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ORIGINAL PAPER

Does family involvement monitor external CEOs' investment decisions?

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Abstract This paper examines two closely related issues: first, the impact of a professional chief executive officer (CEO) on family investment decisions; and second, how the organizational context (family involvement and board effectiveness) interacts with the external CEO risk-bearing attitude to affect investment intensity in family firms. Using a sample composed of 103 family firms from 13 countries for the period 2008–2015, our results support the negative impact of non-family CEOs on family investment levels, especially when they are of longer tenure. However, our results note that family involvement moderates CEO risk aversion propensity, increasing the levels of investment needed to preserve socioemotional and financial goals in family firms. Therefore, this paper extends the knowledge on the determinants of investment intensity in family firms by simultaneously considering non-family CEO characteristics as well as the organizational context variables of family firms.

Keywords Family business · CEO · Investment intensity · Family involvement · Governance

JEL Classification M · M12

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1 Introduction

Although traditionally in family firms the CEO role has been occupied by family relatives, the professionalization of their businesses is among the main challenges family firms face in the next years (Financial Times 2014). In this regard, a recent survey undertaken by PwC in 2016 notes that family firms recognize the need to professionalize the business as a key priority.[1] Theoretical arguments support this view and according to the resource-based view perspective, external CEOs in family firms can mitigate the lack of outside work experience and general business knowledge in family firms (Maseda et al. 2015). Despite its relevance in the finance literature, relatively little research analyses the consequences of professional CEOs on family firm investment decisions (Chen and Hsu 2009), existing calls for conducting further research on this issues (Muñoz-Bullón and Sanchez-Bueno 2011). Financial investments are among the most important corporate decisions that managers can make, highly affecting the probability of a family firm's survival.

Therefore, the main objective of this paper is to analyze the effect of external CEOs on family firm investment levels. In particular we examine whether a CEO without blood ties increases risk aversion in family firms, thus resulting in lower levels of investment. Built on the premise that the CEO risk-bearing attitude can be affected by individual differences in personal styles, skills, and business knowledge (Hambrick and Mason 1984), we also study whether family investment decisions are affected by longer tenured external CEOs. In addition, and as a unique and helpful feature of this study, we extend our primary research by testing whether the effect of an external CEO on family firm investment decisions is moderated by the family involvement in top decisions (the so-called *familiness*). According to Berrone et al. (2010) although some theories such as agency or stewardship have contributed to explain the behavior of family firms, the socioemotional wealth theory (SEW) represents the main reference point for understanding family strategic decision-making and dealing with the uniqueness of family firms. Hence, using insights from the SEW theory, we suggest that *familiness* or the level of family involvement (e.g., family members as top managers) can moderate the decisions made by external CEOs, affecting their risk attitude and consequently the investment intensity. Along with family involvement, we also suggest that the strength of the internal governance mechanisms represented by aspects related to board independence or CEO separation, can condition the non-family CEO's risk-bearing attitude.

To test these objectives, we use a sample composed of 103 family firms from 13 countries for the period 2008–2015. In line with previous studies, we measure investment levels using the measure proposed by Biddle et al. (2009). Following Anderson et al. (2012), we also distinguish between the level of capital investments, as a measure of capital expenditures, and non-capital investments, including the level of R&D expenditure plus the level of acquisition expenditure.

[1] www.pwc.com/fambizsurvey2016.

Our findings show that a CEO without blood ties increases the risk aversion in family firms, resulting in lower levels of investment, especially when they are long tenured. Additionally, we find that family involvement moderates CEO risk aversion, increasing the levels of investment in order to preserve socioemotional and financial goals. This moderating role of family involvement to reduce risk-averse behavior is higher under capital investment levels, with more predictable outcomes than non-capital investments. Accordingly, this study shows that the effect of non-family CEOs on investment decisions cannot be fully elicited without considering the role of *familiness*, because the interaction between the CEO's power and family involvement may generate different risk patterns and thus affect investment decisions. However, the strength of the internal governance mechanisms represented by aspects related to board independence or CEO separation does not moderate CEO risk aversion in family firms. Results are robust to alternative measures of investment.

This study makes several contributions to theory and the previous literature. This paper contributes to the behavioral agency model theory proposed by Berrone et al. (2012) that uses financial and socioemotional reasons to explain decision-making in family firms. By using the SEW theory, we contribute to the recent call for research using this framework to understand the behavior of family firms (Berrone et al. 2012; Gómez-Mejía et al. 2007, 2011; García-Ramos et al. 2017). Thus, although some studies have shown a detrimental effect of SEW in family firms (Kellermanns et al. 2012), this study contributes to the field by showing SEW as an effective endowment that has positive effects on the family investment propensity. This study also adds to the financial literature on investment efficiency by noting the impact that external CEOs have on capital and non-capital family investments, which has relevant implications for a better understanding of the role of individual managerial characteristics in family corporate outcomes. By studying the role of longer tenured external CEOs, this paper is also a response to Bamber et al. (2010) and Hermalin and Weisbach's (2017) call for further exploration of the roles that individual managers play in financial decisions.

Even more relevant, considerable research has been conducted on the question of how family firms behave and, particularly, whether they behave differently from non-family firms. Significant differences have been identified in terms of corporate governance, leadership, performance, and succession (e.g., Brenes et al. 2011). However, the literature thus far has overlooked the topic of investment decisions. In this regard, this is the first study to analyze the interaction between external CEOs, investment decisions, family involvement mechanisms and even, corporate governance mechanisms. Thus, this study delves into the black box of the external CEO-family relations, a relevant and novel topic in corporate governance research and family literature. Finally, this study adds exploratory evidence by using a panel data set (13 countries from 2008 to 2015) and complements previous literature that has used family firms for comparison between countries, time periods or both (e.g., Chrisman and Patel 2012; van Essen et al. 2015; Villalonga et al. 2018; Cabrera-Suárez et al. 2014).

2 Background and hypotheses

2.1 Investment decisions and external CEOs in family firms

Although there is no universal definition of a family firm (Miller et al. 2007), in general, it usually refers to management, ownership, or succession-related issues. The typical family business has been characterized as a firm is one in which one or more family founders continues in a top managerial position and controls a large proportion of the company's shares or is a board member (Chen et al. 2008). In many cases, family ownership is characterised by large investments in company capital and by the presence of family members on the board (Maury 2006). Meanwhile, Global Family Business Index define a family firms as follows: For a privately held firm, a firm is classified as a family firm in case a family controls more than 50% of the voting rights. For a publicly listed firm, a firm is classified as a family firm in case the family holds at least 32% of the voting rights. At this respect, one of the most critical papers about family firms' definition is from Miller et al. (2007, p. 836). Initially, they define "a family firm as one in which multiple members of the same family are involved as major owners or managers, either contemporaneously or over time". However, these authors propose different definitions for family business, distinguishing from lone founder business in which there are one or more founders who have no relatives in the business, and family business in which there are multiple major owners or executives over time or contemporaneously from the same family. The main conclusion about the adoption of several definitions is that findings are highly sensitive to the way in which we define family business.

Despite of the absence of a clear family firms' definition, according to the resource based view, family firms posses unique capabilities and resources (human capital, social and relational capital) that differ them from non-family firms and lead them to have competitive advantages. In recent years, some theoreticians who have focused on examining family firms' behaviour have extended that perspective and have adopted a position based on a SEW perspective (Gómez-Mejía et al. 2007). In this respect, family firms are characterized by the endowment of socioemotional wealth, based on an emphasis on reinforcing family ties, family identity, and their desire to transfer the business to future generations (Berrone et al. 2012).

These characteristics are reinforced under the appointment of a family CEO, who tries to preserve the socioemotional wealth in his/her business. In this regard, because family CEOs improve the altruism in family firms and have a long-term orientation, they may lead to less shortsighted acquisitions and downsizing decisions, and the undertaking more long-term R&D and capital investments (Miller and Breton-Miller 2006). The identification with the company, greater power and stronger psychological attachment also influence their positive effect on family firms (Gao et al. 2017). These arguments are corroborated by some studies that have found a positive impact of family CEOs on firm performance (Anderson and Reeb 2003; Villalonga and Amit 2006).

In contrast, according to the resource-based view, external CEOs can provide valuable insights to family firms because of its outside business experience and

general business knowledge. However, some previous results agree in noting that external CEOs can make strategic decisions that do not improve optional efficiency levels in order to protect themselves against major losses (i.e., favoring R&D investments with low risk) (Neacsu 2015). This attitude is justified because they do not enjoy job security and do not share family socioemotional benefits (Berrone et al. 2012). Moreover, when family firms are managed by external CEOs they can be even more myopic in their investment decisions due to members from non-homogeneous groups tending to communicate less frequently and to have more emotional conflicts, thus leading to more time-consuming and less effective decision-making (Earley and Mosakowski 2000). These non-family CEOs may also erode the internal social and kin ties that improve trust, mutual accommodation, coordination, and knowledge-sharing in family firms (Stewart and Hitt 2012), which can affect the efficiency in family investment decisions.

