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Family or Non-Family Ownership Type Impact, in the enterprise risk management: a contingency perspective

Michael de Alencar Silva, Marcia Zanievicz da Silva

Fundação Universidade Regional de Blumenau

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***Abstract*—** *The growing research interest on family businesses motivated this study, which aimed to assess the family control impact in the relationship between contingency variables and Enterprise Risk Management (ERM), and its influence on organizational performance. ERMI was quantified based on the index proposed by Gordon et al (2009). The results show that, although the literature substantially relates the use of risk management, to non-family firms, family firms that have higher risk management index, also have an effect on performance. This may suggest that family ownership type positively influences ERM use, consequently influences in a higher market performance. The results of this study contribute to literature and organizational studies on ownership type impact in the relationship between ERM and contingency variables, by confirming the inferences that family firms that have higher ERMI, present better market performance.*

I. INTRODUCTION

In recent years there has been a growing advance in accounting and management control scholars in family firms' interest, (e.g., Giovannoni *et al*, 2011; Speckbacher and Wentges, 2012; Songini and Gnan, 2015; Frezatti *et al* 2017; Oro and Lavarda, 2019); Almeida and Flach, 2020). However, according to Quinn *et al* (2018), despite this recent increase, certain attributes of these numerically dominant firms in all economies, which differentiate them from non-family firms, have not yet been incorporated into general research in accounting and management control. When emphasizing specific managerial control mechanisms, one notes a relevant lack of studies investigating Enterprise Risk Management (ERM), in family firms' contexts, with emphasis on the studies by (Hiebl *et al*, 2019) and (Glowka, *et al*, 2020).

Regarding to ERM as a management mechanism, Gordon *et al* (2009) noticed that a paradigm shift has occurred in relation to how organizations face risk management. Replacing the silo-based perspective, the trend is to adopt a holistic view of risk management in an organization, which is commonly referred to as Enterprise Risk Management.

Notably, risk management efforts are growing, however, so are the complexity of the risks. ERM is a systematic process, usually introduced in organizations through a board of directors, and is widespread across all business spheres (Lunardi *et al*, 2019). Additionally, the current global environment evokes the importance of integrated risk management and the need for organizations to improve their approach to manage risks and to meet the demands of a constantly evolving business environment.

For Sax and Andersen (2018), ERM is associated with higher profitability and lower financial leverage, and that strategic planning enforces these favorable outcomes. In this context, environmental scanning, decision analysis, control systems, and communication devices help managers to observe changes and adapt in competitive contexts.

As a primary function, ERM must identify key risks and find a consistent way to measure the organization's exposure to the identified risks. ERM, integrating with strategy and performance, highlights the importance of considering risk both in the strategy-setting process and performance of its conduct (COSO, 2017). ERM requires the controls and systems establishment with a goal of making companies more resilient and adaptable to major changes in the external environment (Dickinson, 2001).

Recent economic crises have shown the increasing dynamics and markets complexity evoking a debate on the importance of implementing ERM (Bromiley and Mcshane, 2018). Uncertainties that put an organization's competitive advantage at risk can come from technological innovation, regulation, competition, and even a pandemic like the one currently experienced. With origins in managerial accounting and controls, ERM has presented a shift in the way companies deal with risk, using core management approaches to holistically assess the major risks facing the organization (Power, 2009).

Despite the existence of many studies involving ERM, there are still gaps for making new inferences. One of them is the control type influence (family and non-family) on environmental factors and organizational performance. From this gap, the following research problems arise: what is the family control impact of organizations, on the relationship between contingency environmental factors and ERM? What is the influence of this relationship on organizational performance? To answer the problem, this study aims to examine the family control impact on the relationship between environmental factors and Enterprise Risk Management (ERM) and its influence on organizational performance.

The research makes theoretical contributions as it extends research on ERM, performance and family firms. In particular it advances the application of the ERM assessment index proposed by Gordon *et al* (2009), which empirically examines the argument that ERM is related to organizational performance and Lunardi *et al* (2019) who assess the relationship between ERM and contingency variables through the business performance of organizations. The study is further justified by the importance of risk management as a fundamental concern in organizations, in an increasingly global and dynamic business context, where several approaches have been observed regarding risk management. From a practical perspective, by examining the effect of ERM and environmental factors on organizational performance in family and non-family businesses, this study offers subsidies for organizations to identify the main risks moderated by the variables evidenced in this research and find a consistent way to measure their exposure to the identified risks.

The study also aims to contribute to the current debate observed in literature, exploring how the control type influence (family and non-family), as a contingent variable moderating the environmental factors to which organizations are exposed, alters organizational performance behavior. According to McShane *et al* (2011), ERM has emerged as a construct that ostensibly overcomes the limitations of traditional silo-based analysis, but that there are still significant limitations on its effectiveness on organizational performance. Some authors argue that ERM has significant potential to create competitive advantage by identifying, assessing, and managing risks that affect firm value (Sax and Andersen, 2018). However, several studies provide mixed support for the claim that ERM enhances organizational performance and value. For some there is the positive effect (e.g., Gordon *et al*, 2009; Hoyt and Liebenberg, 2011) others have evidenced no effect (e.g., Pagach and Warr, 2010; Quon et al, *2012)*.

