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Article

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Ownership, board, and enterprise risk management

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Abstract This paper analyses the effect of family ownership and the characteristics of the board of directors on the implementation level of enterprise risk management (ERM) in Spanish non-financial companies. The sample consists of 162 Spanish non-financial companies listed on Spanish stock exchanges and markets during 2012-2015. The results obtained show that the relationship between the level of family ownership concentration and the implementation level of an ERM system has a non-linear structure. Therefore, a reduction in implementation for moderate ownership levels is observed, although this increases with high ownership values. Regarding corporate governance, our study confirms the importance of certain characteristics of the board of directors, such as the size and the figure of the shareholder director in the implementation of formal ERM systems.

CÓDIGOS JEL
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PALABRAS CLAVE
Propiedad
familiar, Gobierno
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Propiedad, consejo y gestión del riesgo empresarial

Resumen Este trabajo analiza el efecto de la propiedad familiar y de las características del consejo de administración sobre el nivel de implementación de la gestión integral de riesgos (ERM) en las empresas españolas no financieras. La muestra consta de 162 empresas españolas no financieras que cotizan en Bolsas y Mercados Españoles durante el período 2012-2015. Los resultados obtenidos muestran que la relación entre el nivel de concentración de la propiedad familiar y el grado de implementación del sistema de gestión integral de riesgos presenta una estructura no lineal, de modo que se observa una reducción de los niveles de implementación para niveles medios, pero que se incrementa en valores elevados de propiedad. Respecto al gobierno corporativo, nuestro trabajo confirma la importancia de ciertas características del consejo de administración como el tamaño y la figura del accionista-consejero en la implementación de sistemas formales de gestión del riesgo.

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Introduction

Ownership structure and the characteristics of the board can play an important role in the level of risk assumed by the company (Tufano, 1996, Boubakri et al., 2013). In the case of family businesses, previous literature has explained this relationship based on socio-emotional aspects (Gómez-Mejía et al., 2007 and Su and Lee, 2013) and in Agency Theory (Amihud & Lev, 1981; John et al., 2008). In general, they explained increased risk aversion and the incorporation of non-strictly economic incentives (not necessarily monetary), where capital preservation and business transfer determine risk taking.

However, there has been little research on the relationships between ownership, the board of directors and risk management. Increased risk aversion could result in greater involvement in risk management, both through the adoption of Enterprise Risk Management (ERM) and coverage. Among the definitions of Enterprise Risk Management (ERM), COSO II¹ defines corporate risk management as “a process carried out by the board of directors of an entity, its management and remaining personnel, applicable to the definition of strategies throughout the company and designed to identify potential events that may affect the organization, to manage its risks within the accepted level and to provide reasonable assurance regarding the achievement of objectives”. As is clear, all the people who are part of the entity must be involved, although we should highlight the role that the board of directors ought to play as the main driver of these strategies. Due to the link between the board of directors and ownership, the latter will also play a decisive role in the implementation level of this process.

However, concentration of capital in the hands of family businesses can have a negative effect on the adoption of an Enterprise Risk Management (ERM) system and on risk coverage. This approach is proposed by Beasley et al. (2005) and Brustbauer (2016), who believe that the implementation of a risk management system (ERM) requires full support from the owners and awareness of the value it provides. Therefore, they consider that when the person who controls the company is a manager-owner and not a professional manager, it is more likely that there will be less involvement in the implementation of ERM. On the other hand, the existence of other strong investors, in particular, institutional, ones, could make the interest in incorporating ERM systems vary.

Regarding the influence of the board of directors, authors such as Kleffner et al. (2003) con-

sider that it is the most determinant factor of the company for implementing Enterprise Risk Management systems. However, this aspect has hardly been studied in the economic literature, particularly, factors that may be relevant such as types of directors, gender diversity and the size of the board.

The aim of this paper is to evaluate how ownership and company governance affect the adoption of Enterprise Risk Management (ERM) models; as well as risk coverage programmes for Spanish non-financial listed companies. This paper makes several contributions to the literature that relate the level of assumed risk with ownership and corporate governance. Specifically, the aim is to evaluate the effect of family ownership concentration, as well as the influence of other shareholders with significant interests, on the implementation level of formal risk-management processes. The characteristics of *boards of directors* have also been included, meaning that it can also be a significant factor. Thus, it is one of the few papers that addresses this issue, while it also considers a large number of variables which are representative of risk management. The study is limited to the Spanish case, given that it is a market with a significant presence of family businesses and with heterogeneous characteristics that allow us to test the hypotheses considered. The results obtained show that the relationship between the level of family ownership concentration and the implementation level of the risk management system (ERM) has a non-linear structure, so a reduction in the implementation levels for moderate ownership levels is observed, although there is an increase for high ownership values. The presence of institutional investors is very decisive, affecting all the variables related to risk management very positively. Regarding corporate governance, our work confirms the importance of certain characteristics of the board of directors in implementing formal risk management systems.