Taking into the account the above arguments, we expect that a CEO without blood ties increases risk aversion in family firms, thus resulting in lower levels of investment. Consequently, we pose the following hypothesis:

H1a External CEOs increase risk aversion attitude in family firms, thus reducing family investment intensity.

Firm familiness is the advantage of family firms based on their unique capabilities and resources. Recent financial developments extend social capital theories by acknowledging the relevance of manager-specific attributes of firms' behavior (Bertrand and Schoar 2003). These studies, based on the upper echelons perspective, analyze how individual managerial characteristics related to their experience, personal risk attitude, values or personalities, can influence their choices.

In this regard, CEO tenure has captured much attention in large public companies as an indicator of risk attitude and resistance to change, noting that longer tenured CEOs place more emphasis on stability and job security (Musteen et al. 2006). This issue, known as CEO career horizon problem, has been scarcely studied in family firms, despite the prevalence of studies exhibiting the negative influence of the CEO's career horizon on firms' strategic decisions. Following the above arguments, we suggest that the risk behavior of external CEOs in family firms can be reinforced when the CEO's tenure is long.

Thus, longer tenured external CEOs can show a particular behavior and favor self-interested conduct over stewardships, entrenching themselves to extract private benefits or to avoid taking business risks to preserve the family wealth. When their tenure is long, external CEOs may be more prone to reject profitable and high-value projects (risk aversion) if they do not increase their compensation or affect their established reputation, which may have severe negative consequences in the long term for the family firm (Strike et al. 2015). Previous research notes that longer tenured CEOs are potential candidates for following entrenchment practices (Surroca and Tribó 2008), and that longer tenured CEOs tend to emphasize stability and have lower interests in high R&D intensity (Naveen 2006). Moreover, longer tenured CEOs suffer from restricted information

searches, strategic rigidity, organizational simplicity and power on the board, all of which affect the firm's outcomes (Walters et al. 2007). Similarly, as their tenure increases, CEOs reduce their variance in the work routine, restrict the sources sought for information and the time in processing information for making decisions (Finkelstein and Hambrick 1996).

According to Strike et al. (2015), the CEO's career horizon effect on firms' strategic decisions is also likely to differ between family firms and non-family firms due to the additional socioemotional wealth (SEW) perspective of family firms. In this regard, Binacci et al. (2016) point out that tenure can raise emotional attachment and exacerbate differences between longer tenured and recently hired external managers. From the above, we expect a negative influence from longer tenured external CEOs and their investment propensity; thus, we propose the following hypothesis:

H1b The risk aversion of external CEOs, and therefore their negative effect on family investment intensity, increases with the CEO's tenure.

2.2 Interaction effects between external CEOs, family involvement and board effectiveness on investment levels

Although many studies have found that non-family CEOs outperform family CEOs in family firms, these studies fail because they do not take into account the governance contexts of professional CEOs (Miller et al. 2014). According to recent literature, the difference between family and not family firms is based not only on whether the CEO is a family member or not, but also on the degree of family involvement. Family involvement is considered a fundamental variable influencing decisions in family firms. In this regard, Miller et al. (2014) showed that the organizational context of family firms impacts the relationship between CEO risk-taking propensity and new product portfolio innovativeness, pointing socioemotional wealth as the main reference that determines family firm behavior.

According to this view we suggest that the effect of non-family CEOs on investment efficiency can be moderated by the *familiness* or the level of family involvement. Among the mechanisms through which the family can be involved, family involvement in top management and board are among the most relevant (Binacci et al. 2016). We suggest that because inefficient investment decisions made by non-family CEOs could imply catastrophic synoptic losses (socioemotional and economic welfare losses), the controlling family shareholders already have incentives, power and information to control the top managers and affect risk behavior. The family desire to perpetuate the business, the identification with the firm, the emotional attachment, as well as the alignment between family reputation and its success, provide family owners special incentives (SEW) that affect strategic decisions made by external CEOs on behalf of the firm (Berrone et al. 2012; Chrisman and Patel 2012). This family involvement can also improve mutual accommodation, coordination, and knowledge-sharing in family firms and compensate the non-family CEOs erosion of the internal social and kin ties (Stewart and Hitt 2012), which in turn affect the efficiency in family investment decisions. Actually, their personal

attachment makes family owners better monitors when their involvement is high (Miller et al. 2014).

In addition, the *familiness* involvement may create a firm culture of loyalty, family ties and stability that reduce CEOs' incentives to behave opportunistically, and encourage a long-term focus (Le Breton-Miller and Miller 2006). Moreover, family businesses with a high family control can compensate the negative aspects of non-family CEOs related to their myopic attitude in their investment decisions and lower communication attitude (Miller et al. 2014). This family involvement may increase trust, understanding, confidence and support to the external CEO, which in turn may promote a willingness to take risks, and therefore increase the family investment levels (Mitter et al. 2014; Arzubiaga et al. 2017). Family involvement also benefits the firm from lower information asymmetries and better knowledge of the business—aspects that favor the identification of the key drivers of a firm's future growth, as well as the accurate valuation work of future payoffs. At this regard, for example, Mitter et al. (2014) examine the influence of family ownership and governance on the advantages of internationalization.

The influence of family involvement on non-family CEOs is higher under a high family representation in managerial structures and in firm boards. In this regard, O'Toole et al. (2002) notes that a single dominant owner involved in a family firm is less likely to monitor a non-family CEO than would several major family owners. This family support to the professional CEO can also be more important in those investment decisions with a lower risk. Along the same line, organizational aspects of family firms may be even more important to moderate the risk-averse attitude of those external CEOs who are near retirement. Hence, Strike et al. (2015) noted that as retirement approaches, CEOs may view international acquisitions as an opportunity to grow the ownership and managerial roles for future generations rather than as a threat to their control.

Along with family involvement, the strength of the governance mechanisms represented by aspects related to board independence or CEO separation, can condition the non-family CEO's risk-bearing attitude. Under a situation of CEO-duality and a high board independence, non-family CEOs have lower information asymmetries, what facilitates the identification of the key drivers and the efficiency of their investment decisions. Then, a non-family CEO operating in a company under a family chair can have lower incentives to behave opportunistically, a major understanding of the SEW family vision, and a higher long-term focus. In this regard, Fama and Jensen (1983) pose that an effective board of directors is better at monitoring and controlling manager behavior, which can reduce agency costs and improve contracting efficiency. In addition, according to the faultline perspective, an effective board can also reduce tensions and conflicts that can emerge between the groups of family and non-family stakeholders, which in turn can improve investment efficiency.

Previous literature usually measures the strength and effectiveness of the board of directors' according to some corporate governance code recommendations, including the percentage of board independence, and the separation between CEO and chairman roles. This board vigilance is even more important as tenure lengthens and CEO accumulates power, to help firms to reduce opportunism arising from CEO entrenchment. Thus, under long-tenured external CEOs, shareholder interests can be

best protected with a vigilant and efficient board of directors. In this regard, Combs et al. (2007) showed that boards dominated by independent directors help protect shareholders from CEOs' self-serving attitudes and prevent opportunistic behavior that conditions the misuse of resources. Similarly, Chen and Hsu (2009) found that family firms may increase R&D investment when the CEO–chair roles are separated or when more independent outsiders are included in the board. García-Ramos et al. (2017) also noted that the contribution of board effectiveness (measured by independent directors) to a firm's performance differs between family and non-family firms, confirming that the effect is moderated by the generational stage of the family business and by the leadership structure of the firm.

According to the above arguments, we expect that the effect of external CEOs on family firm investment levels could be moderated by family involvement as well as by board effectiveness. We also expect that the effect of these moderating variables on investment intensity will be higher in family firms with longer tenured external CEOs. Thus, we propose the following hypotheses:

H2a Family involvement and board effectiveness constrain the risk-averse attitudes of external CEOs in family firms, thus increasing investment intensity.

H2b Family involvement and board effectiveness constrain the risk-averse attitudes of long-tenured external CEOs in family firms, thus increasing investment intensity.

3 Empirical research: data, variables, and econometric models

3.1 Sample for the analysis

The data for this study is created using the categorization of family firm disclosed in Global Family Business Index and is the result of the information available in the Thomson One Analytic database for a period of analysis from 2008 to 2015. Global Family Business Index defines a family business as follows: for a privately held firm, a firm is classified as a family firm in case a family controls more than 50% of the voting rights. For a publicly listed firm, a firm is classified as a family firm in case the family holds at least 32% of the voting rights.[2]

Archival data was collected from Thomson Reuters Eikon. This source encompasses more than 88,000 companies trading in more than 164 exchanges in over 120 countries. In this study, we took into consideration information for all the firms from

[2] Global Family Business Index posits in their website the following: "The 32% cut-off is motivated by the observation that in OECD countries on average 30% of the votes are sufficient to dominate the general assembly of a publicly listed company. This is because on average only roughly 60% of the votes are present in the general assembly. To be more conservative in our classification we decided to use the 32% cut-off, which is also more conservative than most academic studies who often use a 25% or 20% cut-off. The assessments in this index are based on data for 2015. Companies for which no complete and reliable data for 2015 was available were skipped from the index". See more at http://familybusinessindex.com/.

the benchmark global stock indices from America, Europe, the Middle East and Africa (EMEA), and Asia: 3594 companies from 31 stock indices once duplicated companies were removed. After excluding observations with missing financial and economic information and only examining family business, a final sample of 582 firm-year observations (103 firms) spanning 8 years was available to test the hypotheses (2008–2015). It is an unbalanced panel because we have no information for some companies in some years. Specifically, we managed 582 observations instead of 824 (103 firms × 8 years).