The article is organized, besides this section, in four sections. The second section discusses the theoretical framework and the formulation of the research hypotheses. Starting from the contingency theory, the study advances through the approaches of risk management and the use of ERM, as a tool of managerial control. The third section contains the methodology used in the research, which was a survey with a quantitative approach, having as population the publicly traded companies listed on B3 (Brazil, *Bolsa* e *Balcão*), in the period from 2012 to 2019. It was used the Cluster Analysis statistical technique to identify the control type (family and non-family) of the organizations and panel data regression to test the research hypotheses. In the fourth section, initially presents the descriptive statistics of the variables and the test of means is presented, performed to verify if there are significant differences between family and non-family companies in the use of ERMI. Next, Pearson's Correlation between the variables analyzed in the study is shown. The section concludes with the analysis of the data through panel data regression, with the presentation of the results. The fifth section contains the conclusion with the answer to the research problem, with the theoretical and practical contributions of the study. It also includes the study limitations and recommendations for future research, which include the investigation of other samples, possibly from different countries, with a comparative analysis between the different contexts.

II. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

Among organizational studies, contingency theory has provided a coherent paradigm for analyzing the structure of

organizations. The recurring set of relationships among organizational members can be considered to be the organization structure (Reed, 1999). Contingent structural theory assumes that each of the different aspects of organizational structure is contingent on one or more contingent factors. Thus, the task of contingency research is to identify the particular contingency factor or factors to which each aspect of organizational structure needs to conform (Donaldson, 1976).

The contingency theory states that there is no single organizational structure that is highly effective for all organizations, and structure optimization will vary according to certain factors (Reed, 1999). Given this context, the type of family or non-family control, as a selected approach to the set of possible relationships among organizational members, which also characterizes the organizational structure, is considered a dichotomous moderator variable, to observe its influence on the relationship between environmental variables and ERM, which affect organizational performance.

These factors, which are organizational characteristics, reflect the influence of the environment in which the organization is inserted. Thus, in alignment with the study objective, the theoretical model predicts the contingency variable (family and non-family control), as a contingency factor moderating the relationship between ERM, measured by ERMI (dependent variable) and the environmental factors (independent variables).

For Gordon *et al* (2009) the relationship of business performance and ERM depends on the proper match between the ERM system and the contingency factors. The authors address the five factors that have an impact on the relationship of business performance and ERM, which are: environmental uncertainty, industry competition, company complexity, company size and company growth (Gordon *et al*, 2009). To measure this relationship, the authors developed the Enterprise Risk Management Index (ERMI).

The ERMI proposed by Gordon *et al* (2009) has been applied in several studies to quantify ERM, (e.g., Chang *et al*, 2015; Zou *et al*, 2019; Naseem *et al*, 2020; Adam *et al*, 2021). In the Brazilian context, Lunardi *et al* (2019) note that risk management in some organizations consists only in controlling the business for compliance with risk limits and policies, while in others, the function is to assist the organization in knowing the uncertainties in its competitive environment. Given this context, it is believed that organizations that are more exposed to contingency factors use a higher ERM index. From this, the following research hypothesis was developed:

H1: Exposure to environmental contingency factors is positively related to ERM use.

This hypothesis will be subdivided into the following sub hypotheses:

H1a: Environmental uncertainty is positively related to ERM use.

H1b: Complexity is positively related to ERM use.

H1c: Industry competition is positively related to ERM use.

Managers' perceptions of risks in family and non-family firms, both internal and external risks have rarely been considered in literature (Brustbauer and Peters, 2013). In their study, the authors argue that the risk perceptions of managers of family firms differ from the risk perceptions of managers of non-family firms.

Glowka *et al.* (2020) argue that family firms usually deal with risk management in a more informal manner. The authors suggest that family dynamics further influence risk behavior within the organization. The authors find that ERM is negatively moderated by family involvement. Anderson and Reeb (2003), in a relationship between founding family ownership and firm performance investigation, observed that family ownership was predominant and substantial. They also suggest that family firms may perform better than non-family firms.

Given this still unresolved context, we adopt the premise that the control type (family or non-family) moderates the relationship between contingency variables and ERM, measured based on ERMI. From this, the following research hypothesis was elaborated:

H2: Family control type moderates the positive relationship between contingent environmental variables and ERM.

This hypothesis will be subdivided into the following sub hypotheses

H2a: Family control type moderates the positive relationship between environmental uncertainty and ERM use.

H3b: Family control type moderates the positive relationship between complexity and ERM use.

H3c: Family control type moderates the positive relationship between industry competition and ERM use.

III. METHODOLOGY

To fulfill the purpose of this study, the method used was a descriptive documentary research, with a quantitative approach. The research population is composed of publicly traded companies listed on the B3 (Brazil, *Bolsa e Balcão*). For the sample were selected the companies that presented data for the calculation of the dependent, independent, control and performance variable, in the period from 2012 to 2019.

Then the organizations control type (family and non-family) was observed. Resulting from the established criteria, the sample consists of 278 companies in 2012, 282 companies in 2013, 290 companies in 2014, 295 companies in 2015, 302 companies in 2016, 304 companies in 2017, 305 companies in 2018, and 307 companies in 2019. Table 1 presents the number of family and non-family firms by sample considered in this study.