This paper is structured as follows: the theoretical reference framework is presented in the second section; next, the third section describes the sample and the variables and hypotheses used; the fourth section discusses the methodology and the results obtained; finally, the fifth section summarises the main conclusions.

Previous literature and hypotheses

Regarding the importance of the ERM system, different academic researchers have justified risk management based on the costs of non-

1. Committee of Sponsoring Organizations of the Treadway Commission (2004): *Enterprise Risk Management - Integrated Framework*.

systematic risks involved for the company. Stulz (1996) states that risk management adds value by reducing the probability that the value is destroyed during financial crises and by reducing or eliminating the so-called “*costly lower-tail outcomes*” (Beasley, Pagach, and Warr, 2008; Baxter, Bedard, Hoitash, and Yezegel, 2008). For Nocco and Stulz (2006), ERM can create competitive advantages by allowing access to capital markets and other resources, while also helping managers and employees at all company levels to manage risk. Therefore, ERM helps to reduce the probability of there being /the risk of financial problems. In addition, ERM can also lower other types of costs, in particular, risk coverage costs and the so-called “costs of contracts”. For Hoyt and Liebenberg (2011), by including decision-making in all types of risks handled by the company, risk management expenses that may occur from their individualized treatment are cut and this allows for natural coverage of risks with different business activities. One of the first studies to investigate the implementation of Enterprise Risk Management, which was carried out by Colquitt, Hoyt and Lee (1999), showed via surveys that the role of risk managers was evolving in such a way that they faced an increasing number of risks. In addition, Kleffner, Lee and McGannon (2003) concluded that 31% of the members surveyed of the *Canadian Risk and Insurance Management Society* had found the current organizational structure and resistance to change as the main obstacles to implementing a risk management system (ERM). These authors showed that Canadian companies that had adopted ERM had done so by being encouraged by the board of directors. This implies that the factors that can be decisive in overcoming these obstacles and thus, favour implementing Enterprise Risk Management systems are related to the ownership structure and the characteristics of boards of directors, which are aspects that have seldom been studied in the literature on risk management (ERM). For this reason, in this section we review the literature and propose hypotheses regarding the effect that the concentration of capital in family businesses, the presence of institutional investors and the characteristics of the Board can have on a greater involvement in risk management.

Family ownership

Concentration of capital in the hands of family businesses is considered to have a negative effect on the adoption of a risk management system (ERM). As Brustbauer (2016) points out, implementing ERM requires a great deal of support from the owners and for them to be aware of the value it brings (Beasley et al., 2005; Brustbauer and Peters, 2013). That

is why they consider that when the individual who runs the company is an owner-manager and not a professional one, it is more likely for there to be less involvement in the implementation of a risk management system (ERM). Brustbauer (2016) found in his study that family businesses have fewer incentives to implement a risk management system. In turn, Paape and Speklé (2012) point out that when the owners also manage the company and there are no agency problems between owners and managers, the value of implementing ERM systems is lower and, therefore, less likely to be supported. At the empirical level, he also shows that it is less probable for companies managed by their owners to invest in ERM.

H1: Family businesses have less incentive to implement ERM systems.

Institutional investors.

The presence of institutional investors could lead to better risk management practices being applied in the company (Mafrolla, Matozza and D’Amico, 2016). One theory/hypothesis is that many of them have a small stake and who expect high quality information (Kane & Velury, 2004). On the other hand, Mafrolla, Matozza and D’Amico (2016) claim that when institutional investors have a higher stake, they perform professionally raising management standards and, consequently those of their risk system. In addition, Paape and Speklé (2012) state that as institutional investors are more powerful than individual ones, their presence will lead to a higher level of ERM implementation. At the empirical level, Brustbauer (2016) finds a positive relationship between institutional participation and the implementation of risk management systems (ERM), while Paape and Speklé (2012) find no evidence.

H2: The presence of institutional investors encourages ERM systems to be adopted.

