non family-owned SMEs, which are multiplied by the independent variables, this being the restricted model. The null hypothesis to test is:  $H_0: \beta_{iFOW} = \beta_{iNFOW} = \beta_i$ . Aiming to compare the two models, just as Watson & Westin (1975) and Patuelli et al. (2010), we use the likelihood ratio. This statistic can be presented as follows:

$$\lambda = 2(\text{Log}_{um} - \text{Log}_{rm}) \quad (2)$$

where  $\text{Log}_{um}$  is the log of the likelihood of the unrestricted model and  $\text{Log}_{rm}$  is the log of the likelihood of the restricted model. The value of  $\lambda$  is asymptotically distributed as a  $\chi^2$  with a number of degrees of freedom equal to the number of restrictions.

<sup>3</sup> Just as Blanco-Mazagatos et al. (2007), we consider the following sector dummy variables: 1) agriculture; 2) forestry and fishing; 3) construction industry; 4) manufacturing industry; 5) wholesale and retail; and 6) services.

### 3. Results

This section presents the descriptive statistics and correlation matrices of the variables used in the study. Then, we go on to present the results of the relationships between determinants and survival in family-owned SMEs and non family-owned SMEs as well as the results of the test of possible differences between family-owned SMEs and non family-owned SMEs for the determinants of survival.

#### 3.1. Descriptive statistics and correlation matrices

The following table presents the descriptive statistics of the variables used in this study.

**Table 3: Descriptive statistics**

Variables	Family-Owned SMEs				Non Family-Owned SMEs				Mean Difference
	Firms	Obs	Mean	St. Desv.	Firms	Obs	Mean	St. Desv.	
SIZE <sub>it</sub>	1589	11874	14.9718	1.4718	485	3596	15.1424	1.6177	-6.02**
AGE <sub>it</sub>	1589	11874	2.34451	0.2509	485	3596	2.58912	0.2802	-51.90**
CF <sub>it</sub>	1589	11874	0.06718	0.1575	485	3596	0.06082	0.1514	2.50*
LEV <sub>it</sub>	1589	11874	0.68828	0.2019	485	3596	0.72001	0.2190	-8.63**
IP <sub>it</sub>	1589	11874	0.04391	0.0571	485	3596	0.05844	0.0681	-12.77**
R&D <sub>it</sub>	1589	11874	0.00901	0.0331	485	3596	0.01138	0.0398	-3.57**
EVOL <sub>it</sub>	1589	11874	1.60934	5.1829	485	3596	1.84658	5.7264	-2.11*
L.PROD <sub>it</sub>	1589	11874	19.8312	62.789	485	3596	18.4309	60.9812	0.40

Note: Note: We use t statistical test to test the mean difference.

Based on the t-test of the differences between the means of family-owned SMEs and non family-owned SMEs, we can conclude that, on average, family-owned SMEs have greater levels of cash flow and labour productivity than do non family-owned SMEs. On average, non family-owned SMEs are larger, older, and have higher levels of debt, interest paid and R&D expenditure than do family-owned SMEs.

Tables 4 and 5 below, present the correlation matrices for family-owned SMEs and non family-owned SMEs, respectively.

According to Gujarati & Porter (2010), when the correlation coefficients between independent variables are above 50%, the problem of collinearity becomes significant. Observing the correlation coefficients between the independent variables used, for both family-owned and non family-owned SMEs, in no circumstances the correlation coefficients are above 50%. Therefore, we can conclude that the problem of collinearity between explanatory variables will not be particularly relevant in this study.