Table 1 - Family and non-family businesses and total sample

Item	2012	2013	2014	2015	2016	2017	2018	2019
Family Businesses	75	78	78	80	80	80	80	81
Non-Family Businesses	203	204	212	215	222	224	225	226
Total	278	282	290	295	302	304	305	307

Source: Research data (2020).

To segregate the sample according to the type of ownership (family and non-family) it was adopted, similar to the studies of (Pamplona, 2020), the following criteria adopted as usual: family members (two or more) participate in the management, and/or, family members own 10% or more of the organization's shares (Anderson and Reeb, 2003). From the data presented in Table 1 it can be seen that, based on the criteria for determining ownership (family / non-family) adopted in this study, between the year 2012 and 2019 the number of companies belonging to the non-family sample increased by 8% (from 75 to 81) while the sample of non-family companies rose by 11.3% (203 to 226) and the total sample by 10.4%.

Table 2 contemplates the study construct, which is segregated into three groups of variables (dependent, independent, control, and moderator), describes their definitions, calculation formula, source of data collection, and studies that supported the selection of variables.

Table 2 - Research Construct

Variables	Definition	Formula	Collection	Authors
Dependent Variable (Regression)				
Enterprise Risk Management Index (ERMI)	Index used to measure ERM	Equation 1, Equation 2, Equation 3, Equation 4, Equation 5.	Refinitiv Eikon ® e B3	Gordon *et al* (2009)
Independent Variables (Regression)				
Environmental Uncertainty (INAM)	Market variability, technology and income	Equation 6	Refinitiv Eikon ® e B3	Duncan (1972); Kren (1992); Hartmann (2005)
Sector Competition (CONC)	Proportion of sales in relation to the total sales of the sector	$\frac{\text{Sales amount}}{\text{Total industry sales}}$		Bourgeois (1985); Gordon *et al* (2009)
Company Complexity (CMPX)	Diversity of business transactions	Number of company business segments		Ge and McVay (2005); Doyle *et al* (2007)
Control Variable (Regression)				
Company size (TAMA)	Size of the organization	Ln of Assets	Refinitiv Eikon ® e B3	Gordon *et al* (2009)

Sales Growth (CRES)	Sales Growth	$\frac{(\text{Revenue}_{t} - \text{Revenue}_{t-1})}{\text{Revenue}_{t-1}}$	Refinitiv Eikon ® e B3	Kleffner *et al* (2003)
Performance variable (sensitivity test)				
Net Margin (MARG)	Organization Net Margin	$\frac{\text{Net profit}}{\text{Net Sales}}$	Refinitiv Eikon ® e B3	Bolton *et al* (2011)
ROA	Return on Assets	$\frac{\text{Net profit}}{\text{Total assets}}$	Refinitiv Eikon ® e B3	Alves and Matias (2014)
Market-to-Book (MKBK)	Organization Market-to-book Index	$\frac{\text{Market Value}}{\text{Equity value}}$	Refinitiv Eikon ® e B3	Santanna *et al* (2003)
Contingential Moderator (Regression)				
COTR	Control Type	$0 =$ Family businesses 1= Non-Family Businesses	Refinitiv Eikon ® e B3	Pamplona (2020)

Source: Research data, 2020.

The data to measure the variables were obtained from the Refinitiv Eikon ® database on the B3 website and from the Investor Relations (IR) section on the companies' websites. In detail, the procedure consisted of checking the ownership type of the organizations, published on each company's website or on the B3 reference form, during the analyzed period from 2012 to 2019. Next, the calculation model for the dependent variable is demonstrated.

1.1 Enterprise Risk Management Index (ERMI)

As proposed by Gordon *et al* (2009), the Index is based on the four COSO ERM indicators, Therefore, ERM effectiveness in an organization is measured by the Enterprise Risk Management Index (ERMI) and derives from the company's ability to achieve the following objectives: i) strategy; ii) operations; iii) reporting; iv) compliance, as shown in Equation (1):

$$ERMI = \sum_{k=1}^{1} Estrategy + \sum_{k=1}^{1} Operation + \sum_{k=1}^{1} Report + \sum_{k=1}^{1} Conformity$$

Equation (1)

The Strategy indicator is related to the company's market positioning in relation to its competitors. By defining and executing its strategy, a company aims to achieve a competitive advantage in relation to participants in the same industry (Porter, 2008). This competitive advantage should promote a differentiation in relation to the competitor that is able to mitigate the organization's survival risks. The metric adopted in this study to measure whether a strategy is successful was the amount of standard deviations that its sales (Refinitiv Eikon®), deviate from the sales of its industry. The underlying idea proposed in the model is that ERM favors meeting organizational strategy, as shown below:

$$Estrategy = \frac{Sales - \mu_{sales}}{\sigma_{sales}}$$

Equation (2)

Where:

Sales = Company Sales

μ_{sales} = Average company sales

σ_{sales} = Standard deviation of sales of all firms

Operations are defined as a relationship between input and output in the operational processes of a company (Banker *et al*, 1989). In other words, more output for a given level of input or less input for a given level of output means better operational efficiency. Thus, as Kiymaz (2006) noted, the

value of sales (Refinitiv Eikon®), divided by total assets (Refinitiv Eikon®) is a measure of operational efficiency, which was measured as follows:

$$Operation = \frac{Sales}{Total\ assets} \quad \text{Equation (3)}$$

Inadequate financial reporting is likely to increase a company's risk of failure and thus decrease its performance and value. One measure of a firm's reliability, is how well quality of accounting information is evidenced in accounting reports. For this study the Total Accruals model according to (Kothari *et al*, 2005) was used which captures the effects of firms' performance by adding return on total assets (ROA) to the model as shown below:

$$Report = \frac{(Ebitda - Cash\ Flow)}{(Total\ assets)} \quad \text{Equation (4)}$$