Board of Directors and ERM

According to Kleffner et al. (2003), the boost given by the board of directors is the most important factor that influences the implementation of ERM in companies. The importance of the Board is also shared by other authors such as Beasley, Clune and Hermanson (2005), Desender (2007), Altuntas, Berry-Stölzle and Hoyt (2011) and Baxter, Bedard, Hoitash and Yezegel (2013), who maintain that *Management teams and boards of directors* have a significant influence on the implementation of ERM. Beasley, Branson, and Hancock (2009) defend this based on an increased demand for greater risk transparency with the aim of reducing the probability of possible fraudulent or opportunistic behaviour.

Desender (2007) measures the risk management system (ERM) by using public information and finds that

the *independence of the board* of directors is not enough on its own to lead to higher levels of ERM, but only when the position of the general manager or chief executive officer (CEO) and the chairman of the company are held by two different individuals. Beasley (1996) shows a positive relationship between independent directors and ERM. Altuntas, Berry-Stölzle and Hoyt (2011) find via a survey that companies that report using ERM generally have better corporate governance and a more appropriate organizational structure for risk management. Baxter, Bedard, Hoitash and Yezegel (2013) state that companies with the highest quality of risk management (ERM) are those with better corporate governance, with the presence of risk committees and senior management boards.

The *size of the board* is also another factor that can play a significant role due to its ability to control managers' actions (Daud, Haron & Ibrahim, 2011). Finally, regarding *gender diversity* in Boards of Directors, it is considered that the presence of women provides differing varied points of view (Joecks, Pull and Vetter, 2013) so much so that females more often than not tend to be seen as being more averse to risk than their male counterparts when it comes to investing (Eckel and Grossman, 2002; Fehr-Duda, de Gennaro and Schubert, 2006; Eckel and Grossman 2008; and Borghans, Golsteyn, Heckman and Meijers, 2009). We believe that a greater presence of female directors can positively influence the implementation of a risk management system (ERM).

H3: The size of the board and the presence of women positively affect the implementation of ERM and risk coverage.

H4: The presence of shareholder-directors negatively affects the implementation of ERM.

Empirical analysis

The empirical analysis was carried out based on information obtained from the SABI Database and Morningstar Direct. The sample is formed of the 162 Spanish companies that are listed on the stock exchange, excluding financial and real estate companies. The data related to ownership and other economic-financial data were obtained from the SABI database. This information was complemented with the risk indicators available in the Morningstar Direct database. Several dummy variables obtained from the information in the listed companies' reports were used as ERM indicators. The independent variables are mainly made up of the percentage of ownership in the hands of family or individual investors, the presence of strong investors and other indicators related to the characteristics of the board of directors. Thus, the aim is to analyse the impact that ownership and the characteristics of Boards

of Directors have on the implementation of risk management systems.

Variables used

Next, the variables used in the work will be discussed.

Dependent variables

The dependent variables determine the implementation of a risk management system in each company, as well as the quality of the implemented system, based on whether or not they have particular characteristics, which are indicators of good practices in risk management. Table 1 shows the variables used, keywords used in the search and their description. It is simply considered if the company has a risk committee (Risk_committee) and a chief risk officer (CRO) in its organizational structure. It is also borne in mind if the company measures its risks with a risk map and has established risk tolerance levels. We use the variables ISO 31,000 and COSO as an indicator of having ERM being used in the company, which entails that it has an enterprise risk system. Finally, we have included three indicator variables of coverage for the main financial risks, exchange and credit risk being most worthy of mention.

Table 1. Definition of Variables

Related With Presence Of Risk Management System		
Name	Key Word	Specification
Risk_committee	Risk Committee	Existing risk committee in the company
CRO	Chief Risk Officer, CRO	Presence of a manager in charge of the company's risk management
Risk_map	Risk Map	Existing risk map in the company
Risk_tolerance	Risk Tolerance	Existing risk tolerance level
ISO 31000	ISO, 31000	Monitoring of the ISO 31000 standard
COSO	COSO	Monitoring of the COSO framework
Cov_int_rate	Derived Financial Instruments, Coverage	Existing financial instruments dedicated to risk coverage of interest rate variation
Cov_exch_rate	Derived Financial Instruments, Coverage	Existing financial instruments dedicated to risk coverage of currency exchange rate variation
Cov_credit	Derived Financial Instruments, Coverage	Existing financial instruments dedicated to risk coverage of credit rate

Source: own elaboration.

As observed in Table 2, only 20% of companies report the presence of a risk committee, and to a lesser extent (in 9% of cases) of a risk manager. However, it is quite common for Spanish listed companies to measure their risks (57%) and use the risk map in decision making while about 35% adopt formal risk management policies implemented in accordance with the COSO or ISO standard instead. Finally, interest risk is the most common form of coverage, followed by exchange and then credit risk.

