



# The moderating effect of idiosyncratic risk on the market value of cash: A study of Brazilian family and non-family businesses

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## ABSTRACT

The objective of this research was to test whether idiosyncratic risk affects the market value of cash and whether this value, moderated by such risk, differs between Brazilian family and non-family businesses. Although the family business is the dominant type of organization in the world, the literature highlights the need to explore the behavioral differences between family and non-family businesses. Therefore, this study seeks to fill this gap, by considering that the idiosyncratic risk of the firm is influenced by the more or less conservative behavior of the decision maker. Given the impasse between the risk of expropriation of shareholder wealth by managers through available cash balances and the importance of the immediate availability of cash for the survival of the firm, it is relevant to compare whether an additional Brazilian real (the official currency of Brazil) of retained cash is less valuable for Brazilian family businesses compared to non-family businesses. The research has an impact by providing insights into the value that shareholders attribute to each additional Brazilian real of cash. The empirical model is based on the model developed by Fama and French (1998) and adapted by Dittmar and Mahrt-Smith (2007) and Pinkowitz et al. (2006), and idiosyncratic risk is estimated based on the 3-factor model of Fama and French (1993). The firms were classified as family and non-family using the Reference Form, and a total of 83 firms were analyzed using multiple and quantile regressions. The results show that idiosyncratic risk positively affects the market value of cash and that the market value of cash, moderated by idiosyncratic risk, is lower for family businesses than for non-family businesses. This finding that family control has a different effect on the market value of cash of Brazilian firms when idiosyncratic risk is taken into account contributes to the research in this field.

**Keywords:** cash retention, market value of cash, family businesses, idiosyncratic risk.

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## ***Efeito moderador do risco idiossincrático no valor de mercado do caixa: um estudo em empresas brasileiras familiares e não familiares***

### **RESUMO**

*O objetivo desta pesquisa foi verificar se o risco idiossincrático afeta o valor de mercado do caixa, bem como se esse valor, moderado por tal risco, difere-se entre empresas brasileiras familiares e não familiares. Embora a empresa familiar seja o tipo dominante entre as organizações no mundo, a literatura ressalta a necessidade de explorar as diferenças comportamentais entre empresas familiares e não familiares. Desse modo, ao considerar que o risco idiossincrático da empresa é influenciado pelo comportamento mais ou menos conservador do tomador de decisão, este estudo busca preencher essa lacuna. Diante do impasse entre o risco de expropriação da riqueza dos acionistas pelos gestores por meio dos saldos de caixa disponíveis e a importância da disponibilidade imediata do caixa para a sobrevivência da empresa, mostra-se relevante comparar se um real extra de caixa retido é menos valioso para as empresas brasileiras familiares em relação às não familiares. A pesquisa tem impacto por fornecer insights sobre o valor que os acionistas atribuem a cada real adicionado no caixa. O modelo empírico foi elaborado a partir do modelo desenvolvido por Fama e French (1998) e adaptado por Dittmar e Mahrt-Smith (2007) e Pinkowitz et al. (2006) e o risco idiossincrático foi estimado com base no modelo de 3 fatores de Fama e French (1993). A classificação das empresas em familiares e não familiares foi feita por meio do Formulário de Referência e, no total, 83 empresas foram analisadas com o uso de regressões múltiplas e quantílicas. Os resultados mostram que o risco idiossincrático afeta positivamente o valor de mercado do caixa e que o valor de mercado do caixa, moderado pelo risco idiossincrático, é menor para as empresas familiares do que para as empresas não familiares. Visto que o controle familiar provoca um efeito diferente sobre o valor de mercado do caixa das empresas brasileiras quando se considera o risco idiossincrático, contribui-se ao explorar esse campo.*

**Palavras-chave:** *retenção de caixa, valor de mercado do caixa, empresas familiares, risco idiossincrático.*

## **1. INTRODUCTION**

If the capital market were perfect and functioned as expected, the amount of cash would be irrelevant (Opler et al., 1999). However, given that the contracts between parties are incomplete, the business environment is complex (Hart & Moore, 1988), and there are financial frictions in the market that can prevent some firms from fully financing their investment opportunities (Acharya et al., 2007), the amount of cash held is relevant to the decision maker (Almeida et al., 2014; Opler et al., 1999).