The firms were engaged in activities in different sectors and were from 13 different countries. Table 1 shows the sample distribution by country, year and industry. As we can see, the percentages are quite similar for all the years. In relation to geographic diversity, the observations are not distributed homogeneously: 35.65% of the companies are from the USA and Canada and, in the case of industry, the food, beverage & tobacco group comprised 14.94% of the sample.

3.2 Variables

Regarding our dependent variable, "INVEST" is the dependent variable that represents several measures of investment in both capital and non-capital goods. Similar to Biddle et al. (2009), our investment proxy is a measure of total investment defined as capital expenditures plus R&D plus acquisition expenditures less cash receipts from sales of property plant and equipment, multiplied by 100 and scaled by average total assets. An advantage of this investment measure is that it considers several types of investments that have increased in importance in recent years, such as capital expenditures, acquisitions and research and development, and that it contrasts with prior research that normally has studied these components separately. In addition, we have analyzed these different typologies of investment independently in order to examine them. In this regard, "Capital_Invest" reflects the level of capital expenditures and "Non-Capital_Invest" includes the level of R&D expenditure plus the level of acquisition expenditure. The use of separate investment measures allows us to identify the effect of external CEOs and the monitoring role that family and board of directors mechanisms play on capital and non-capital investment decision-making.

As explanatory variables, we define the dummy "ExternalCEO" that takes the value 1 if the CEO is not a member of the owning family, and 0 otherwise (Vandemaele and Vancauteren 2015). In other words, it is coded as "0" if the CEO is from the family that dominates the firm in terms of ownership, and "1" if the CEO is not from this family although he/she could have (Ishak et al. 2012). External CEOs are those who are not related to family owners; these are manually identified through yearly proxy statements published by the companies, comparing their personal data and affiliations with family information. "Tenure", meanwhile, is a numerical variable that identifies the years the CEOs have been realizing these functions (Minichilli et al. 2010; Mooney et al. 2017). Moreover, the interactions of both variables, "ExternalCEO*Tenure" is included in order to identify the effect of long-tenured external CEO's conservatism.

Table 1 Sample distribution

Country	Freq.	%
Panel A: Sample by country		
Australia	6	1.02
Canada	102	17.32
France	56	9.51
Germany	55	9.34
Hong Kong	32	5.43
Japan	8	1.36
Luxembourg	7	1.19
Netherlands	8	1.36
Singapore	3	0.51
Spain	30	5.09
Switzerland	40	6.79
United Kingdom	32	5.43
United States	210	35.65
Year	Freq.	%
Panel B: Sample by year		
2008	61	10.36
2009	71	12.05
2010	74	12.56
2011	76	12.90
2012	76	12.90
2013	77	13.07
2014	77	13.07
2015	77	13.07
Industry	Freq.	%
Panel C: Sample by industry		
Automobiles & Components	52	8.83
Capital Goods	48	8.15
Commercial & Professional Services	32	5.43
Consumer Durables & Apparel	16	2.72
Consumer Services	8	1.36
Energy	16	2.72
Food & Staples Retailing	48	8.15
Food. Beverage & Tobacco	88	14.94
Health Care Equipment & Services	15	2.55
Household & Personal Products	38	6.45
Materials	23	3.90
Media	28	4.75
Pharmaceuticals. Biotechnology & Life	45	7.64
Real Estate	32	5.43
Retailing	37	6.28

Table 1 (continued)

Industry	Freq.	%
Software & Services	13	2.21
Telecommunication Services	8	1.36
Transportation	11	1.87
Utilities	31	5.26
Total	589	100.00

Furthermore, "FamilyInvolvement" is a numerical variable that groups several dimensions of family involvement in the monitoring process as will be described in the following. We contribute, thus, by proposing a novel measure about family involvement considering several dimensions beyond previous studies focused on only some aspects (for instance, Minichilli et al. 2010 who examined the presence of a family CEO and the number of family members involved in top managerial teams). The assertive control mechanisms that family members could play over long-tenured external CEOs' conservatism is analyzed by the interactions of "FamilyInvolvement" with the two previous independent variables—external CEOs and tenure indicator variables. More concretely, "FamilyInvolvement" is the factor obtained by a principal component analysis of several characteristics of family monitoring involvement. Initially, we define several mechanisms that family members could use in order to monitor CEOs more or less: first, those related to the family involvement in managerial control—the presence of family members in the managerial team and on the board, as well as the control of the dominant position of the board with a family chairman. Regarding family involvement in managerial team, a dummy variable "FamilyMT" takes a value of 1 if family members are top managers, and 0 otherwise. We have adopted this variable due to it not being possible to determine the exact number of top managers; thus it impells us to use the percentage of family top mangers. According to the upper echelon perspective on *familiness*, top management teams cast additional light on the financial performance of family-controlled firms (Ensley and Pearson 2005).The presence of family members on the board is represented by the percentage of family members in the boardroom "%FamilyBoard" (Minichilli et al. 2010; Matzler et al. 2015). "FamilyChairman" is a dummy variable that takes the value 1 when the chairman of the firm is a family member, and 0 otherwise (Maury 2006; Kowalewski et al. 2010).

Similarly, "BoardEff" is a numerical variable that groups several dimensions related to board effectiveness recommendations, like independence of the board by the inclusion of higher levels of independent directors and the separation of CEO and chairman functions, along with the existence of compensation policies related to risk-bearing associated with stock options. Regarding the board effectiveness code recommendations, the level of board independence is measured by the percentage of independence ("%Indep") following the prior literature about corporate governance (Haniffa and Cooke 2005; Harjoto and Jo 2011; Mooney et al. 2013; Villarón-Peramato et al. 2018). The separation of CEO and chairman functions is identified

Table 2 Factor analysis of family involvement and board effectiveness

	FamilyInvolvement
FamilyMT	0.8706
FamilyChairman	0.8192
%FamilyBoard	0.8242
Variance accounted	70.28%
Kaiser–Meyer–Olkin (KMO) measure of simple suitability	0.693
Bartlett test of sphericity (Chi square)	516.463
p value	0.000
	BoardEff
%Indep	0.6820
Separation	0.6325
Policy	0.6662
Variance accounted	43.63%
Kaiser–Meyer–Olkin (KMO) measure of simple suitability	0.569
Bartlett test of sphericity (Chi square)	39.251
p value	0.000

by the value 1 for the dummy "Separation" (Mooney et al. 2013). The existence of a risk-bearing policy is identified by the dummy "Policy", taking a value of 1 if the firm has specific policies related to risk-bearing associated with stock options. Positivist agency theory have defend the existence of these policies as a means to align the interest of top managers with that of shareholders (Singh and Harianto 1989).

The variables proposed to identify the family involvement and board effectiveness have been grouped by a factorial analysis and results are shown in Table 2. The Kaiser–Meyer–Olkin (KMO) measure of sample suitability is 0.693 and 0.569 for family involvement and board effectiveness, respectively, greater than 0.5, the minimum variable of suitability, and the Bartlett test of sphericity is significant at a 99% confidence level. This means that results of the factorial analysis provide an adequate basis for empirical examination. Results show a factor for each dimension: (1) "FamilyInvolvement", which defines the family involvement in top management and board (positive charge of "FamilyMT", "FamilyChairman" and "%FamilyBoard" with a weight greater than 0.8); and (2) "BoardEff", which defines the strength of the board of directors' characteristics according to corporate governance code recommendations worldwide (positive charge of "%Indep", "Separation" and "Policy" with a weight greater than 0.6). "FamilyInvolvement" also represents, following the upper echelon perspective, the unique resources or capabilities of family firms created through the interaction between the firm and the company (Habbershon et al. 2003).

Finally, several control variables are included in order to avoid biased results. Included is a vector of eleven control variables that affect the level of investment: financial reporting quality "FRQ", debt maturity "STDebt" and several specific firms' characteristics. Better financial reporting quality (FRQ) makes managers

more accountable by allowing for better monitoring; it may reduce information asymmetries and, consequently, adverse selections and moral hazards. It could also diminish overinvestment and underinvestment problems. On the other hand, FRQ could also improve investment efficiency by allowing managers to make better investment decisions through better identification of projects and more truthful accounting numbers for internal decision-makers. In order to estimate FRQ and including it as determinant of investment decisions (similar to Biddle et al. 2009). our measure was obtained following the model proposed by Mcnichols and Stubben (2008), who consider discretionary revenues as a proxy for earnings management.

$$\Delta AR_{i,t} = \beta_1 \Delta Sales_{i,t} + \mu_{it}$$

where $\Delta AR_{i,t}$ is the annual change in accounts receivable for firm i in the year t. $\Delta Sales_{i,t}$ represents the annual change in sales revenues for firm i in the year t. All terms are scaled by lagged total assets. The model is estimated separately for each industry-year group. Discretionary revenues are the residuals from the above equation, which represent the change in accounts receivable that is not explained by sales growth. Our first proxy for FRQ will be the absolute value of the residuals multiplied by − 1. Thus, higher values indicate higher FRQ.