Table 2. Descriptive data of independent variables

Variable	Obs	Mean	Std. Dev.	Min	Max
risk_committee	577	.2062392	.4049553	0	1
cro_	577	.0918544	.2890709	0	1
risk_map	577	.5719237	.4952293	0	1
iso_31000_	577	.0433276	.2037701	0	1
coso_	577	.3015598	.4593334	0	1
risk_tolerance	577	.5459272	.4983182	0	1
cov_interest_rate	577	.4592721	.4987709	0	1
cov_exch_rate	577	.3379549	.4734235	0	1
cov_credit	577	.1975737	.3985142	0	1

Source: own elaboration.

Table 3 includes the correlations between the dependent variables, where it can be observed that in general, the values are positive, in line with expectations, since they are representative variables of risk management.

Table 3. Correlations between the dependent variables

	Risk_committee	Cro_	Map_risk_	Iso_31000_	Coso_	Tolerance_	Cov_interest	Cov_exch	cov_credit
Risk_committee	1								
Cro_	0.2828	1							
Risk_map_	0.3111	0.2145	1						
Iso_31000_	0.2492	0.2271	0.1325	1					
Coso_	0.4024	0.1833	0.3471	0.2311	1				
Tolerance_	0.1896	0.2298	0.4210	0.1770	0.2731	1			
Cov_interest_rate	0.1663	0.2608	0.2140	0.1626	0.2431	0.2188	1		
Cov_exch_rate	0.2516	0.2929	0.2109	0.2259	0.2491	0.2984	0.3709	1	
Cov_credit	0.0913	0.0532	0.1390	0.0868	0.0913	0.1990	0.2152	0.2252	1

Source: own elaboration.

Independent variables

Taking the above into account regarding the determinant factors for adopting an Enterprise Risk Management model or ERM, we have considered the variables listed below to specify our explanatory model for the determinants for implementing an Enterprise Risk Management system in the company.

Ownership variables

Firstly, we considered a continuous variable that represents the percentage of capital concentrated in individual investors or families (*Famcont*). As shown in Table 4, stakes in Spanish family-run businesses capital are very common, with an average value of 40%. In 10% of cases, controlled capital exceeds 85%, while in another 10% there is no presence of families or other individual investors in the shareholding.

Table 4. Distribution of representative family ownership variables

Probability	Values	Obs
1%	0	716
5%	0	Mean
10%	0	0.4096369
25%	0.2	DT
50%	0.35	0.2865664
75%	0.65	Skewness
90%	0.85	0.4016694
95%	0.95	Kurtosis
99%	0.95	2.116003

Source: own elaboration.

The presence of other owners, in particular, investment funds (*Flcont*), has also been considered. Thus, the aim is to evaluate to what extent the presence of other relevant partners can influence the implementation of ERM. As previously

stated, the existence of multiple relevant shareholders can positively influence risk taking and management (Mishra, 2011).

Variables related to the characteristics of company governance

Variables related to Corporate Governance of companies have also been considered specific-

ly, information regarding the number of members that make up Boards of Directors (*Totalmembers*). In addition, the number of women that make up Boards of Directors (*Boardwom*), and of shareholders who are members of Boards of Directors (*Sharboard*) have been calculated. In general, companies opt for boards with an average of 14 members, although in some cases they may have 40 representatives. Women participate in virtually all boards, which are outnumbered by men so that out of the 14 members mentioned above, women only account for 1.5 on average. In more than 85% of cases, managers are shareholders, an element that can contribute to aligning interests. Finally, we should point out that a high percentage of the members of Boards of Directors (31.2%) are also company shareholders.

Table 5. Characteristics of Corporate Governance

Variable	Obs	Mean	Std. Dev.	Min	Max
totalmembers	716	14.41899	8.238941	3	40
boardwom	716	1.586592	1.701349	0	8
sharboard	716	4.530726	4.313959	0	23

Table 6. Summary of ownership and corporate governance variables

Name	Specification
Relating to company ownership	
Famcont	% of capital in the hands of family
Flcont	% Investment fund held by companies that are listed on the stock exchange
Relating to company governance	
Totalmembers	Total members that make up the board of directors of the companies listed on the stock exchange
Boardwom	Number of female members on the Board of Directors
Sharboard	Number of shareholders that make up the board of directors

Source: own elaboration.