Compliance is related to legislation and regulations. When a company promotes an adequate *compliance* management, authors such as Shavell (1982) and Gordon *et al* (2009) consider that in a company, there should be a mitigation of its general risks of failure and, consequently, an increase in its performance and value. The measure of compliance used in the study, similar to the one adopted in the study by Gordon *et al.* (2009), is the ratio of auditor's fees to total assets (Refinitiv Eikon®).

$$Compliance = \frac{auditor\ fees}{Total\ Assets} \quad \text{Equation (5)}$$

Environmental uncertainty is defined as the variability or change in the environment, in which the organization is embedded. As noted by Kren (1992) environmental uncertainty is measured as the combination of three metrics as shown below:

(1) Market: coefficient of sales variation;

(2) Technological: Coefficient of variation of the sum of R&D and capital expenditures divided by total assets; and

(3) Income: Coefficient of variation of net income before taxes.

According to the model of Gordon *et al* (2009), environmental uncertainty is calculated as shown in equation (6) below:

$$INAM = \log + (\sum_{k=1}^{3} CV(X_k)), \quad \text{Equation (6)}$$

Where: CV(Xk) = $CV(X_k) = \frac{\sqrt{\sum_{t-1}^{5} \frac{(z_{k,t} - z_k)^2}{5}}}{z_k}$, $Z_{k,t}$ = $(X_{k,t} - X_{k,t-1})$, $X_{k,t}$= uncertainty k in the year $t, CV(X_k)$ = coefficient of variation of uncertainty $k, t = 1,2, \ldots,8$ to represent the years 2012-2019, $k = 1, 2, 3$ to represent market, technological or income uncertainty, z_k means changes in eight years of uncertainty k. The absolute value of z_k is used as the denominator of $CV(X_k)$ to avoid the case where a negative z turns a situation of uncertainty into a situation of certainty.

1.2 Model Test

Initially, the Cluster Analysis technique was used to classify the organizations into family and non-family businesses. Clusters or data clustering analysis is the set of data mining techniques that aims to classify organizations into similarity groups (Fávero and Belfiore, 2017). Next, it was tested the relationship between enterprise risk management and contingent variables, considering, as observed Gordon *et al* (2009), that companies more exposed to contingent factors have a higher rate of ERM use.

Thus, the relationship between ERMI (which is used as a proxy for enterprise risk management according to Equation 1) and contingency factors was verified. To test H1, robust OLS (Ordinary Least Squares) regressions were performed, controlling for sector and year, using Statistics Data Analysis software (Stata® 13.0), as follows:

$$\text{ERMI} = \beta_0 + \beta_1 INAM + \beta_2 TAMA + \beta_3 CRES + fixed\ effects\ year + fixed\ effects\ industry + \varepsilon \quad \text{Equation (7)}$$

$$\text{ERMI} = \beta_0 + \beta_1 CMPX + \beta_2 TAMA + \beta_3 CRES + fixed\ effects\ year + fixed\ effects\ industry + \varepsilon \quad \text{Equation (8)}$$

$$\text{ERMI} = \beta_0 + \beta_1 CONC + \beta_2 TAMA + \beta_3 CRES + fixed\ effects\ year + fixed\ effects\ industry + \varepsilon \quad \text{Equation (9)}$$

Where:

ERMI = Enterprise Risk Management Index

INAM = Environmental Uncertainty

CMPX = Complexity

CONC = Sector Competition

TAMA = Company Size

CRES = Company Growth

ε = Regression error

To test H2, the impact of the contingency moderator variable on the relationship between ERMI (which is used as a proxy for enterprise risk management according to Equation 1) and the contingency factors was verified. Robust Ordinary Least Squares (OLS) regressions were adopted, controlling for sector and year, using Statistics Data Analysis software (Stata® 13.0), as follows:

$$\text{ERMI} = \beta_0 + \beta_1 INAM + \beta_2 TAMA + \beta_3 CRES + \beta_4 COTR + \beta_5 MOD0 + fixed\ effects\ year + fixed\ effects\ industry + \varepsilon \quad \text{Equation (10)}$$

$$\text{ERMI} = \beta_0 + \beta_1 CMPX + \beta_2 TAMA + \beta_3 CRES + \beta_4 COTR + \beta_5 MOD1 + fixed\ effects\ year + fixed\ effects\ industry + \varepsilon \quad \text{Equation (11)}$$

$$\text{ERMI} = \beta_0 + \beta_1 CONC + \beta_2 TAMA + \beta_3 CRES + \beta_4 COTR + \beta_5 MOD2 + fixed\ effects\ year + fixed\ effects\ industry + \varepsilon \quad \text{Equation (12)}$$

$$\text{ERMI} = \beta_0 + \beta_1 INAM + \beta_2 CMPX + \beta_3 CONC + \beta_2 TAMA + \beta_3 CRES + \beta_4 COTR + \beta_5 MOD3 + fixed\ effects\ year + fixed\ effects\ industry + \varepsilon \quad \text{Equation (13)}$$