Several studies show that companies around the world such as American (Almeida et al., 2014; Bates et al., 2009; Bates et al., 2018; Cambrea et al., 2021; Chakraborty et al., 2017; Pinkowitz et al., 2016; Ward et al., 2018), European (Caprio et al., 2020; Mortal et al., 2020; Schauten et al., 2013), Taiwanese (Hsu & Liu, 2018), and Brazilian (Ferreira & Vicente, 2020; Manoel & Moraes, 2022; Pereira et al., 2021) firms hold significant amounts of cash on their balance sheets.

Cash holdings can be explained by various reasons such as precautionary, transactional and speculative (Bates et al., 2009; Keynes, 1936; Opler et al., 1999), idiosyncratic risk (Campbell et al., 2001) and corporate governance (Dittmar et al., 2003; Harford et al., 2008; Al-Najjar & Clark, 2017). In addition to these, actual or potential

agency problems can also explain corporate liquidity (Chen et al., 2020; Denis & Sibilkov, 2009; Ferreira & Vilela, 2004; Jensen, 1986).

Harford et al. (2008) highlight two main perspectives on the relationship between agency problems and cash holdings. One argues that managers prefer to hold excess cash in order to minimize the firm's risk and increase the amount of assets under management control (Jensen, 1986); the other suggests that managers with excess cash take on more risk in the projects they work on in order to maximize their short-term returns (Jensen & Meckling, 1976).

Several studies point out that classical agency problems are less intense in family businesses than in non-family businesses (Caprio et al., 2020; Chen et al., 2010; Feldman et al., 2019; Helsen et al., 2017; Hsu & Liu, 2018) due to the smaller distance between ownership and management, as they tend to coincide (Berrone et al., 2012; Feldman et al., 2016). However, even if the family is not directly involved in management, family members have strong incentives to monitor managers and thus reduce agency costs (Helsen et al., 2017).

A business is defined as family-owned if the founder or a member of their family, by blood or marriage,

is an executive, director, or blockholder, individually or as a group (Anderson & Reeb, 2003; Villalonga & Amit, 2006). Thus, factors related to origin, history, and organizational plans can differentiate a family business from a non-family business (Silva, 2015). In addition to being more concerned with non-financial objectives (Gómez-Mejía et al., 2011), family businesses adopt more conservative management policies as their investments are less diversified (Bouzgarrou & Navatte, 2013; Chen & Wang, 2019).

According to Chen and Wang (2019), the well-being of the family business owner is associated with idiosyncratic risk, which is why the family has greater incentives to mitigate idiosyncratic risk due to the low diversification of investments and the high amount of personal capital invested in family businesses (Caprio et al., 2020). Also known as unsystematic risk or diversifiable risk, idiosyncratic risk represents the specific risk of the firm that can be minimized or even eliminated by fully diversifying the portfolio (Ganz et al., 2019).

Chen and Wang (2019) suggest that investments with higher idiosyncratic risk are lower in family businesses compared to non-family businesses, as family businesses tend to be more conservative and cautious. Moreover, according to Alim and Khan (2016), Bouzgarrou and Navatte (2013) and Caprio et al. (2020), the greater risk aversion of family businesses implies a lower opportunity cost of holding cash for precautionary reasons, since the well-being of the family business owner depends on the continuity and performance of the firm (Chen & Wang, 2019).

According to Cheung (2016), idiosyncratic risk has a positive relationship with cash reserves, as the demand for cash for precautionary reasons increases when cash flows become riskier (Bates et al., 2009). In this sense, Chakraborty et al. (2017) find that the benefits of cash holdings are even greater when the firm operates in a more uncertain environment, as greater uncertainty is associated with greater information asymmetry.

While cash holdings are positively related to idiosyncratic risk, the opposite is thought to be true for the market value of cash, which is the value that shareholders assign to an additional unit of cash held by the firm. According to Faulkender and Wang (2006), when cash reserves exceed the firm's predictable needs, shareholders tend to assign less value to each additional dollar of cash. However, when internal resources are insufficient

to guarantee profitable investment opportunities and companies need to raise money in the external market, the stock market tends to assign more value to each dollar added to cash (Faulkender & Wang, 2006).