Control variables

The level of ERM adoption is also related to the size of the company, since there are economies of scale and minimum sizes required to implement risk management programmes and these can incur very high costs. The size of the company is usually related to the diversification level. Therefore, larger companies can use their market power to obtain greater benefits (Ang et al., 1985) and have a greater capacity to face the effect of economic changes (Sullivan, 1978; Hardwick, 1997). On the other hand, smaller companies are affected by a number of financial disadvantages that result in economic restrictions, greater difficulties in acquiring medium and long-term financing (Hellmann and Stiglitz, 2000) and a higher financial cost (Melle, 2001). Thus, there are studies that identify *size* and *sector* as relevant factors (Colquitt, Hoyt and Lee, 1999; Beasley, Clune and Hermanson, 2005; Pagach and Warr, 2011; Baxter, Bedard,

Hoitash and Yezegel, 2013), although the work by Liebenberg and Hoyt (2003) is inconclusive. While Liebenberg and Hoyt (2003) found no significant differences in the use of ERM from one company to another of a similar size or industry, Beasley, Clune and Hermanson (2005) found that the companies with a higher implementation of a risk management policies had risk managers, were larger and operated in the financial, insurance or education sectors. As for Baxter, Bedard, Hoitash and Yezegel (2013), they found that larger and more diversified companies had better ERM programmes.

H5: Larger companies adopt ERM to a greater extent.

There are also differing theories which have the aim of explaining the relationship between liquidity and risk. In this regard, Bonfim and Kim (2012) show that the relationship can be either positive or negative. Based on the agency theory of free cash flow (Jensen, 1986), a positive relationship is established between both variables, with the argument that there is a greater risk of

inappropriate investment when there is a very high level of liquidity; this is because managers prefer to retain excess funds and have greater discretion, which at times, can be materialized by way of the implementation of investment projects having a negative net current value. On the contrary, Logue and Merviué (1972) and Moyer and Chartfield (1983), postulate a negative relationship between liquidity and risk, maintaining that high liquidity indicates a low level of short-term liability and therefore a lower risk, bearing in mind that a higher liquidity reduces risk because there are more resources available to meet the company's obligations (Edge, 1998). In the initial investigation of the correlation between both variables, Beaver, Kettler, and Scholes (1970) found a negative relationship with risk. However, the empirical studies of Borde (1998), Rosenberg and McKibben (1973) and Pettit and Westerfield (1972) showed liquidity ratios to be positively associated with

risk. Nonetheless, the studies by Gu and Kim (1998) and Logue and Merville (1972) found no significant relationship between liquidity coefficients and risk.

Finally, profitability can also be decisive for the risk level, because following financial valuation models, a positive relationship between the profitability and risk of all investments has been confirmed both theoretically and empirically (Blume and Friend, 1973; Fame and MacBeth, 1973). If the company carries out aggressive strategies to increase profitability, which can increase risk (Edge, 1998), it seems logical that the riskiest investments are those that promise the highest rates of return. However, and as indicated by Bowman (1980), and Chen (2013), if the company is very profitable, there is a lower chance of incurring losses and bankruptcy. Bowman (1980) maintains that correlations between the accounting measures of profitability and risk are negative for most of the sectors analysed, that is, the most profitable companies have a lower risk. Consequently, the most at-risk companies obtain worse results on average. The same result is found by Fiegenbaum and Thomas (1988). This double relationship is justified due to the double attitude towards the risk that managers may take based on the prospect theory formulated by Kahneman and Tversky (1979). According to these authors, managers show a risk-averse attitude when the expected result is higher than desired, but they are prone to risk when the expected result is lower than desired. The values of the control variables considered in the study are shown in Table 7 Summary of control variables. As can be seen, companies are heterogeneous in terms of size, liquidity, solvency and profitability.

Table 7. Summary of control variables

logta	572	12,37317	2,190238	6,598531	16,96684
ratliq_	572	1,246647	1,204686	0,006	6,739
rroa_	572	0,3376346	14,02567	-73,205	62,517

Source: own elaboration.

While, in general there is not a very high correlation between the variables considered.

Table 8. Correlation coefficient between control variables

	logta	ratliq_	rroa_
logta	1		
ratliq_	-0.1003	1	
rroa_	-0.0917	-0.0319	1

Source: own elaboration.

Table 9 shows all the variables considered, as well as the expected sign for each case.

Table 9. Variables and initial hypotheses

Variable	Expected relationship ERM
Relating to ownership	
Famcont	-
Flcont	+
Relating to Corporate Governance	
Totalmembers	+
Boardwom	+
Sharboard	+
Control variables	
Size	+
Liquidity	+
Profitability	+

Source: own elaboration.