Where:

ERMI = Enterprise Risk Management Index

INAM = Environmental Uncertainty

CMPX = Complexity

CONC = Sector Competition

TAMA = Company Size

CRES = Company Growth

COTR = Control Type

MOD0 = Control Type Moderation on Environmental Uncertainty

MOD1 = Control Type Moderation on Complexity

MOD2 = Moderation of the Control type in Sector Competition

MOD3 = Control Type Moderation on All Contingency Variables

ε = Regression error

IV. RESULTS ANALYSIS

Initially, the descriptive statistics of the variables and the test of means are presented, carried out to verify whether there are significant differences between family and non-family companies in the use of ERM measured by ERMI. The descriptive statistics are shown in Table 3. The avarage ERMI for the family business is 0,4416, as compared to 0,5044 for the non-Family business. These two groups are not statistically different in the means of their ERMI. Ind addition, the means for all five contingency variables of the family business are not statistically different than the means for de non-family business.

However, it is noted a decrease in the indicators that measure the contingency variables for companies classified as family businesses. This shows that contingency indicators are higher for companies classified as non-family businesses, thus these companies are more prone to risk management when exposed to contingency factors in carrying out their activities.

Table 3 - Descriptive statistics of the variables

Variables	Family Business			Non-Family Business		
	Average	Med.	D.P	Average	Med.	D.P
ERMI	0,4416	0,2727	1,1737	0,5044	0,1882	1,4217
INAM	5,2689	7,6038	4,0326	5,8478	8,1512	4,0655
CMPX	2,9877	3,0000	0,8394	2,6667	3,0000	0,8239
CONC	0,0232	0,0039	0,0552	0,0400	0,0079	0,0916
TAMA	20,5505	20,9366	3,8488	20,9188	22,0139	5,0658
CRES	0,0585	0,0257	0,41134	0,5217	0,0364	9,4408

Key: ERMI: *Enterprise Risk Management Index*; INAM: Environmental Uncertainty; CMPX: Complexity; CONC: Competition; TAMA: Size; CRES: Company Growth; Med: Median; S.D: Standard Deviation. Source: Research data (2020).

As Gordon *et al* (2009) noticed, ERMI measures a firm's ability to achieve objectives through strategy, operations, reporting, and compliance. It was observed here that on average this index is higher for non-family firms, which shows that family firms are less likely to use risk management when exposed to contingent factors. This result corroborates the results of Glowka *et al* (2020), who argue that family firms usually deal with risk management in a more informal way. Next, Table 4 shows the Pearson's Correlation between the variables analyzed in the study.

Table 4 - Pearson's Correlation

Variable	ERMI	INAM	CMPX	CONC	TAM	CRES	COTR
ERMI	1	0.3240	0.0086***	0.7020	0.3370	0.0760*	0.0144**
INAM		1	0.6704	0.2053	0.4232	0.3280	0.0627*
CMPX			1	-0.0739*	0.0210**	-0.0410**	-0.1858
CONC				1	0.2881	0.0298**	0.0884*
TAMA					1	0.0570*	0.0341**
CRES						1	0.0535*
COTR							1

Caption: Legend: ERMI: Enterprise Risk Management Index; INAM: Environmental Uncertainty; CMPX: Complexity; CONC: Competition; TAMA: Size; CRES: Company Growth; COTR: Control Type. Notes: Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Source: Research data (2020).

Regarding the Pearson's Correlation, the existence of correlation among the variables can be noticed. The COTR presents a positive correlation with INAM, CONC, TAMA and CRES. Regarding the CRES, a negative correlation is observed with CMPX and positive with CONC and TAMA. A positive correlation is also observed between TAMA and CMPX and a negative correlation between CONC and CMPX. As far as ERMI is concerned, a positive correlation is observed with CMPX, CRES and COTR, thus the risk management index is correlated with the contingency variables. In general, the data in Table 4 demonstrate that there is no high correlation among the variables analyzed, which allows ruling out possible multicollinearity problems in the following regression models (Table 5) calculated according to Equations 7, 8 and 9.

Table 5 - Regression results exposure to contingency factors and the use of ERM.

Variables	Predicted Signal	Model 1		Model 2		Model 3	
		Coefficient	*t-statistic*	Coefficient	*t-statistic*	Coefficient	*t-statistic*
_Cons	+/-	-1.2008	-6.85	-1.3570	-7.11	-1.6878	-8.88
INAM	+	0.0701***	10.75				
CMPX	+			-0.0369**	-1.35		
CONC	+					11.2899	26.11
TAMA	+	0.0663***	13.37	0.0906***	19.23	0.0340**	14.46
CRES	+	-0.0744***	-1.67	0.1389	2,46	0.1747	4.19
Significance		0.0000*		0.0000*		0.0000*	
R^2		0.2127		0.1705		0.6023	
VIF		1.49 – 5.64		1.26 – 5.58		1.25 – 5.86	
DW		1.9395		1.9019		1.9361	
N		2.471		2.471		2.471	

Notes: *Significance at 1% level, **Significance at 5% level, ***Significance at 10% level

Source: Research data (2020).