Therefore, given that the higher the cash holdings, the lower the market value of cash (Caprio et al., 2020; Cheung, 2016; Faulkender & Wang, 2006; Park & Jang, 2019), and that the higher the idiosyncratic risk, the higher the cash holdings (Bates et al., 2009; Cheung, 2016; Chakraborty et al., 2017), a negative relationship is expected between the market value of cash and idiosyncratic risk for family businesses. Accordingly, this study aims to test whether idiosyncratic risk affects the market value of cash and whether this value, moderated by this risk, differs between Brazilian family and non-family businesses.

One reason for this study is the importance of the risk variable. For example, Im et al. (2017) examined whether corporate liquidity uncertainty affects the cash holdings of U.S. firms and found that between 1980 and 2015, the average value of cash holdings was 10.8% for firms with low levels of uncertainty and 22.06% for firms with high levels of uncertainty. Thus, it is expected that the greater the idiosyncratic risk, the greater the cash holdings and, consequently, the lower the market value of cash for family businesses.

Another reason is the need to investigate the market value of cash in Brazil due to the regulatory, political, economic and social differences between countries (Loncan & Caldeira, 2014). According to Faulkender and Wang (2006), \$1 of cash can be worth more than \$1 if shareholders believe that the difficulty in accessing capital markets causes firms to waste value-creating investments, while it can be worth less if shareholders believe that the additional cash only serves to increase the agency problems associated with excess cash.

Moreover, Caprio et al. (2020) found that family businesses hold more cash and have a lower market value of cash compared to non-family businesses. In this sense, given that family involvement can influence decisions regarding the management of corporate cash, it is relevant to verify whether idiosyncratic risk affects the value that shareholders attribute to each Brazilian monetary unit of real added to cash, in addition to comparing whether the value of this additional cash unit, moderated by this risk, differs between Brazilian family and non-family businesses.

## 2. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

### 2.1 Market Value of Cash and Idiosyncratic Risk in Family Businesses

Firms hold representative and growing amounts of cash reserves that represent a significant portion of total firm wealth (Dittmar & Mahrt-Smith, 2007). According to Keynes (1936), three motives (precautionary, transactional and speculative) can explain the demand for corporate liquidity. The precautionary motive is associated with protecting the firm against potential risks, financial constraints and future uncertainties (Keynes, 1936), so firms hold cash as a means of dealing with unexpected contingencies.

The transactional motive relates to the day-to-day transactions of the firm, i.e., cash and cash equivalents are used to ensure the functioning of the firm's operating activities (Keynes, 1936), i.e., to meet current obligations. The speculative motive is based on ensuring that the firm has the resources available to invest in new projects and take advantage of profitable opportunities (Keynes, 1936).

Modigliani and Miller (1958) state that in a perfect market economy, firms are able to finance all value-creating investment opportunities. However, this is not necessarily the case when capital market frictions are taken into account (Pinkowitz & Williamson, 2007). According to Pinkowitz and Williamson (2007), in a frictionless market, a dollar added to cash increases the market value of the firm by a dollar. However, because capital markets are imperfect, shareholders tend to assign different values to each monetary unit added to the firm's cash.

Pinkowitz and Williamson (2007) estimated the market value of the cash that shareholders attribute to a dollar of cash and found that estimates vary on average from \$0.94 to \$0.97. According to the authors, the market value of cash is affected by firm characteristics, such as the extent of conflicts between shareholders and bondholders, the quality and volatility of investment opportunities, and growth prospects and financial distress, which is why cross-sectional differences in the market value of cash are found when the sample is segmented to account for each of these characteristics.

Several studies show a strong participation of family businesses worldwide (Adhikari & Sutton, 2016; Meglio & King, 2019; Villalonga & Amit, 2006), especially in emerging markets (Faccio & Lang, 2002; Faccio et al., 2001). According to Rajverma et al. (2019), family businesses are prevalent in emerging markets, therefore,

there is a higher idiosyncratic risk in these markets as the lower diversification of investments leads to greater idiosyncratic risk, which is a common characteristic of these firms.