Methodology

Most empirical studies carried out, which this paper belongs to, test the hypotheses established in the theoretical framework by means of conditional probability models. Therefore, we have chosen to apply a logit model to analyse the implementation of the variables related to ERM. This method establishes a linear relationship between the set of independent variables and the dependent variable. The dependent variable, which varies in the [0; 1] interval, is the logarithm of the ratio of opportunities or probabilities (odds ratio), probability of a certain event (default) and probability of its complement (no default).

We take P as the probability of the event occurring (value “1”) and 1-P, the probability of the complementary event occurring (value “0”). It is a Bernoulli or dichotomous variable whose mathematical expectancy represents the random result of default or no default. Taking the variable as Y, the probability that the company has some of the issues evaluated in the differing dependent variables is $E = [Y/X_i] = P$, where X_i represents the explanatory or independent variables (Caballo, 2013). The logistic regression model approximates the probability of the event “1” with the value of the explanatory variable as follows:

$$P(Y = 1) = P = \frac{1}{1+e^{-z}} = \frac{1}{1+e^{-(\beta_0+\beta_1X_1+\dots+\beta_kX_k)}} = \frac{e^z}{1+e^z} \quad [1]$$

thus,

$$P(Y = 0) = 1 - P = 1 - \frac{1}{1+e^{-z}} = 1 - \frac{1}{1+e^{-(\beta_0+\beta_1X_1+\dots+\beta_kX_k)}} = \frac{1}{1+e^z} \quad [2]$$

If we now express the number of times that an event occurs versus how many times it does not occur (odds-ratio or probability ratio), we can deduce the following:

$$\log\left(\frac{P}{1-P}\right) = \log(P) - \log(1 - P) = Z = \beta_0 + \beta_1X_1 + \dots + \beta_kX_k = \text{Logit} \quad [3]$$

obtaining a linear relationship in both the

independent variables X_i and parameters $\beta_0 (i = 1, 2, \dots, k)$ (Caballo, 2013).

The proposed model is as follows:

$$P(ERM = 1) = F(\beta_0 + \beta_1 \text{Famcont} + \beta_2 \text{Ficont} + \beta_3 \text{Totalmembers} + \beta_4 \text{Boardwom} + \beta_5 \text{Sharboard} + \beta_6 \text{Manshar} + \sum \beta_j X_j) \quad [4]$$

The regression signs are interpreted in the following way: a positive sign shows an increase in the probability that $y_i = 1$ and a negative sign means the opposite. It is important to interpret the sign and not the magnitude since the latter must be done in terms of marginal effects that are calculated as:

$$\frac{\partial F(x'\beta)}{\partial x_j} = \Lambda(x'\beta)[1 - \Lambda(x'\beta)]\beta_j = \frac{\exp(x'\beta)}{(1 + \exp(x'\beta))^2} \beta_j \quad [5]$$

Mean difference

Before analysing the results of the logit models, we performed an analysis of mean differences for some of the dependent variables. First, we chose the implementation of COSO as a proxy for ERM, where we observed that in general, companies that had implemented the standard have significant and positive differences in terms of ownership and the boards of directors. Thus, in general they have a higher percentage of institutional participation in capital, larger boards of directors, more women on boards of directors and more shareholders who are members of the boards.

Table 10. Mean difference considering the COSO variable as proxy of ERM

	COSO=1	COSO=0	Diff.	Std. Error	Obs.
famcont	0.3871	0.4158	0.0287	0.0255	577
ficont	0.2224	0.1690	-0.0534***	0.0080	577
total members	20,1609	14,0521	-6.1088***	0.7136	577
boardwom	2,2931	1,4392	-0.8539***	0.1547	577
sharboard	7,6207	4,1290	-3.4917***	0.3730	577

Source: own elaboration.

As we can see in Table 7 the differences are all significant, like before showing once again that in general, companies with a risk map have more institutional presence and larger, more diverse management boards, with more directors as shareholders. This does not happen with the family ownership concentration variable, which we have seen has a negative result, so a higher concentration implies a lower implementation level of the risk map.

Table 11. Difference of means considering the Risk Map variable

	Risk Map=1	Risk Map=0	Diff.	Std. Error	Obs.
Famcont	0.3809	0.4421	0.0612***	0.0235	577
Ficont	0.2048	0.1587	-0.0461***	0.0075	577
Total members	18.3818	12.5709	-5.8110***	0.6597	577
Boardwom	2.0303	1.251	-0.7793***	0.1436	577
Sharboard	6.6879	3.17	-3.5178***	0.3412	577

Source: own elaboration.