**Table 4: Correlation matrix – family-owned SMEs**

	SIZE <sub>i,t</sub>	AGE <sub>i,t</sub>	CF <sub>i,t</sub>	LEV <sub>i,t</sub>	IP <sub>i,t</sub>	R&D <sub>i,t</sub>	EVOL <sub>i,t</sub>	L.PROD <sub>i,t</sub>
SIZE <sub>i,t</sub>	1							
AGE <sub>i,t</sub>	0.1520**	1						
CF <sub>i,t</sub>	0.0891**	-0.0716**	1					
LEV <sub>i,t</sub>	0.0209*	-0.0894**	-0.3471**	1				
IP <sub>i,t</sub>	0.0082	0.0265**	-0.2123**	0.1686**	1			
R&D <sub>i,t</sub>	0.0378**	0.0677**	0.0781**	0.0122	0.0098	1		
EVOL <sub>i,t</sub>	-0.1019**	-0.0102	-0.0106	0.0588**	0.0976**	0.0051	1	
L.PROD <sub>i,t</sub>	0.0105	0.1288**	0.2516**	0.0671**	-0.0056	0.1150**	-0.0233*	1

Notes: 1. \*\* Statistical significant at 1% level; \* Statistical Significant at 5% level.

**Table 5: Correlation matrix – non family-owned SMEs**

	SIZE <sub>i,t</sub>	AGE <sub>i,t</sub>	CF <sub>i,t</sub>	LEV <sub>i,t</sub>	IP <sub>i,t</sub>	R&D <sub>i,t</sub>	EVOL <sub>i,t</sub>	L.PROD <sub>i,t</sub>
SIZE <sub>i,t</sub>	1							
AGE <sub>i,t</sub>	0.1671**	1						
CF <sub>i,t</sub>	0.1192**	-0.1299**	1					
LEV <sub>i,t</sub>	0.0544**	0.2785**	-0.3871**	1				
IP <sub>i,t</sub>	0.2144**	-0.1133**	-0.2776**	0.1112**	1			
R&D <sub>i,t</sub>	0.0212	0.2482**	0.1561**	-0.0120	0.0790**	1		
EVOL <sub>i,t</sub>	-0.0089	-0.0076	-0.0717**	0.0302	-0.0085	0.0071	1	
L.PROD <sub>i,t</sub>	0.0819**	0.0311	0.2091**	-0.0108	-0.0897**	0.0862**	-0.1301**	1

Notes: 1. \*\* Statistical significant at 1% level.

### 3.2. Survival determinants

We test the differences between family-owned and non family-owned SMEs for the relationships between determinants and survival, comparing the restricted and unrestricted models described in Section 2.3. Estimation Methods<sup>4</sup>. The value of the  $\lambda$  statistic is 76.68, with 8 degrees of freedom equal to the number of restrictions in the restricted model, this value being statistically significant at 1% level. Based on this value, we reject the null hypothesis ( $H_0: \beta_{iFOW} = \beta_{iNFOW} = \beta_i$ ) of equality of the estimated parameters, which measures the relationships between determinants and survival in family-owned SMEs and non family-owned SMEs. This result justifies the estimation of the relationships between determinants and survival in family-owned SMEs and non family-owned SMEs.

In probit regressions, the comparison between estimated parameters, related to different samples, is not sufficient. In fact, given that the models are not linear, the magnitude of each estimated parameter is influenced by the values and coefficients of all the independent variables. For a correct comparison of the impact of the independent variables on the probability of survival in family-owned SMEs and non family-owned SMEs, it is necessary to estimate the elasticity of each independent variable. In this paper, these elasticities measure the percentages of variation of the survival probability of family-owned and non family-owned SMEs, for an increase of 1% in each independent variable. The elasticities were

<sup>4</sup> The results of the unrestricted model and the restricted model can be requested from the authors.

calculated on the basis of the mean values of the independent variables. The results of the estimated coefficients and elasticities are presented in the following table.