Luo and Bhattacharya (2009) explain that a firm's total risk consists of systematic risk, which represents the firm's sensitivity to changes or news of changes in market returns, which are common to all stocks, and idiosyncratic risk, which refers to the risk associated with the firm's specific strategies after accounting for variation in the overall market. Thus, while systematic risk expresses the portion of risk that is explained by changes in the average returns of the market portfolio, idiosyncratic risk denotes the residual risk that cannot be explained by changes in the average returns of the market portfolio (Luo & Bhattacharya, 2009).

Examining the relationship between family ownership and firm liquidity, Liu (2011) found that the market value of cash is lower in family businesses than in non-family businesses. For the author, this result can be supported by the spending hypothesis, which suggests that although family businesses have incentives to accumulate cash, they are encouraged to spend cash on projects that benefit the family.

Hsu and Liu (2018) examined the incremental value of cash for the Taiwanese stock market, and the empirical evidence from a sample of 6,561 firm-year observations over the period from 2000 to 2013 showed that an additional \$1.00 of cash is valued by shareholders at \$0.93, and that family ownership associated with greater investment layers implies a lower market value of cash than non-family ownership associated with successive investment layers.

In an analysis of 538 European firms, Caprio et al. (2020) found that family businesses, on average, hold more cash than non-family businesses. They also found that cash holdings are higher when the firm is led by a family Chief Executive Officer (CEO) than when it is led by a non-family CEO, and that each €1.00 added to the cash of family businesses is worth, on average, €0.38 less than the same euro added to the cash of non-family businesses.

Rajverma et al. (2019) confirmed that family control is associated with greater idiosyncratic risk, showing that the average percentage of idiosyncratic risk for non-family businesses is 34.42%, 40.37% for family businesses, and 41.58% for family businesses with family management.

According to Pinkowitz et al. (2016), cash levels vary across firms and, as predicted by the precautionary motive, firms hold more cash as risk increases.

Based on studies showing that family businesses hold more cash than non-family businesses (Alim & Khan, 2016; Caprio et al., 2020; Ozkan & Ozkan, 2004) and studies showing that the market value of cash decreases

with greater cash holdings (Caprio et al., 2020; Cheung, 2016; Faulkender & Wang, 2006; Park & Jang, 2019), the following research hypotheses are developed:

**H<sub>1</sub>:** Idiosyncratic risk negatively affects the market value of cash.

**H<sub>2</sub>:** The market value of cash, moderated by idiosyncratic risk, is lower for family businesses than for non-family businesses.

### 3. METHODOLOGICAL PROCEDURES

#### 3.1 Sample and Data Collection

The sample consisted of public companies listed on the B3 between 2010 and 2019, with the exception of financial companies and public utilities (Ferreira & Zanolla, 2022; Hsu & Liu, 2018). Observations for the year of companies with negative net assets were discarded (Faulkender & Wang, 2006). The research period started in 2010, the year of mandatory adoption of international accounting standards by Brazilian listed companies, and ended in 2019, due to the impact that the SARS-CoV-2 (COVID-19) pandemic may have on results from 2020 onward.

Some exclusions were made from the selected sample: a) exclusion of companies whose shares were traded for a period of less than 15 days in each month of the sample period; b) exclusion of companies that did not provide the data required to calculate idiosyncratic risk for the entire sample period; and c) exclusion of companies that had negative equity on the balance sheet closing date (12/31) in at least one of the years of the sample period (Fu, 2009; Ganz et al., 2019; Mendonça et al., 2012). In total, 83 companies, grouped into 8 sectors according to the TRBC Economic Sector Name classification by Refinitiv Eikon, formed the sample for this study and were analyzed using multiple and quantile regressions.

Financial data were obtained from the Refinitiv Eikon data platform. The information needed to classify the companies as family-owned or non-family-owned was obtained from the B3 website, specifically from item 7.5 (Family Relationships) of each company's Reference Form for each year. The websites of the Brazilian Central Bank (BCB), the B3 and the Financial Economics Research Center (NEFIN) of the University of São Paulo (USP) were also used to calculate idiosyncratic risk.

#### 3.2 Classifying Family Businesses

Although there is no specific measure or universally accepted criterion in the literature for identifying a company as family-owned, this identification can be made directly by the company itself when it discloses information on "Family Relationships" in item 7.5 of the Reference Form. Therefore, in this study, this item was consulted by company and by year to classify companies as family-owned or non-family-owned (Oliveira et al., 2020; Santos & Silva, 2018). If the company disclosed any type of family relationship, it was classified as family-owned; otherwise, it was classified as non-family-owned.