As regards investment efficiency, debt maturity can be used to mitigate overinvestment and underinvestment problems; when there are positive projects, firms can finance them with short-term debt and diminish underinvestment problems, because the debt will be liquidated in a short time and the profitability will be entirely for the company (Myers 1977). In addition, debt holders may monitor borrowers better and thus reduce the agency conflict between creditors and borrowers that arises from investment opportunities (Cutillas Gomariz and Sánchez Ballesta 2014). To verify the role of debt maturity in investment efficiency, we include the variable "STDebt", measured as the ratio of short-term debt (debt that matures before 1 year) to total debt (Cutillas Gomariz and Sánchez Ballesta 2014).

Moreover, we included firms' specific characteristics such as: "FirmSize" measured by the natural logarithm of sales (Minichilli et al. 2010; Mooney et al. 2013; Villarón-Peramato et al. 2018); "Tangibility", the ratio of tangible fixed assets to total assets (Villarón-Peramato et al. 2018); "StdCFO", the standard deviation of cash flow from t − 2 to t; "StdSales", the volatility of sales in the same period (Maury 2006); "QTobin", a measure of growth options as the ratio between the firm's market value of equity and debt to its total assets (Minichilli et al. 2010; Maury 2006); "Z-Score", measured with Altman's Z-score (1968), is included to control for the financial solvency of the firm (Dhaliwal et al. 2012); "DLoss", dummy variable that takes the value 1 if net income before extraordinary items is negative, and 0 otherwise (Dhaliwal et al. 2012); "AvgCFO", the ratio of cash flow to average total assets which captures the cash effect on investment efficiency (Lang et al. 1991); and "Opercycle", the length of the operating cycle (Biddle et al. 2009; Cutillas Gomariz and Sánchez Ballesta 2014). We also include industry, country and year (by multinomial variables) similar to Kowalewski et al. (2010),

Villarón-Peramato et al. (2018) and Martínez-Ferrero and García-Sánchez (2017), religion,[3] and culture[4] to control for these specific shocks to investment.

3.3 Model and variables

Our model is based on Biddle et al.'s (2009) model, which permits capturing the effects of the family on the investment decisions taken by external CEOs. Specifically, we propose the following models in order to contrast our hypotheses that are represented in Eqs. 1 and 2:

$$\begin{aligned} \mathrm{INVEST}_{i,t+1} &= \beta_1 \mathrm{ExternalCEO}_{i,t} + \beta_2 \mathrm{Tenure}_{i,t} + \beta_3 \mathrm{ExternalCEO} * \mathrm{Tenure}_{i,t} \\ &+ \sum_{j=4}^{14} \beta_j \mathrm{Controls}_{i,t} + \beta_{15} \mathrm{Industry}_{i,t} + \beta_{16} \mathrm{Country}_{i,t} + \beta_{17} \mathrm{Religion}_{i,t} + \beta_{18} \mathrm{Culture}_{i,t} \\ &+ \beta_{19} \mathrm{Year}_t + \mu_{it} \end{aligned} \tag{1}$$

$$\begin{aligned} \mathrm{INVEST}_{i,t+1} &= \beta_1 \mathrm{ExternalCEO}_{i,t} + \beta_2 \mathrm{Tenure}_{i,t} + \beta_3 \mathrm{ExternalCEO} * \mathrm{Tenure}_{i,t} \\ &+ \beta_4 \mathrm{FamilyInvolvement}/\mathit{BoardEff}_{i,t} + \beta_5 \mathrm{ExternalCEO} * \mathrm{FamilyInvolvement}/\mathit{BoardEff}_{i,t} \\ &+ \beta_6 \mathrm{Tenure} * \mathrm{FamilyInvolvement}/\mathit{BoardEff}_{i,t} \\ &+ \beta_7 \mathrm{ExternalCEO} * \mathit{Tenure} * \mathit{FamilyInvolvement}/\mathit{BoardEff}_{i,t} \\ &+ \sum_{j=8}^{18} \beta_j \mathrm{Controls}_{i,t} + \beta_{19} \mathrm{Industry}_{i,t} + \beta_{20} \mathrm{Country}_{i,t} + \beta_{21} \mathrm{Religion}_{i,t} \\ &+ \beta_{22} \mathrm{Culture}_{i,t} + \beta_{23} \mathrm{Year}_t + \mu_{it} \end{aligned} \tag{2}$$

[3] We include Religion, a multinomial variable, due to Pe'er (2016) evidenced that religiosity in a firm's environment influences decision making of organizations when initiating and evaluating corporate development strategies and hence leading to uneven distribution of economic activity.

[4] We follow the previous approach of García-Sanchez et al. (2015) and Martínez-Ferrero and García-Sánchez (2017) and group all the cultural dimensions into a global variable, "Culture". This is created by calculating the mean value of the six dimensions by country: (1) "Power_distance", which is a numerical variable that represents the level of hierarchy within a society; (2) "Individualism", which is a numerical variable that reflects the prevalence of individual values compared with group values; (3) "Masculinity", which is a numerical variable that represents the level of male orientation; (4) "Uncertainty_avoidance", which is a numerical variable that identifies the level of uncertainty avoidance; (5) "Long_term_orientation", which is a numerical variable that represents the orientation of a society towards the future; and (6) "Indulgence", which is a numerical variable that expresses the extent to which a society is socialized. We use the regional score of each of Hofstede's cultural dimensions because the country scores are relative owing to societies being compared with each other (Akman 2011). Accordingly, we consider the value of the dimensions related to power distance and indulgence but the inverse value of the dimensions related to power distance, individualism, masculinity and uncertainty avoidance. Thus, the higher the level of the "Culture" variable, the higher the level of cultural system development and therefore the greater the pressure of the normative force.

We estimate Eqs. (1) and (2) using ordinary least squares (OLS). We adjust the standard errors for heteroskedasticity, serial, and cross-sectional correlation using a two-dimensional cluster at the firm and year level. This technique is proposed by Petersen (2009) as the preferred method for estimating standard errors in corporate finance applications using panel data, i.e., repeated observations of the cross section of companies over time.

Note that prior literature suggest that endogeneity problem may arise (Miller et al. 2007). According to Wooldridge (2010), endogeneity may be defined as the existence of a correlation between the explanatory variables and the error term, due to causality between the dependent and the independent variables. Endogeneity problems may have three causes: the omission of relevant variables from the model, errors in measuring variables, and the existence of causality among dependent and independent variables. One way to control the possible endogeneity is expressing the explanatory variables in lags, as we do in this paper. To minimize the endogeneity problem in some specifications, we lag all our independent in one period Lagged explanatory variables are commonly used in business and management studies in response to endogeneity concerns (e.g., Lo and Sheu 2007). Lagged explanatory variables are effective in surmounting endogeneity concerns.

4 Results

4.1 Descriptive statistics

Panel A of Table 3 shows the descriptive statistics for family firm and board effectiveness variables. We can see that, on average, 67.57% of family firms have an external CEO and around 43.63% have family members on a managerial team. The chairman of the firms are a family member in 50.08% of the companies, showing a lower level of separation between CEO and chairman functions (33.11%) and remuneration policies related to risk-bearing (28.52%). The mean presence of independent directors is 56.48 and 12.03% for family directors. On average, CEOs are performing their functions for around 9 years for the same firm. These characteristics differ between companies with external CEOs versus family CEOs. Concretely, Panel A shows that in absolute terms, the participation of family members in managerial control seems higher in firms with family CEOs than those with external CEOs; they present higher values for those characteristics associated with board code recommendations. The relationship can be confirmed in the correlations coefficients in Panel B.