As shown in Table 12, the differences are significant in all cases, as with the previous variable, demonstrating again that, on the whole, the results are the same as those with a risk map.

Table 12. Difference of means considering the Risk Committee

	Risk Committee=1	Risk Committee=0	Diff.	Std. Error	Obs.
Famcont	0.3475	0.4226	0.0751***	0.0288	577
Ficont	0.2122	0.1781	-0.0341***	0.0093	577
Total members	20.3613	14.7336	-5.6277***	0.8268	577
Boardwom	2.2857	1.5437	-0.7420***	0.1773	577
Sharboard	7.3361	4.6223	-2.7139***	0.4398	577

Source: own elaboration.

The same applies to coverage (Table 13), which backs up how the differences are repeated in general with only the negative variable being the representative variable of family ownership once again.

Table 13. Difference of means considering coverage

	Coverage int rates=1	Coverage int rates=0	Diff.	Std. Error	Obs.
Famcont	0.3638	0.4439	0.0801***	0.0232	577
Ficont	0.2011	0.1715	-0.0297***	0.0075	577
Total members	19.1811	13.1026	-6.0786***	0.6501	577
Boardwom	2.1962	1.2724	-0.9238***	0.141	577
Sharboard	6.5245	4.0417	-2.4829***	0.3539	577

Source: own elaboration.

Results of the logistic regression

In Table 14 we can see that the Famcont variable is significant in six of the estimated models, showing a U-shaped relationship. This means that in general, a greater concentration of capital in the hands of family businesses leads to a lower likelihood of the company adopting risk management

and control structures and policies. However, at very high concentration levels, it is observed, as before, that companies have more incentives to implement ERM. In the same way, companies with moderate levels of capital are less likely to have a structure with a risk committee or to hire a CRO, or even have fundamental management tools such as a risk map either. In addition, control of the company at moderate levels by a family member reduces the probability that the company implements a risk coverage programme. However, this situation changes when the concentration levels exceed approximately 50% of the capital. The results obtained are partially in line with *hypothesis 1* and with the approaches by Brustbauer (2016), who showed that family businesses have less of an incentive to implement an ERM system and Paape and Speklé (2012), when they confirm that the coincidence of owners and managers makes implementing ERM less worthwhile because there are fewer agency problems. Therefore, our results support a non-linear re-

lationship between the family control level and the ERM implementation degree, so at moderate levels there is a lower incentive to invest in risk management systems, whereas the propensity to implement ERM systems increases when the capital concentration level is very high.

On the contrary, the presence of an institutional investor is very significant in seven of the eight models studied, the adoption of ERM, the provision of a professionalized risk management structure and measurement tools, as well as the coverage of risks all showing a positive relationship. Thus, our results support hypothesis 2, which establishes a positive relationship between the presence of institutional investors and enterprise risk management. These results are in line with Mafrolla, Matozza and D'Amico, (2016), who postulate that the presence of institutional investors can lead to better risk management practices being applied in the company and CROs and Risk Committees being incorporated (Pagach and Warr, 2011). On the other hand, as it is a continu-

Table 14. Estimated Logit models for the differing variables related to risk management.

	ERM	Risk Committee	CRO	Risk Map	Tolerance	Covinterest	Covexch	Covcredit
famcont	-3.3481**	0.2317	-11.4816***	-5.4070***	-4.7700***	-3.4866**	2.206	3.3740**
famcont2	3.0653*	-1.3662	9.7460***	4.6844***	4.7081***	2.4559	-3.4093**	-4.2347***
ficont	8.1359***	4.4982*	10.5305**	4.9928***	3.5492***	2.1781	3.5584*	5.0766***
totalmembers	-0.0092	-0.002	0.0602**	-0.0125	0.0285	0.0237	0.0008	-0.0767***
boardwom	0.0665	0.0686	-0.1326	-0.0595	-0.2379***	-0.0257	-0.0917	-0.0916
sharboard	0.1163***	0.0166	-0.0036	0.2173***	0.0929**	-0.0388	0.0261	0.0814**
logta	0.2575***	0.4070***	0.7391***	0.3607***	0.3499***	0.6875***	0.7270***	0.3742***
ratliq_	-0.0386	-0.1041*	-0.006	0.0077	0.0353	0.0001	-0.0177**	0.0000
rroa_	-0.0001	-0.0014	-0.0077***	0.0005***	-0.0002	-0.0016	0.0003***	-0.0016
yr2013c	-0.2376	-0.3716	-0.8135	-0.8059***	-3.2413***	0.7005**	0.2729	0.1451
yr2014c	-0.1991	-0.2132	-0.1464	-0.4549	-0.4476	0.5591*	0.2267	0.2807
yr2015c	-0.0439	-0.263	-0.1277	-0.2934	-0.45	0.159	-0.045	0.0439
cn_2	0.2975	0.7879**	-	-0.0417	-0.5301	-0.1673	1.2297***	1.0488**
cn_3	-1.4404***	-0.0646	1.2452*	0.7542**	0.7843**	-0.1731	1.4182***	1.4723***
cn_4	0.0588	0.7123	0.5774	-0.7236	-0.2193	1.0712***	-0.7409	-0.3377
cn_5	-1.1424***	-1.0418***	1.2165***	-0.2806	0.3599	0.3698	1.1297***	-0.4788
cn_6	-0.3619	-	1.2102*	1.2889*	1.3709**	1.9736*	-1.6440***	-0.5468
_cons	-5.3581***	-7.1147***	-13.7780***	-4.3505***	-3.7056***	-9.1712***	-11.4455***	-6.9540***
N	544	520	495	544	544	544	544	544
r2_p	0.2362	0.189	0.3387	0.2559	0.3047	0.304	0.2914	0.133
p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: own elaboration.