In addition to the details of the manager of the issuer or subsidiary and the related person, item 7.5 indicates the nature of the relationship with the issuer or subsidiary, which can be 1st or 2nd degree and consanguinity or affinity. In the case of consanguinity, these are father/mother, son/daughter, brother/sister (1st degree) and grandfather/grandmother (2nd degree); in the case of affinity, these are husband/wife (1st degree) and mother-in-law/son-in-law, son-in-law/daughter-in-law, brother-in-law/sister-in-law, stepfather/stepmother, stepson/stepmother (2nd degree).

#### 3.3 Measuring idiosyncratic risk

The values related to idiosyncratic risk were estimated using the Fama and French (1993) 3-factor model (Model 1), tested by firm and by year with daily data, as used by Fu (2009) and Mendonça et al. (2012). According to this model, the return on assets is explained by 3 factors: a) the excess return of the market (difference between the return of the market portfolio and the return of the risk-free rate); b) the return of a small minus big (SMB) portfolio; and c) the return of a high minus low (HML) portfolio.

Model 1:

$$R_{i,t} - R_{f,t} = \beta_0 + \beta_1(R_{m,t} - R_{f,t}) + \beta_2(SMB_t) + \beta_3(HML_t) + \varepsilon_{i,t}$$

where

$R_{i,t}$  is the return of each stock on each day;

$R_f$  is the daily risk-free return;

$R_m$  is the daily return of the market portfolio;

$SMB_t$  and  $HML_t$  are the daily returns of the *SMB* and *HML* portfolios;

$i$  represents the company;

$t$  represents the day;

$\beta_0$  is the intercept;

$\beta_1$ ,  $\beta_2$  and  $\beta_3$  are the coefficients for each factor;

$\varepsilon_{i,t}$  is the random error of the regression.

To calculate the 3-factor model, the daily stock prices needed to measure returns were obtained from Refinitiv Eikon; the SELIC rates for the corresponding years, used as a proxy for the risk-free rate, were obtained from the BCB website; and the point values of the Ibovespa index, used to calculate the return of the market portfolio, were obtained from the B3 website. Returns were measured by the logarithm of the quotient between the value of the stock on day  $t$  and the value of the stock on day  $t-1$ , i.e.,  $(\ln(R_{i,t} / R_{i,t-1}))$  (Mendonça et al., 2012).

The factor data corresponding to the daily returns of the *SMB* and *HML* portfolios published on the NEFIN website were used. According to NEFIN, the *SMB* factor represents the return of the small stock portfolio minus the return of the big stock portfolio (small minus big), with stocks ranked in ascending order of market value and then divided into 3 percentiles.

The *HML* factor, on the other hand, represents the return of the portfolio of stocks with a high book-to-market ratio minus the return of the portfolio of stocks with a low book-to-market ratio (high minus low), where the stocks are ordered by increasing book-to-market ratio and then also separated into 3 percentiles (Núcleo de Pesquisa em Economia Financeira [NEFIN], 2021). Also according to NEFIN (2021), after the separation into 3 percentiles, the returns of the *SMB* and *HML* factors, equally weighted for the first and third portfolios, are calculated in such a way that every January of year  $t$ , the eligible stocks are classified in December  $t-1$  (*SMB*) or in June  $t-1$  (*HML*).

According to Ganz et al. (2019), idiosyncratic risk (diversifiable or unsystematic) is the risk specific to the firm; it is the part that can be minimized or even eliminated through efficient diversification of a portfolio.

According to the authors, this risk is identified based on the random error that is not explained by the asset pricing models, and since this risk represents the idiosyncrasies of company  $i$ , this study uses the standard deviation of the random error of the Model 1 regression as a proxy for idiosyncratic risk (Ganz et al., 2018, 2019).

In general, the random error includes the values not observed in the model, which is why there is a residual for each observation rather than a single residual. If we consider the standard deviation of the random error of the regression in Model 1 as a proxy for idiosyncratic risk, the greater the relationship between the firm and the return on its stock, the lower the idiosyncratic risk, and vice versa (Ganz et al., 2019).