Table 5 shows that Durbin-Watson presented a value very close to 2 for the three models analyzed, demonstrating that the independence of errors in the data analyzed is satisfactory and that there is no autocorrelation between the residuals (Fávero and Belfiore, 2017). Finally, the multicollinearity test (VIF) demonstrates the absence of multicollinearity problems, considering that its values should be between 1 and 10 (Hair *et al*, 2009). Thus, it can be seen that there were no multicollinearity problems, since the values of the variables analyzed were between 1.49 -

5.64 in model 01, 1.26 - 5.58 in model 2, and 1.25 - 5.86 in model 03.

The three models analyzed are found to be statistically significant, and the explanatory power (^{R2}) was 21.27% for Model 1, 17.05% for Model 2, and 60.23% for Model 3. These results are similar to the study by (Gordon *et al*, 2009). Regarding the relationship between ERM use and contingency variables, a positive and significant relationship was found in Models 1, 2 and 3 at the 1 % level. When operationalizing the use of ERM with the contingency variables and with the other control variables, in Model 1 the positive and significant relationship between the use of ERM and the contingency variables INAM and TAMA, is confirmed, in Model 2 the positive and significant relationship between the use of ERM and the contingency variables TAMA and CRES is confirmed and in Model 3 the positive and significant relationship between the use of ERM and the contingency variable TAMA is confirmed. In all models the significance level was 5% and 10%.

Table 6 - Regression result of ownership type moderation on exposure to individual contingent factors and the use of ERM

Variables	**Predicted Signal**	**Model 4**		**Model 5**		**Model 6**	
		Coefficient	***t-statistic***	**Coefficient**	***t-statistic***	**Coefficient**	***t-statistic***
_Cons	+/-	-1.2398	-6.70	-1.6633	-6.75	-1.6774	-8.97
INAM	+	0.0639***	6.34				
CMPX	+			0.0343**	0.60		
CONC	+					13.6262	29.59
TAMA	+	0.6598	13.19	0.0907***	19.26	0.0342**	14.47
CRES	+	-0.0766***	-1.72	0.1369	2.41	0.1718	4.13
COTR	+	0.0425**	0.59	0.3730	2.01	0.0409**	1.21
MOD0	+	0.0089*	0.74				
MOD1				-0.1033	-1.64		
MOD2						-27582	-4.25
Significance		0.0000***		0.0000***		0.0000***	
R^2		0.2139		0.1721		0.6063	
VIF		4.33 – 5.66		3.58 – 5.60		7.22 – 5.95	
DW		1.9404		1.9124		1.9010	
N		2.471		2.471		2.471	

Notes: *Significance at 1% level, **Significance at 5% level, ***Significance at 10% level

Source: Research data, 2020

Table 7 - Regression results of property type moderation on exposure to the combined contingency factors and the use of ERM

Variables	Predicted Signal	Model 7	
		Coefficient	*t-statistic*
_Cons	+/-	-1.6174	-8.10
INAM		0.0444**	6.73
CMPX		0.0425**	1.67
CONC		11.0689	25.69
TAMA		0.0200**	7.24
CRES		0.0433**	1.18
COTR		0.0009*	0.01
MOD3		-0.0018	-0.24

Significance	0.0000***
R^2	0.6193
VIF	4.14 – 6.01
DW	1.9951
N	2.471

Notes: *Significance at 1% level, **Significance at 5% level, ***Significance at 10% level

Source: Research data, 2020

Tables 6 and 7 also show that the Durbin-Watson presented a value close to 2 for the four models analyzed, demonstrating that the independence of errors in the data analyzed is satisfactory and that there is no autocorrelation between the residues. Thus, it can be seen that there were no multicollinearity problems, since the values of the variables analyzed were between 4.33 - 5.66 in model 4; 3.58 - 5.60 in model 5; 7.22 - 5.95 in model 6; and 4.14 - 6.01 in model 7. The models analyzed are found to be statistically significant, and the explanatory power (R^2) was 21.39% for Model 4, 17.21% for Model 5, and 60.63% for Model 6 and 61.93% for Model 7.

Regarding the contingency moderator variables impact in the relationship between the use of ERM, measured by ERMI, and the contingency factors, it was found in models 4, 5, 6 and 7 a positive and significant relationship at the 1% level. When operationalizing the impact of moderator variables and ERM use on exposure to contingency variables, with the other control variables, in Model 4 a positive and significant relationship is confirmed between ERM use and the contingency variables INAM, COTR and MOD0 and negative for the variable CRES. In Model 5 the positive and significant relationship between ERM use and the contingency variables CMPX and TAMA is confirmed. In Model 6 it is confirmed the positive and significant relationship between the use of ERM and the contingent variable TAMA and COTR, in Model 7, it is confirmed the positive and significant relationship between the use of ERM and the contingent variable INAM, CMPX, TAMA, CRESC and COTR, and a negative relationship with the variable MOD3 at 1%, 5% and 10% levels.

To test the first research hypothesis, one has models 1, 2 and 3 (which deals with the relationship between ERM and contingent factors), organizations demonstrated a better correspondence between ERMI and the variables of Environmental Uncertainty (INAM) and Company Size (TAMA). These results suggest that companies are placing greater importance on the information obtained through data from the INAM variables. Therefore, the effectiveness of their ERM consisting of strategy, operation, reporting and compliance variables, related to environmental uncertainty, tends to be higher.