Table 4 displays the descriptive statistics for the full sample. In this regard, the mean (standard deviation) of total investments is 0.098 (±0.312). The capital investment shows a mean (standard deviation) of 0.124 (±0.317) whereas in the non-capital investment, the mean (standard deviation) is 0.070 (±0.306). These values are consistent with previous studies (Biddle et al. 2009). For the measures of FRQ, the mean (standard deviation) of − 0.064 (±0.038), has values in accord with earlier research (Biddle et al. 2009; McNichols and Stubben 2008). As regards debt maturity, we observe that, on average, 22% of liabilities are short-term debt. This is

Table 3 Family firm and board effectiveness indicators description

	Total		ExternalCEO		FamilyCEO	
	Freq.	%	Freq.	%	Freq.	%
Panel A: Descriptive statistics						
CEO	589	100	398	67.57	191	32.43
FamilyMT	257	43.63	82	20.6	175	91.62
FamilyChairman	295	50.08	131	32.91	164	85.86
Separation	195	33.11	107	26.88	88	46.07
Policy	168	28.52	134	33.67	34	17.8
	Mean	SD	Mean	SD	Mean	SD
%FamilyBoard	12.03%	11.10%	8.92%	10.70%	18.36%	9.10%
%Indep	56.48%	28.17%	57.94%	30.33%	53.45%	22.82%
Tenure	9.03	9.78	5.60	4.38	16.19	13.39

	1	2	3	4	5	6	7
Panel B. Bivariate correlation							
1. ExternalCEO							
2. FamilyCEO							
3. FamilyMT	− 0.668	− 0.337					
4. FamilyChairman	− 0.400	− 0.230	0.592				
5. %FamilyBoard	− 0.510	− 0.290	0.583	0.486			
6. %Indep	0.072	0.010	− 0.106	− 0.072	− 0.092		
7. Separation	0.185	0.079	− 0.189	− 0.036	− 0.195	0.155	
8. Policy	0.157	0.211	− 0.183	− 0.290	− 0.146	0.170	0.151

Table 4 Descriptive statistics

	Mean	SD
INVEST	0.098	0.312
Capital_Invest	0.124	0.317
NonCapital_Invest	0.070	0.306
FRQ	− 0.064	0.038
STDebt	21.876	1.2232
FirmSize	5.865	1.207
Tanbigility	0.444	0.222
StdCFO	0.005	0.005
StdSales	0.015	0.013
QTobin	0.982	0.637
Zscore	1.358	1.696
DLoss	0.254	0.428
AvgCFO	− 0.010	0.079
OPerCycle	4.537	0.876

consistent with the results of Datta et al. (2005) in US companies, and is quite different from those observed for Spanish firms that hold around 60% short-term debt (Cutillas Gomariz and Sánchez Ballesta 2014).

Table 5 presents the correlations among selected variables. The dependent variable used to represent investment efficiency is shown to be positively correlated with family firms, the presence of a family CEO and managerial team ability. They also show negative correlations with over- and under-investment. To corroborate the absence of multicollinearity among variables, the variance inflation factors (VIFs) were calculated for each model estimated. The statistical literature is not conclusive regarding acceptable levels of VIF. The most commonly used value is 10 (see Hair et al. 1995). Nevertheless, a maximum value of 5 or even 4 is also recommended in the literature. This study's results comply with this limit: there are no adverse consequences from multicollinearity in this case.

4.2 Regression results

Table 6 presents the results for Eq. (1) with investment, capital investment and non-capital investment as dependent variables. For each explanatory variable, we report the estimated coefficient and the standard error associated with each coefficients. The first two columns show regression results for "INVEST" as a dependent variable, the second two columns for "Capital_Invest" as a dependent variable and the last two columns, for "Non-capital_Invest". For each model, we provide the R^2, as the percent of variance explained. It is a measure of the overall fit of the model. For social science, 30.71, 19.71 and 20.32%, respectively, is fairly high (Achen 1982; Yerrabati and Hawkes 2015).

Our results corroborate that the presence of an external CEO is negatively associated with investment, especially with capital investment (coef. − 0.018, $p < 0.01$ for "INVEST"; coef. − 2.000, $p < 0.05$ for "Capital_Invest"; and coef. − 0.006, $p < 0.10$ for "NonCapital_Invest"). From the above results, we can support our hypothesis 1a; external CEOs increase risk aversion attitude in family firms, thus reducing family investment intensity. While, our results also confirm the negative and non-significant impact of "Tenure" on investment variables (coef. − 0.001, $p > 0.10$ for "INVEST"; coef. − 0.012, $p > 0.10$ for "Capital_Invest"; and coef. − 0.000,[5] $p > 0.10$ for "Non-Capital_Invest"). The absence of significance leads us to thinking that tenure only affects to external CEOs in the extant that guarantee their risk-aversion decisions; but CEO tenure does not affect to investment decisions.

The main findings of our regression models are those related to the moderating effect of tenure on the impact of external CEO on investment decisions through the interaction variable "ExternalCEO*Tenure". This variable shows a negative and significant impact of our three dependent variables (coef. − 0.003, $p < 0.10$ for "INVEST"; coef. − 0.076, $p < 0.05$ for "Capital_Invest"; and coef. − 0.001, $p < 0.10$ for "NonCapital_Invest"). For examining the moderating effect, it is necessary to

[5] There is a lack of effect when the coefficient is around 0.000.

Table 5 Bivariate correlation between dependent and independent variables

	1	2	3	4	5	6	7	8	9
1. INVEST	1.000***								
2. Capital_Invest	0.406***	1.000***							
3. NonCapital_Invest	0.829***	0.167***	1.000***						
4. ExternalCEO	0.068	− 0.015	0.035	1.000***					
5. Tenure	− 0.029	− 0.035	− 0.026	− 0.509***	1.000***				
6. ExternalCEO*Tenure	0.123***	0.053	0.095**	0.591***	− 0.001	1.000***			
7. STDDebt	− 0.018	− 0.097**	0.017	0.061	0.070*	0.146***	1.000***		
8. FRQ	0.076*	− 0.012	0.023	0.088**	0.020	0.142***	0.428***	1.000***	
9. FirmSize	− 0.030	− 0.139***	− 0.017	0.202***	0.043	0.173***	0.886***	0.493***	1.000***
10. Tangibility	0.150***	0.122***	− 0.067	0.302***	− 0.158***	0.161***	− 0.055	0.103***	0.126***
11. StdFCO	0.055	− 0.052	0.091**	0.164***	0.009	0.264***	0.509***	0.521***	0.491***
12. STDSales	− 0.013	− 0.047	− 0.022	0.143***	0.006	0.206***	0.594***	0.733***	0.682***
13. QTobin	− 0.055	0.005	− 0.031	0.088**	0.033	− 0.053	− 0.359***	− 0.107***	− 0.278***
14. Dloss	− 0.059	0.057	− 0.029	− 0.056	− 0.003	− 0.015	0.057	0.035	0.029
15. AvgFCO	0.055	− 0.052	0.091**	0.164***	0.009	0.264***	0.509***	0.521***	0.491***
16. Zscore	− 0.088**	− 0.010	− 0.062	− 0.073*	0.121***	− 0.122***	− 0.423***	− 0.118***	− 0.340***
17. OperCycle	− 0.072*	− 0.060	− 0.012	− 0.344***	0.093**	− 0.217***	0.102***	− 0.055	− 0.096**
18. FamilyInvolvement	0.005	0.136***	0.001	− 0.630***	0.270***	− 0.342***	− 0.140***	0.108**	− 0.286***
19. BoardEff	− 0.011	− 0.028	− 0.003	0.030	0.068*	0.080*	0.035	0.058	0.104**

	10	11	12	13	14	15	16	17	18
1. INVEST									
2. Capital_Invest									
3. NonCapital_Invest									
4. ExternalCEO									
5. Tenure									

Table 5 (continued)

	10	11	12	13	14	15	16	17	18
6. ExternalCEO*Tenure									
7. STDDebt									
8. FRQ									
9. FirmSize									
10. Tangibility	1.000***								
11. StdFCO	− 0.121***	1.000							
12. STDSales	0.124***	0.588***	1.000***						
13. QTobin	− 0.189***	− 0.028	− 0.107***	1.000***					
14. Dloss	0.027	− 0.185***	0.003	− 0.148***	1.000***				
15. AvgFCO	− 0.121***	0.990***	0.588***	− 0.028	− 0.185***	1.000***			
16. Zscore	− 0.295***	− 0.015	− 0.151***	0.823***	− 0.158***	− 0.015	1.000***		
17. OperCycle	− 0.434***	0.070*	− 0.083**	− 0.069	− 0.068	− 0.069	0.097**	1.000***	
18. FamilyInvolvement	− 0.299***	− 0.152***	− 0.178***	0.021	0.069*	− 0.152***	0.079*	0.254***	
19. BoardEff	0.143***	− 0.062	0.041	− 0.019	0.084**	− 0.062	− 0.094**	− 0.191***	− 0.113***

Table 6 Regression results for longer-tenured CEO on Investment

	INVEST Coeff. SE	Capital_Invest Coeff. SE	NonCapital_Invest Coeff. SE
ExternalCEO	− 0.018***	− 2.000**	− 0.006*
	(0.007)	(0.792)	(0.004)
Tenure	− 0.001	− 0.012	0.000
	(0.001)	(0.017)	(0.000)
ExternalCEO*Tenure	− 0.003*	− 0.076**	− 0.001*
	(0.002)	(0.032)	(0.001)
STDebt	0.011	0.158	0.002
	(0.012)	(0.258)	(0.006)
FRQ	0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)
FirmSize	− 0.017	− 0.426	− 0.004
	(0.013)	(0.286)	(0.007)
Tangibility	0.104***	− 0.009	− 0.032*
	(0.034)	(0.153)	(0.018)
StdFCO	0.010*	− 0.039	0.007**
	(0.005)	(0.107)	(0.003)
STDSales	− 0.013	− 0.664	− 0.006
	(0.021)	(0.455)	(0.011)
QTobin	0.001	0.038	0.003
	(0.009)	(0.167)	(0.004)
Dloss	− 0.029	0.589	− 0.007
	(0.025)	(0.427)	(0.013)
AvgFCO	0.288	67.141	0.861