**Table 6: Survival analysis – Family-owned SMEs and non family-owned SMEs**

Independent Variables	Dependent Variable: $\Pr(\delta_{i,t})$			
	Family-Owned SMEs		Non Family-Owned SMEs	
	Estimated Coefficients	Elasticities	Estimated Coefficients	Elasticities
SIZE <sub>i,t</sub>	0.02178 (0.03612)	0.12784	0.14818** (0.03897)	0.60433
AGE <sub>i,t</sub>	0.03992 (0.04019)	0.14742	0.16711** (0.05019)	0.55534
CF <sub>i,t</sub>	0.59712** (0.12219)	0.43521	0.20112* (0.09894)	0.09182
LEV <sub>i,t</sub>	-0.07812* (0.03801)	-0.17824	0.20177** (0.067169)	0.38171
IP <sub>i,t</sub>	-0.07641** (0.01890)	-0.25162	-0.01541 (0.01603)	-0.05617
R&D <sub>i,t</sub>	0.05612 (0.13929)	0.10293	0.35612** (0.10192)	0.51913
EVOL <sub>i,t</sub>	-0.05491** (0.01448)	-0.36344	0.01024 (0.01344)	0.08173
L.PROD <sub>i,t</sub>	0.01663** (0.00482)	0.31909	0.00544 (0.00761)	0.07108
CONS	-0.01456 (0.02909)		0.00891 (0.02435)	
Pseudo R <sup>2</sup>	0.3451		0.3789	
Firms	1589		485	
Observations	11874		3596	

Notes: 1. Standard errors in parenthesis. 2. \*\* Statistical significant at 1% level; \* Statistical Significant at 5% level; 3. The estimates include sectoral *dummy* variables, but not show. 4. The estimates include time dummy variables but are not show.

Based on the estimated parameters, and above all on the elasticities, we can conclude that: 1) size, age, debt and R&D expenditure are of greater relative importance for increased survival of non family-owned SMEs than do for family-owned SMEs; 2) cash flow and labour productivity are of greater relative importance for increased survival of family-owned SMEs than do for non family-owned SMEs; and 3) interest paid and risk are of greater relative importance for diminished survival of family-owned SMEs than do for non family-owned SMEs.

Firstly, the empirical evidence indicates that the scale effect conferred by size and the reputation effect conferred by age are more relevant for the survival of non family-owned SMEs than for that of family-owned SMEs. Smaller, younger family-owned SMEs have greater possibilities of survival than non family-owned SMEs. Secondly, the terms in accessing finance affect, particularly, the survival of family-owned SMEs. Debt, interest paid and risk are determinants with a higher restrictive effect on the survival of family-owned SMEs than in the case of non family-owned SMEs. When internal finance is insufficient, access to external funding can imply particular difficulties for the survival in family-owned SMEs, compared to the case of non family-owned SMEs. Thirdly, R&D expenditure is more important in the activities of non family-owned SMEs than in those of family-owned SMEs. Non family-owned SMEs may manage R&D expenditure more efficiently than family-owned SMEs. Fourthly, labour productivity is more relevant for increased survival of family-owned SMEs than for that of non family-owned SMEs. This result indicates, firstly, that the labour factor, and its corresponding productivity, may be more important in the activities of family-owned SMEs, and secondly, that human resource management may be more efficient in family-owned SMEs than do in non family-owned SMEs.

#### 4. Conclusion and implications

Using probit regressions and based on two samples: 1) 1589 family-owned SMEs; and 2) 485 non family-owned SMEs, this paper analyze the differences between family-owned SMEs and non family-owned SMEs for the determinants of survival. The empirical evidence obtained shows the existence of significant differences between these two types of firms for the determinants of survival.

The empirical evidence obtained allows us suggest important measures to support family-owned SMEs and non family-owned SMEs as well as owners/managers of these type of firms, to increase their chances of survival. In the case of family-owned SME, considering their particular difficulties in managing debt and financial charges, it is suggested to central and local authorities as well as business associations to make available direct financial support to this type of SMEs with special difficulties in funding good investment opportunities. It is, also particularly, relevant that family-owned SME owners/managers build up trusting relationships with creditors for improving the terms of credit. In addition, it is suggested that central and local authorities, and business associations, become active agents, in providing technical support for R&D investment in family-owned SMEs. The owners/managers of this type of firm should also manage this kind of investment more efficiently, promoting R&D investment as a positive determinant of survival of family-owned SMEs. As for non family-owned SMEs, considering that greater size and greater age are particularly important for increased likelihood of survival, it is suggested that local and central authorities and business associations give financial support to smaller and younger SMEs with good investment opportunities. Considering that labour productivity is not a determinant increasing the likelihood of survival of non family-owned firms, collaboration between trade union associations and the owners/managers of this type of SME is particularly recommended to improve efficiency in human resource management, so that employee productivity can become a determinant increasing the likelihood of survival.

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