Similarly, the greater observance of the Company Size Index (TAMA), seems to be linked to a high ERM index. These results corroborate the findings of (Gordon *et al* 2009) amplifying its robustness, considering that the authors analyzed such correlations only in 2005, in the context of American companies, whereas in the present model the time span of 8 years (2012 - 2019) is observed. However, diverging from the results of Gordon *et al* (2009), a negative correlation was found for the variables Corporate Complexity (CMPX) and Growth (CRES) and no significant results were found for Sector Competition (CONC).

Thus, hypothesis **H1a** is confirmed**:** environmental uncertainty is positively related to the use of ERM. Gordon *et al* (2009) evidenced that ERM is intended to identify and manage uncertain future events that may negatively influence the organization's performance.

However, hypotheses **H1b**: complexity is positively related to the use of ERM and **H1c**: sectorial competition is positively related to ERM are rejected. By not evidencing a relationship between complexity and ERM, this study diverges from Bourgeois (1985), Liebenberg and Hoyt (2003) and Beasley *et al* (2008), who show that organizational complexity increases the risks and hinders the achievement of organizational strategy. It can be seen from these findings that ERM is related to the environmental uncertainties suffered by organizations.

To test the second research hypothesis, family control type positively moderates the relationship between environmental contingent factors and ERMI, we have Equations 10, 11, 12 and 13 (which deals with the control type variable moderation in the relationship between ERM, measured by ERMI, and contingent variables). The organizations also showed a better correspondence between ERM and the variables of Environmental Uncertainty (INAM), Company Size (TAMA). But in the context of family businesses, they also demonstrated a better correspondence between ERM and Complexity (CMPX), Company Growth (CRES) and Type of Control (COTR).

Regarding to contingent factors, the results suggest that the type of control (family or non-family) is a relevant and moderating variable. Therefore, ERM effectiveness, consisting of strategy, operation, reporting and compliance variables, when related to the variable Environmental Uncertainty (INAM), Size (TAMA), Company Growth (CRES), Complexity (CMPX) and Type of Control (COTR) tends to be higher. This finding is relevant in the context of family firm research, as Glowka *et al* (2020) note, family firms tend to have more informal controls. The authors suggest that family dynamics further influence risk behavior within the organization. Also, Brustbauer and Peters (2013) argue that the risk perceptions of managers of family firms differ from the risk perceptions of managers of non-family firms.

Thus, the sub-hypotheses **H2a:** the type of family control moderates the positive relationship between environmental uncertainty and the use of ERM and **H2b**: the type of family control moderates the positive relationship between complexity and the use of ERM. However, **H2c** is rejected: family type of control moderates the positive relationship between sector competition and ERM use.

It can be seen, from these findings, that ERM in a family businesses scenario also has a relationship with the environmental uncertainties suffered by organizations and with complexity. In the Brazilian national context, these findings agree with the studies of (Lunardi *et al*, 2019) when they observe that environmental uncertainty generates difficulties for companies in terms of predicting future events that may affect their operations. The risks associated with an appropriate response to events of environmental uncertainty suggest that organizations tend to monitor environmental uncertainty in order not to suffer negative impacts on their results.

Gordon *et al.* (2009) evidenced that ERM is intended to identify and manage uncertain future events that may negatively influence the organization's performance. Anderson and Reeb (2003), in investigating the relationship between founding family ownership and firm performance, observed that family ownership was prevalent and substantial. They also suggest that family firms may perform better than non-family firms. From these statements, sensitivity test was conducted (table 8) to check the impact of ownership type on the performance of organizations:

Table 8 - Sensitivity test

Variables	Predicted Signal	Dependent variables: MKTB, ROA and MARG	
		Coefficient	*t-statistic*
-Cons	+/-	-0.0275**	-0.60
INAM	+	0.0186**	10.61
CMPX	+	0.0074*	1.04
CONC	+	0.1616	4.04
TAMA	+	-0.0031*	-4.74
CRES	+	-0.0234**	-1.43
COTR	+	-0.0629***	-2.87
MOD3	+	0.0049*	2.53
GRCON	+	0.0005*	2.68
Significance		0,000***	
R^2		0.2469	
VIF		4.12 – 5.82	
DW		2.0404	
N		2.456	

Key: ROA: *Return on Asset*; MKTB: *Market-to-Book;* MARG: Net Margin; INAM: Environmental Uncertainty; CMPX: Complexity; CONC: Competition; TAMA: Size; CRES: Company Growth; COTR: Type of Control; MOD3: Moderation of Contingency Factors; GRCON: Family Firm x ERMI. Notes: *Significance at 1% level, **Significance at 5% level, ***Significance at 10% level

Source: Research data, 2020

To verify the impact on the organizations' performance, moderated by the type of family control, in the relationship between the ERM and the contingency variables, the family companies were isolated from the study sample and the regression model was applied according to Table 8. According to the observed results, in the context of family businesses, there is a positive relationship between ERM and performance. The higher the ERMI the better the performance measured by Return on Asset (ROA), Market-to-Book (MKTB) and Net Margin (MARG). It can be seen that Durbin-Watson presented a value of 2 for the model analyzed, demonstrating that the independence of the errors in the data analyzed is satisfactory and that there is no autocorrelation between the residuals. Finally, the multicollinearity test (VIF) demonstrates the absence of multicollinearity problems. Thus, it can be seen that there were no multicollinearity problems, since the values of the variables analyzed were between 4.12 - 5.82 in the model.