Note: This Table shows the estimations of the logit model which were carried out by using different risk measures as dependent variables. Famcont is a representative variable of the percentage of capital in the hands of family or individual investors. Totalmembers is the number of members belonging to the board of directors, boardwom represents the percentage of women on the board and sharboard the percentage of shareholders who are also directors. Logta is the logarithm of the company's total assets, ratliq_ is the liquidity ratio and rroa_ is profitability. Temporary and sectorial dummies have also been included. *Significant at 10%. ** Significant at 5%. *** Significant at 1%.

ous variable, it also implies that the higher the level of control of the institutional investor, the greater the relationship. which again supports the approach by Mafrolla, Matozza and D'Amico (2016), when they maintain that if institutional investors have a higher stake, they perform in a professional way, improving the quality of management and therefore, of their risk system too. Equivalent results have been found by Brustbauer (2016) for the relationship between institutional participation and implementation of ERM systems.

The figure of the shareholder, who is also a board director, is a variable that has been significant in so many of the estimated models. Contrary to what is stated in the initial hypothesis, in the case of a director being a shareholder and, therefore, not independent, ERM is more likely to be adopted, risk management techniques incorporated and credit risk covered, the adoption of ERM is more positively affected. This situation could be explained by the fact that when the shareholder does not have control of the company, but participates in the board of directors, he or she may be interested in having a sophisticated risk system that allows managers to be better controlled. In addition, we have also observed that when the capital concentration level is very high, there is greater involvement in risk management. In this case, it is quite common for the shareholder to also be a member of the board of directors, whereby both roles would converge in boosting ERM. Size of the Board can also play a significant role due to its ability to control managers' actions (Daud, Haron & Ibrahim, 2011). Our work only finds a significant relationship between size of the Board and the incorporation of a CRO, as it appears that a larger size makes it more difficult for a company to control its managers and leads to the incorporation of a CRO in order to monitor them. Finally, gender diversity does not seem to influence the characteristics of risk management which the company takes.

As for other more classic variables, the important role that size plays stand out, showing how important it is to be of a certain size in order for formal risk management processes to be undertaken.

Conclusions

We have evaluated the effect of ownership and corporate governance on the level of ERM implementation. This aspect has seldom been considered in previous literature, which in general has resorted to more conventional indicators. The results obtained show that the relationship between the level of family ownership concentration and risk presents a non-linear structure, in such a

way that there is a reduction in the level of ERM implementation for moderate levels of ownership and an increase for higher levels. Thus, it seems that family businesses are less interested in implementing ERM, except when shareholders have greater control of the company, in which case they are more motivated to implement risk management systems. Similarly, when professional investors are present in the company, they boost management and control systems as well. In general, our results are in line with Mafrolla, Matozza and D'Amico (2016), who postulate that the presence of institutional investors could lead to better risk management practices being applied in the company and CROs and Risk Committees being incorporated. Furthermore, since it is a continuous variable, it also implies that this relationship is greater the higher the level of control the institutional investor has, so if institutional investors have a higher, stakes, they perform in a professional way, improving management standards and, therefore, its risk system too. Regarding the variables related to corporate governance, the importance of the characteristics of boards of directors in risk taking is confirmed. In this regard, we have observed that larger boards encourage risk managers to be hired and that the presence of shareholders on the board also acts as a catalyst for ERM to be adopted.

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