Table 6 (continued)

	INVEST Coeff. SE	Capital_Invest Coeff. SE	NonCapital_Invest Coeff. SE
	(4.774)	(77.795)	(2.469)
Zscore	− 0.001	− 0.010	− 0.002
	(0.002)	(0.041)	(0.001)
OperCycle	0.000	0.000	0.000
	(0.000)	(0.001)	(0.000)
Industry	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Country	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Religion	− 0.011*	− 0.011	− 0.011
	(0.006)	(0.006)	(0.006)
Culture	− 0.001	− 0.001	− 0.001
	(0.004)	(0.004)	(0.004)
Year	0.000	0.000	0.000
	(0.002)	(0.002)	(0.002)
VIF values	ExternalCEO: 3.64; Tenure: 1.92; ExternalCEO*Tenure: 2.21; STDebt: 5.71; FRQ: 2.46; FirmSize: 4.69; Tangibility: 1.75; StdFCO: 2.23; STDSales: 3.65; QTobin: 3.9; Dloss: 1.1; AvgFCO: 3.19; ZScore: 4.54; OperCycle: 1.57; Industry: 1.3; Country: 2.34; Religion: 2.76; Culture: 2.22; Year: 1.09		
R^2	30.71%	19.71%	20.32%
p value	(0.003)	(0.002)	(0.02)

***, **, and * Statistical significance at 99, 95, and 90%, respectively

operate with coefficients (coef. "ExternalCEO" + coef. "ExternalCEO*Tenure"). At this respect, for investment model for example, it can be affirmed that the negative impact of external CEO on investment decisions (coef. "ExternalCEO" − 0.018), is even greater when external CEO has a longer tenure within the firm (coef. "ExternalCEO" − 0.018 + coef. "ExternalCEO*Tenure" (− 0.003) = − 0.021). A longer tenured external CEO increases the family's risk aversion; longer tenure may allow CEOs to entrench and to have more power to pursue their personal objectives. Our results support our hypothesis H1b; that is, the risk aversion of external CEOs, and therefore their negative effect on family investment intensity, increases with the CEO's tenure.

Once we have examined the negative effect of non-family CEOs on investment decisions and the moderating effect of tenure, in the following, we discuss the results related to hypotheses 2a and 2b. We thus respond to the research call to consider the governance contexts of professional CEOs (Miller et al. 2014). Table 7 reflect the results of equations for the two alternative models considering: "FamilyInvolvement" (Panel A) and "BoardEff" (Panel B). Again, for each model, we provide the R2: 32.20, 16.13 and 23.37% for family involvement models; and 27.41, 15.79 and 15.91%, for board effectiveness models.

In Panel A, results again show a negative impact on investment decisions—capital and non-capital investments—.[6] We again support the moderating effect of tenure on the impact of external CEO on investment decisions. "ExternalCEO*Tenure" shows a negative impact of our three dependent variables (coef. − 0.003, $p < 0.05$ for "INVEST"; coef. − 0.164, $p < 0.05$ for "Capital_Invest"; and coef. − 0.001, $p < 0.05$ for "NonCapital_Invest"). Again, operating with coefficients, the negative impact of external CEO on investment (coef. "ExternalCEO" − 0.001) is even greater when its tenure is longer (coef. "ExternalCEO" − 0.001 + coef. "ExternalCEO*Tenure" (− 0.003) = − 0.004), supporting again our hypothesis 1b. Results are similar for capital and non-capital investment models.

The most interesting results are in line with the additional variables related to family involvement. At this regard, we must compare the coefficients of "External*Tenure" and the interaction "FamilyInvolvement*ExternalCEO*Tenure"; the last indicator shows a positive and significant effect on investment decisions (coef. 0.001, $p < 0.10$ for "INVEST"; coef. 0.020, $p < 0.10$ for "Capital_Invest"; and coef. 0.001, $p < 0.10$ for "NonCapital_Invest"). Operating with coefficients for examining the moderation of family involvement allows us to support the following. For the investment model, the greater negative effect of external CEO with longer tenure on investment decisions (coef. "ExternalCEO*Tenure" − 0.003) is constrained by family involvement (coef. "ExternalCEO*Tenure" − 0.003 + coef. "FamilyInvolvement*ExternalCEO*Tenure" 0.001 = −0.002). Results are similar for capital and non-capital investment models.

[6] ExternalCEO → (coef. − 0.001, $p < 0.05$ for "INVEST"; coef. − 0.030, $p < 0.05$ for "Capital_Invest"; and coef. − 0.001, $p < 0.05$) for "NonCapital_Invest"). Tenure → (coef. − 0.010, $p > 0.10$ for "INVEST"; coef. − 0.914, $p > 0.10$ for "Capital_Invest"; and coef. − 0.002, $p > 0.10$) for "NonCapital_Invest").

Table 7 Regression results for monitoring mechanisms over longer-tenured external CEO

	INVEST Coeff. SE	Capital_Invest Coeff. SE	NonCapital_Invest Coeff. SE
Panel A: Family involvement			
ExternalCEO	− 0.001**	− 0.030**	0.001**
	(0.001)	(0.013)	(0.000)
Tenure	− 0.010	− 0.914	− 0.002
	(0.015)	(0.761)	(0.008)
ExternalCEO*Tenure	− 0.003**	− 0.164**	− 0.001**
	(0.002)	(0.086)	(0.000)
FamilyInvolvement	0.000*	0.000*	0.000*
	(0.000)	(0.000)	(0.000)
FamilyInvolvement*ExternalCEO	0.108***	2.351*	− 0.035**
	(0.031)	(1.284)	(0.017)
FamilyInvolvement*Tenure	0.012	0.203	0.007
	(0.011)	(0.534)	(0.006)
FamilyInvolvement*ExternalCEO*Tenure	0.001*	0.020*	0.001*
	(0.000)	(0.012)	(0.000)
STDebt	0.010	0.037	0.002
	(0.011)	(0.332)	(0.005)
FRQ	0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)
FirmSize	− 0.014	− 0.132	− 0.004
	(0.015)	(0.309)	(0.007)
Tangibility	− 0.001	0.147	− 0.002
	(0.002)	(0.129)	(0.001)
StdFCO	0.010	− 0.049	0.007
	(0.006)	(0.096)	(0.005)
STDSales	− 0.018***	− 0.042	− 0.006
	(0.007)	(0.135)	(0.004)
QTobin	0.000	0.060	0.003
	(0.005)	(0.147)	(0.003)
Dloss	− 0.029	0.300	− 0.004
	(0.023)	(0.600)	(0.011)
AvgFCO	− 0.001	− 0.010	− 0.002**
	(0.001)	(0.027)	(0.001)
Zscore	0.486	0.666	0.869
	(0.539)	(0.966)	(0.761)
OperCycle	0.000*	0.000	0.000**
	(0.000)	(0.001)	(0.000)
Industry	0.001*	0.046	0.000
	(0.001)	(0.029)	(0.000)
Country	0.001	− 0.028	0.001**

Table 7 (continued)

	INVEST Coeff. SE	Capital_Invest Coeff. SE	NonCapital_Invest Coeff. SE
	(0.001)	(0.024)	(0.000)
Religion	− 0.010***	0.211	− 0.006***
	(0.004)	(0.161)	(0.002)
Culture	− 0.002	0.090	− 0.002
	(0.003)	(0.096)	(0.002)
Year	0.000	− 0.036	0.000
	(0.003)	(0.047)	(0.001)
R^2	32.20%	16.13%	23.37%
p value	(0.001)	(0.003)	(0.002)
Panel B: Board effectiveness			
ExternalCEO	− 0.016**	− 0.749**	− 0.006**
	(0.006)	(0.421)	(0.001)
Tenure	− 0.001	− 0.010	− 0.001
	(0.000)	(0.013)	(0.001)
ExternalCEO*Tenure	− 0.003**	− 0.103**	− 0.000**
	(0.002)	(0.055)	(0.000)
BoardEff	0.003*	0.001*	0.000*
	(0.002)	(0.000)	(0.000)
BoardEff*ExternalCEO	0.019***	0.064	0.006
	(0.007)	(0.138)	(0.004)
BoardEff*Tenure	− 0.011	0.426	− 0.009
	(0.014)	(0.337)	(0.009)
BoardEff*ExternalCEO*Tenure	0.001	0.087	0.001
	(0.003)	(0.081)	(0.002)
STDebt	0.011	0.155	0.002
	(0.011)	(0.301)	(0.005)
FRQ	0.000***	0.000*	0.000
	(0.000)	(0.000)	(0.000)
FirmSize	− 0.016	− 0.350*	− 0.004
	(0.014)	(0.193)	(0.007)
Tangibility	0.107***	1.996	− 0.030**
	(0.026)	(1.214)	(0.015)
StdFCO	0.010	− 0.065	0.008
	(0.008)	(0.122)	(0.005)
STDSales	0.000	− 0.008	0.000
	(0.000)	(0.008)	(0.000)
QTobin	0.001	0.050	0.002
	(0.005)	(0.127)	(0.003)
Dloss	− 0.028	0.534	− 0.005
	(0.024)	(0.852)	(0.010)