The model analyzed here is found to be statistically significant, and the explanatory power (^{R2}) was 24.69% for the model. Regarding the impact of ownership type on performance, a positive and significant relationship was found at the 1 % level. When operationalizing the type of control impact in moderating the relationship of ERMI with the contingency variables and with the other control variables, the positive and significant relationship between the contingency variables INAM, CMPX, MOD3 and GRCON is confirmed and negative for the variable CRES and COTR, at the 1%, 5% and 10% levels. It can be inferred from this result that family businesses that have higher risk management index, also have an effect on market performance**.** This result corroborates with the study of Yazdi (2018) who concluded that strategic planning has positive relationship with family business and better organizational performance. Also, Hiebl and Mayrleitner (2017) whose study when investigating the professionalization of managerial accounting in family firms, suggests that the presence of family management, such as CFOs, may be related not to less, but to higher levels of managerial accounting professionalization. Florio and Leoni (2017) show that companies with advanced levels of ERM implementation perform better in both financial performance and market valuation.

Environmental uncertainty creates difficulties for companies when it comes to predicting future events that may affect their operations. The risks associated with an appropriate response to environmental uncertainty events suggest that organizations tend to monitor environmental uncertainty in order not to suffer negative impacts on their results, so companies with an efficient ERM system (high ERMI) are prone to greater monitoring of environmental uncertainties. In the same vein, sectoral competition and complexity must be closely monitored by organizations. Analyzing the products and services offered in the market by other companies, both similar and different, can help the entity in the competition for sales in the various market niches. Thus, companies with greater management of this information tend to have higher rates of ERMI. It is also inferring that organizations of large size, that is, those considered larger, tend to adopt risk management systems.

According to Arena et al. (2010) highlight that ERM can be seen as a way for managers to prepare their organizations in the face of uncertainties in the corporate sphere. In addition, Gordon, Loeb and Tseng (2009) showed that the ERM is intended to identify and manage uncertain future events that can negatively influence the organization's performance. Corroborating the findings of Baxter et al. (2013), the quality of business risk management, is associated with organizational performance.

V. CONCLUSIONS

This research aimed to assess the impact of family control on the relationship between contingency variables and ERM and its influence on organizational performance. By using the ERM-index proposed by Gordon *et al* (2009) it uses data from companies listed on B3 in a longitudinal cut-off of eight years (2012 to 2019). The results show that the use of ERM is related to environmental uncertainty, which allowed us to accept H1a. However, contrary to expectation, we conclude for the sample and period investigated, the greater the business complexity and competition, the lower the ERMI. We highlight two directions for the contradictory results, the ERM-index may not be adequate to capture these variables or the complexity and competition have attributes that need to be better observed by studies that investigate their relationship with managerial mechanisms such as the ERM.

The second group of hypotheses, still with emphasis on the first research question, focuses attention on the moderating effect of ownership type, family and non-family, on the relationship between environmental uncertainty, complexity and competition and ERM. The results show that the use of ERM is related to environmental uncertainty and complexity. This allows inferring that, for the analyzed context, family ownership type moderates the positive relationship between environmental uncertainty and ERM use and complexity and ERM use.

In relation to performance, for the specific sample of family firms, it is concluded that ERM has an effect on market performance. This answers the second research problem of this study, by evidencing that family ownership type positively influences the use of ERM, consequently, it positively influences market performance. The results of

this study contribute to the literature on the impact of ownership type on the relationship between ERM and contingency variables, by confirming the inferences that family-owned firms that have higher ERMI, perform better. It is worth noting that taking the right amount of risk is essential for organizational performance. Thus, as a response to the importance of risk management, the effectiveness and implementation of Enterprise Risk Management (ERM) is a critical factor. Further testing also supports the expectation that effective ERM systems lead to improved performance by reducing risk exposure and that reverse causality between ERM and organizational performance is not present.

This study contributes to the literature and organizational studies, on the impact of ownership type on the relationship between ERM and contingent variables, by confirming the inferences that family firms that have higher ERMI, exhibit better market performance.

From a practical perspective, by examining the effect of ERM and environmental factors on organizational performance in family and non-family businesses, this study offers subsidies to managers. In general, firms with more sophisticated ERM have better ability to manage the uncertainties of the environment. ERM, regardless of ownership type, is related to environmental uncertainty, business complexity, competition, size and growth. The present research presents limitations, such as the impossibility of the generalization of the results, since only companies listed in B3 (Brazil, *Bolsa e Balcão*) with information available in the Refinitiv Eikon® database were analyzed, in the period from 2012 to 2019. Although the ERM-Index proposed by Gordon *et al.* (2009) and adopted in this study as a proxy for measuring ERM is widely used, its non-adequacy for the Brazilian context may be a limitation of the study. It is recommended for future researches the investigation of other samples, possibly from different countries, being carried out a comparative analysis between the different contexts investigate particularities of countries that may impact the effectiveness of the ERM-index. Another possibility would be to conduct similar research, using other contingency variables and/or adding such variables in the present analysis and to expand the studies related between managerial mechanisms and the variables complexity and competition.

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