### 3.4 Dependent and Independent Variables

According to Table 1, the market value of the shares is the dependent variable, while the independent variables are: a) earnings; b) total assets net of cash; c) research and development expenses; d) interest expenses; e) total dividend paid; f) cash; g) family; and h) idiosyncratic risk.

### 3.5 Empirical Model

The empirical model (Model 3), based on the model developed by Fama and French (1998) and adapted by Pinkowitz et al. (2006) and Dittmar and Mahrt-Smith (2007) (Model 2), takes into account the family business and idiosyncratic risk variables and was estimated for the period from 2010 to 2019 using multiple and quantile regressions, which allows the analysis of the average functions and percentile functions conditioned on 0.10, 0.25, 0.50, 0.75 and 0.90, respectively.

**Table 1**  
Summary of dependent and independent variables

		Dependent variable		
Variable	Definition	Measurement	Data source	References
Market Value of Equity (Equity-to-Book) (V)	The market value of company <i>i</i> 's shares in period <i>t</i>	Market value of equity / Total assets	Refinitiv Eikon	Pinkowitz & Williamson (2007)
		Independent variables		
Variable	Definition	Measurement	Data source	References
Earnings (E)	The value of company <i>i</i> 's earnings in period <i>t</i>	(Earnings before extraordinary items + Interest + Deferred tax credit + Investment tax credit) / Total assets	Refinitiv Eikon	Chakraborty et al. (2017); Faulkender & Wang (2006); Pinkowitz & Williamson (2007); Pinkowitz et al. (2006)
Total Assets Net of Cash Holdings (NA)	The value of total assets net of cash and cash equivalents of company <i>i</i> in period <i>t</i>	(Total Assets – Cash and Cash Equivalents) / Total Assets	Refinitiv Eikon	Chakraborty et al. (2017); Faulkender & Wang (2006); Pinkowitz et al. (2006)
Research and Development Expenses (RD)	The value of company <i>i</i> 's research and development (R&D) expenses in period <i>t</i>	R&D / Total assets	Refinitiv Eikon	Chakraborty et al. (2017); Faulkender & Wang (2006); Pinkowitz et al. (2006)
Interest Expenses (I)	The value of company <i>i</i> 's interest expenses in period <i>t</i>	Interest paid / Total assets	Refinitiv Eikon	Chakraborty et al. (2017); Faulkender & Wang (2006); Pinkowitz & Williamson (2007); Pinkowitz et al. (2006)
Total Dividend (D)	The value of the total dividend paid and interest on own capital (IOC) of company <i>i</i> in period <i>t</i>	(Dividend paid + IOC) / Total assets	Refinitiv Eikon	Chakraborty et al. (2017); Faulkender & Wang (2006); Pinkowitz et al. (2006)
Cash Holdings (C)	The value of company <i>i</i> 's available cash in period <i>t</i>	(Cash and cash equivalents) / Total assets	Refinitiv Eikon	Dittmar et al. (2003); Pinkowitz et al. (2006)
Family (F)	The dummy variable that classifies company <i>i</i> in period <i>t</i> as family-owned or non-family-owned	1 = family business, if the company discloses any type of relationship; 0 = non-family business, if the company does not disclose any type of relationship	B3 website – Reference Form: Item 7.5 “Family relationships”	Oliveira et al. (2020, 2022); Santos & Silva (2018)
Idiosyncratic Risk (IR)	The value of the standard deviation of the random error of the regression of the Fama and French (1993) 3-factor model (Model 1)	Standard deviation of $\varepsilon_{i,t}$ $R_{i,t} - R_{i,t} = \beta_0 + \beta_1(R_{m,t} - R_{f,t}) + \beta_2(SMB_t) + \beta_3(HML_t) + \varepsilon_{i,t}$	Refinitiv Eikon; BCB website; NEFIN website; B3 website	Ganz et al. (2018, 2019); Lin & Shen (2015)

Source: Prepared by the authors.