Table 7 (continued)

	INVEST Coeff. SE	Capital_Invest Coeff. SE	NonCapital_Invest Coeff. SE
AvgFCO	− 0.573	0.787	0.206
	(0.575)	(0.762)	(0.693)
Zscore	− 0.001	− 0.009	− 0.001**
	(0.001)	(0.027)	(0.001)
OperCycle	0.000***	0.000	0.000**
	(0.000)	(0.001)	(0.000)
Industry	0.001	0.028	0.000
	(0.001)	(0.032)	(0.000)
Country	0.001*	− 0.017	0.001*
	(0.001)	(0.022)	(0.000)
Religion	− 0.014***	0.143	− 0.007***
	(0.005)	(0.139)	(0.002)
Culture	− 0.002	0.065	− 0.002
	(0.003)	(0.078)	(0.002)
Year	0.000	− 0.039	0.000
	(0.003)	(0.051)	(0.001)
R^2	27.41%	15.79%	15.91%
p value	(0.002)	(0.003)	(0.003)

***, **, and * Statistical significance at 99, 95, and 90%, respectively

The above results allow us to support and corroborate the prediction of our hypothesis 2b; that is, family involvement constrain the risk-averse attitudes of external CEOs in family firms, thus increasing investment intensity. As we postulated, the family involvement in monitoring managers favors dealignment between the risk that CEO and family are disposed to assume, thus reducing the underinvestment practices that longer tenure external CEOs have adopted with the minor involvement of family members in top managerial decisions and control and by increasing investment intensity. Moreover, the moderate effect of family monitoring over CEO risk aversion although is supported for both, is greater for capital investment than for non-capital investment, thereby suggesting that family involvement reduces the levels of information asymmetry and project outcome uncertainty.

Panel B reflects the moderating effect that board effectiveness code recommendations plays over CEO conservatism. The effect of "ExternalCEO" and "Tenure" on investment decisions again are negative and significant.[7] Similar to Panel A, we again support the moderating effect of tenure on the impact of external CEO on

[7] ExternalCEO → (coef. − 0.016, $p < 0.05$ for "INVEST"; coef. − 0.749, $p < 0.05$ for "Capital_Invest"; and coef. − 0.006, $p < 0.05$) for "NonCapital_Invest"). Tenure → (coef. − 0.001, $p > 0.10$ for "INVEST"; coef. − 0.010, $p > 0.10$ for "Capital_Invest"; and coef. − 0.001, $p > 0.10$) for "NonCapital_Invest").

investment decisions. "ExternalCEO*Tenure" shows a negative impact of our three dependent variables (coef. − 0.003, $p < 0.05$ for "INVEST"; coef. − 0.103, $p < 0.05$ for "Capital_Invest"; and coef. − 0.006, $p < 0.05$ for "NonCapital_Invest"). Again, the negative impact of external CEO on investment (coef. "ExternalCEO" − 0.016) is even greater when its tenure is longer (coef. "ExternalCEO" − 0.016 + coef. "ExternalCEO*Tenure" (− 0.003) = −0.019), in line with our hypothesis 1b. One more time, results are similar for capital and non-capital investment models.

Regarding the effects of board effectiveness on investment decisions, the variable "BoardEff" has a positive impact on investment (coef. 0.003, $p < 0.10$ for "INVEST"; coef. 0.001, $p < 0.01$ for "Capital_Invest"; and coef. 0.000,[8] $p < 0.10$) for "NonCapital_Invest"). However, with respect to the interaction "BoardEff*ExternalCEO*Tenure", results are not significant for all of our dependent variables (coef. 0.001, $p > 0.10$ for "INVEST"; coef. − 0.087, $p > 0.10$ for "Capital_Invest"; and coef. 0.001, $p > 0.10$ for "NonCapital_Invest"). We cannot operate with coefficient to examine the moderating effect as result of the non-significance of the interaction term. Thus, the above results do not allow us to support our hypothesis 2b; we cannot confirm that board effectiveness constrain the risk-averse attitudes of long-tenured external CEOs in family firms, thus increasing investment intensity. Jointly considered, the monitoring mechanism of family firm involvement is more effective in aligning family and external CEO agendas than controlling mechanisms based on board effectiveness code recommendations are.

4.3 Robust results

In order to obtain robust results and check the sensitive of our findings, we proposed a new measure that identifies the level of efficiency of family firm investments, "Optimal_Investment". It is the residuals of a firm-specific deviation from optimal investment, calculated by estimating an industry-year model of investments as a function of growth opportunities (as measured by sales growth, percentage change in sales from year t − 1 to t). The model is described as:

$$\text{Investment}_{i,t+1} = \beta_1 \text{SalesGrowth}_{i,t} + \mu_{it} \quad (3)$$

However, it could not be considered as a dependent variable because these residuals identify different deviations (negatives and positives) from optimal investment; for it, we rank this measure into quartiles, and rescale the quartiles' rankings from 0 to 4. Firm-year observations in the middle quartiles are classified as an optimal investment or benchmark group. Firm-year observations in the bottom quartile (e.g., the most negative residuals) are classified as underinvested and observations in the top quartile (i.e., the most positive residuals) are classified as overinvested.

We estimate multinomial logit models for Eqs. (1) and (2) that predict the likelihood that a firm will be in one of the middle quartiles as opposed to the extreme quartiles. Table 8 presents results that are quite similar to those obtained for

[8] Despite of the variable significance is lower than 0.10, the effect is almost inexistent.

Table 8 Robust result: regression results for optimal investment

	Coeff. SE	Coeff. SE	Coeff. SE
ExternalCEO	− 0.070*	− 0.031*	− 0.065*
	(0.040)	(0.010)	(0.036)
Tenure	0.014	− 0.011	0.014
	(0.011)	(0.015)	(0.011)
ExternalCEO*Tenure	0.078*	0.086**	0.084**
	(0.042)	(0.039)	(0.043)
FamilyInvolvement		0.000*	
		(0.000)	
FamilyInvolvement*ExternalCEO		0.112***	
		(0.029)	
FamilyInvolvement*Tenure		− 0.001	
		(0.040)	
FamilyInvolvement*ExternalCEO*Tenure		0.032***	
		(0.011)	
BoardEff			0.000***
			(0000)
BoardEff*ExternalCEO			0.010**
			(0.005)
BoardEff*Tenure			0.001
			(0.290)
BoardEff*ExternalCEO*Tenure			0.012
			(0.056)
STDebt	− 0.166	− 0.173	− 0.160
	(0.256)	(0.254)	(0.253)
FRQ	0.001**	0.001**	0.001**
	(0.000)	(0.000)	(0.000)
FirmSize	1.174***	1.310***	1.218***
	(0.352)	(0.379)	(0.352)
Tangibility	0.532	0.804	0.619
	(0.662)	(0.623)	(0.723)
StdFCO	0.516***	0.518***	0.513***
	(0.199)	(0.192)	(0.201)
STDSales	− 1.351***	− 1.403***	− 1.378***
	(0.380)	(0.404)	(0.389)
QTobin	− 0.254*	− 0.304**	− 0.273*
	(0.150)	(0.153)	(0.155)
Dloss	− 1.690	− 1.706	− 1.690
	(1.643)	(1.638)	(1.640)
AvgFCO	− 0.772	− 0.471*	− 0.812*
	(0.717)	(0.381)	(0.614)
Zscore	0.783*	0.738*	0.723*

Table 8 (continued)

	Coeff. SE	Coeff. SE	Coeff. SE
	(0.469)	(0.425)	(0.392)
OperCycle	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)
Industry	0.037*	0.039**	0.037**
	(0.020)	(0.020)	(0.019)
Country	0.029**	0.020	0.038**
	(0.014)	(0.015)	(0.017)
Religion	− 0.312***	− 0.264***	− 0.350***
	(0.090)	(0.095)	(0.100)
Culture	− 0.063	− 0.068	− 0.062
	(0.083)	(0.082)	(0.085)
Year	0.081	0.080	0.086
	(0.051)	(0.052)	(0.055)
R^2	76.81%	73.54%	74.05%
p value	(0.000)	(0.000)	(0.000)

***, **, * Statistical significance at 99, 95, and 90%, respectively

investment and capital and non-capital investment.[9] On the one hand, in the first model proposed, the moderating effect is examined through the coefficient of "ExternalCEO" and the interaction variable "ExternalCEO*Tenure". The last variable shows a positive impact on optimal investment variable (coef. 0.078, $p < 0.10$). Thus, the negative impact of external CEO on optimal investment (coef. "ExternalCEO" − 0.070) is lower when its tenure is longer (coef. "ExternalCEO" − 0.070 + coef. "ExternalCEO*Tenure" 0.078 = 0.008).

On the other hand, including the family involvement and board effectiveness variables, the main results are those associated to the effect of "FamilyInvolvemen t*ExternalCEO*Tenure" (coef. 0.032, $p < 0.01$) because again, the interaction term "BoardEff*ExternalCEO*Tenure" is non-significant and we cannot operate with coefficients. Regarding family involvement, our results can support that the positive effect of external CEO when he/she has longer tenure on optimal investment (coef. "ExternalCEO*Tenure" 0.086)—decreasing the negative impact of external CEO—is higher under a greater family involvement (coef. "ExternalCEO*Tenure" 0.086 + coef. "FamilyInvolvement*ExternalCEO*Tenure" 0.032 = 0.118). Overall, we again evidence that longer tenure external CEOs take underinvestment decisions, contributing to family involvement being needed to correct this practice. Again, it is not possible to observe this global effect for the monitoring mechanism based on corporate governance code recommendations about board effectiveness.

[9] For each model, we provide the R2: 30.71, 19.71 and 20.32%, respectively.

4.4 Discussion of results

From the above, our findings provide evidence of the following. On the one hand, our results support that external CEOs make strategic decisions that do not improve efficiency levels (Neacsu 2015) by decreasing the level of investment. As per Berrone et al. (2012), we support that CEOs without blood ties do not share family SEW and thus, avoid fearing the cost associated with long-term investments. Moreover, like the previous evidence from Muñoz-Bullón and Sanchez-Bueno (2011), external CEOs tend to increase projects with short-term payoffs, thereby reducing R&D intensity. Thus, these results confirm that CEOs present lower risk aversion to non-capital investment; at least in part, because R&D increases have been found to boost share prices in the short term and to lead to great investment efficiency, thus suggesting that R&D is a useful tool when the firm's decision-makers have shorter-term share price objectives in mind. Therefore, external CEOs do not seem to be so reluctant to undertake complex and costly R&D activities. Probably, because they represent access to both human and financial resources that allow them to become more capable.

In addition, by examining the CEO's tenure, we support previous evidence about how longer tenured external CEOs favor self-interested conduct, entrenching themselves and avoiding taking business risks that preserve family wealth. In this regard, similar to Strike et al. (2015), our results confirm the higher risk aversion of CEOs with longer tenure, who reject profitable and high-value projects; or, as Naveen (2006) defends, these CEOs have lower levels of interest in R&D investments.

On the other hand, our evidence supports that family firms with a higher level of involvement will be more able to reduce moral hazard problems and asymmetric information associated with investment decisions and external CEOs; therefore, they will be more likely to encourage investment intensity than other family firms with a lower level of involvement. In this respect, our results are in line with the previous assertions of Minichilli et al. (2010) and Miller et al. (2014); we support that the controlling family shareholders already have incentives, power and information to control the top managers and affect risk behavior. Concretely, family involvement allows for a reduction in CEOs' incentives to behave opportunistically, and encourages a long-term focus. Additionally, family firms are more oriented to long-term inversion that is traditionally associated with the durability of investments in fixed assets (Lumpkin et al. 2010). This result is in line with results obtained by Anderson et al. (2012), who noted that family firms prefer investing in physical assets relative to riskier R&D projects. Overall, results confirm agency arguments and support that family involvement aligns the interests of the family firm and its CEO, and increases CEO willingness to engage in investment projects. The findings also confirm that family firm-specific characteristics affect individual dispositions and, in turn, the behavior of non-family leaders (Binacci et al. 2016; Kraiczy et al. 2015).

However, despite Combs et al. (2007) and Walters et al. (2007), we cannot support the constraining effect of the strength of the governance mechanisms on the impact of external CEOs on investment and the moderating effect of tenure. We cannot so confirm that corporate governance tools (e.g., independence from board or CEO non-duality) protects shareholders from a CEO's self-serving attitude and

prevents opportunistic behavior that conditions the misuse of resources. This result could be explained by the fact that corporate governance code mechanisms related to board effectiveness are oriented to defend the interests of all shareholders, especially minority ones, who are less worried about CEO conservatism and risk aversion due to the fact that they may benefit from high-risk/high-return strategies across all firms in their portfolio (Anderson and Reeb 2003). Additionally, independent directors may be useful when expropriation problems come from family owners and not from external CEOs (Miller and Breton-Miller 2006).

5 Concluding remarks

The aim of this paper was to examine the effect of external CEOs on family firm investment levels, by examining the risk behavior of external CEO and the moderating roles of family involvement and governance mechanisms. We also incorporated the upper echelon perspective to test whether external CEOs' risk attitude is different depending on their tenure. Then, guided by the socio-emotional perspective we examine the conditions of *familiness* and governance that influence investment intensity levels among external CEOs and longer tenured external CEOs of family firms.

Using a sample composed of 103 family firms from 13 countries for the period 2008–2015, we confirm our expectations as follows. The findings confirm the negative impact of non-family CEOs on family investment levels, especially when they are long tenured. Therefore, external CEOs can use their superior knowledge in convincing family owners and boardrooms that investment cuts are optimal due to the information asymmetries, the technical knowledge involved, and the difficulties of differentiating between opportunistic and efficient investment decisions. Our results also note that although non-family CEOs show risk-averse behaviour, they are not as risk-averse to non-capital investments, probably due to the association between R&D increases and share prices in the short term, and because of the relevance of R&D investments in CEO rewards (e.g., patent citations). This paper also shows that family involvement is efficient in curbing investment cut decisions made by external CEOs. Specifically, we find that the *familiness* or the level of family involvement moderates the decisions made by external CEOs, thus reducing their risk-averse attitude and consequently increasing the investment intensity in the family business. This moderating role of family involvement in CEO risk behavior is higher in capital investments, for which external CEOs may perceive lower levels of information asymmetry and project outcome uncertainty when *familiness* levels are high.

Overall, the risk aversion of external CEOs, and therefore their negative effect on family investment intensity, increases with the CEO's tenure. In addition, family involvement and board effectiveness constrain the risk-averse attitudes of external CEOs in family firms, thus increasing investment intensity.

Our results have relevant practical implications by showing that benefits and costs of professional CEOs depend very much on the family involvement in the firm, and that by appointing talented CEOs with no blood ties can only raise investment intensity under a proper contextualization of family involvement. Thus, we show how the

degree of family involvement can help to understand the conditions under which outside talent can operate effectively, thus confirming the need to consider family firms as heterogeneous groups. This study helps to guide in designing a governance structure in family firms, noting that although professionalization is necessary to ensure the long-term survival of the family firm (Le Breton-Miller and Miller 2006), the appointment of an external CEO can be problematic for investment intensity levels when these CEOs work with low family involvement.

Obtaining further evidence on the financial impact of additional specific individual attributes of external CEOs, such as religious beliefs or educational background, is a fruitful direction for future empirical research in family firm literature. Moreover, Villalonga et al. (2018) demonstrate that family generation impacts on family professionalization and on the creation of the board. For it, future studies could examine the relationships here proposed by taking into consideration the family generation. Moreover, as Miller et al. (2007) highlighted, the research findings of a paper are highly sensitive to the way in which family firms are defined and operationalized. It could be interesting for future studies to verify our findings by using other definitions of family businesses. At this respect, it would be very useful to consider not only family ownership but also other features that characterise family businesses—for instance, the existence of an 'emotional kinship group' (Shanker and Astrachan 1996) or their behaviour (Chua et al. 1999). Or, as Mitter et al. (2014) evaluated, family ownership and governance. This limitation may be overcome in future research by improving our measurement of family-owned firms. Furthermore, family ownership and family management should be considered in greater detail to provide a better characterisation of the evidence discussed. A limitation related to the family firm measure is that this paper is focuses only on family ownership, without examining the appointment of family members to the board as managers (Jaggi et al. 2009; Arzubiaga et al. 2017). Our results could be checked with an additional analysis of the family control of the firm; a precise measure of family management, such as the percentage of family members in senior management positions, would be a valuable addition to the analytical tools employed.[10]

In addition, our analysis, conducted in a limited international context, is focused on countries with different systems of corporate governance and different legislative and legal frameworks; this approach could affect the findings. Due to the limited information available in the different databases, the sample is restricted to specific countries and is biased, at least in part, toward US and Canadian firms. The sample size must be increased in order to overcome the lack of representativeness for many of the countries under analysis. These limitations need to be addressed in future studies about family firms, by increasing the number of countries, number of firms

[10] We have hand-collected data about CEO and chairman of family firms. By reviewing each CEO and chairman, we have checked if they are from the family business founder or controller. In relation to the family ties of the CEO, we conducted an exhaustive search of information to check whether it belonged to the founding company or the family company that controls the percentage of votes to the company. However, we could not to review this information for all the board members or managers. Future research aims to analyze each manager and director individually in order to identify ties with the founding family.

by country, and examining the relationships of our analysis in the context of greater stakeholder or shareholder protection and different legal systems and cultural values.

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