### Model 2:

$$V_{i,t} = \alpha + \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} \\ + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} \\ + \beta_{14} dD_{i,t+1} + \beta_{15} dV_{i,t+1} + \beta_{16} dC_{i,t} + \beta_{17} dC_{i,t+1} + \varepsilon_{i,t}$$

### Model 3:

$$V_{i,t} = \alpha + \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} + \beta_6 GO_{i,t} + \beta_7 dGO_{i,t} + \beta_8 dGO_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \\ \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dV_{i,t+1} + \beta_{16} dC_{i,t} + \beta_{17} C_{i,t+1} * dC_{i,t} + \beta_{18} F_{i,t} + \beta_{19} IR_{i,t} \\ + \beta_{20} IR_{i,t} * dC_{i,t} + \beta_{21} F_{i,t} * IR_{i,t} * dC_{i,t} + \varepsilon_{i,t}$$

where

$V_{i,t}$  is the market value of company  $i$ 's stock in period  $t$ ;

$\alpha$  is the intercept;

$E_{i,t}$  is the earnings of company  $i$  in period  $t$ ;

$NA_{i,t}$  is the total assets net of cash of company  $i$  in period  $t$ ;

$RD_{i,t}$  is company  $i$ 's research and development expenses in period  $t$ ;

$GO_{i,t}$  is the annual growth rate of sales of company  $i$  in period  $t$ ;

$I_{i,t}$  is company  $i$ 's interest expenses in period  $t$ ;

$D_{i,t}$  is the total dividend paid by company  $i$  in period  $t$ ;

$C_{i,t}$  is the available cash of company  $i$  in period  $t$ ;

$F_{i,t}$  is the family business dummy, (1) for family business and (0) for non-family business, for company  $i$  in period  $t$ ;

$IR_{i,t}$  is the idiosyncratic risk of company  $i$  in period  $t$ ;

$\epsilon_{i,t}$  is the random error (white noise).

The explanatory variables include past, current, and future values to predict the earnings portion of expected net cash flows, i.e., the expected earnings growth beyond the current level ( $E$ ); to represent the net investment component of the expected net cash flows ( $NA$ ); to collect information on expected profit lost through earnings variables ( $RD$ ); to capture the level of interest and dividends, as well as expected growth and changes in leverage and dividend policy ( $I$  and  $D$ ); and to correct for other future changes in unexpected components ( $V$ ) (Fama & French, 1998). Changes in available cash are also considered ( $C$ ).

The variable  $X_t$  is the level of  $X$  in year  $t$  scaled by total assets in year  $t$ , i.e.  $(X_t / TA_t)$ ; the variable  $dX_t$  is the change in the level of  $X$  from year  $t-1$  to year  $t$  scaled by total assets in year  $t$ , i.e.  $((X_t - X_{t-1}) / TA_t)$ ; and the variable  $dX_{t+1}$  is the change in the level of  $X$  from year  $t+1$  to year  $t$  scaled by total assets in year  $t$ , i.e.  $((X_{t+1} - X_t) / TA_t)$  (Dittmar & Mahrt-Smith, 2007; Pinkowitz et al., 2006).

## 4. RESULTS

### 4.1 Descriptive Statistics

The descriptive statistics of the continuous variables before and after winsorization are shown in Table 2.

It can be seen that the average total assets net of cash is greater than 92% and that there are significant changes in the descriptive statistics for the market value of the shares and the annual growth rate of sales after winsorization. For example, the maximum value of the market value of the shares falls from R\$146.69 to R\$7.73, while the

The variables (except for family business and idiosyncratic risk) were scaled by the book value of total assets to prevent larger firms from biasing the analysis and, like Manoel and Moraes (2022), due to the small amount of data on R&D expenses, the annual value of the growth rate of sales (growth opportunities), measured as  $((Sales_t - Sales_{t-1}) / Sales_{t-1}) * 100$ , was used as an alternative proxy.

Still in Model 3, if the  $\beta_{20}$  coefficient shows significance, the model proposed in this study indicates that the variation in idiosyncratic risk moderates the value of the change in cash. The  $\beta_{21}$  coefficient indicates whether there is a difference between family and non-family businesses when the market value of cash is moderated by idiosyncratic risk.

### 3.6 Statistical Approach

Winsorization at the 1% level was used for all variables except the family business dummy (Alim & Khan, 2016; Bates et al., 2009; Pinkowitz et al., 2006; Im et al., 2017), and the logarithm function was applied for continuous variables with only positive values to reduce data variability. The analyses were performed using the Stata statistical program, version 16.0.

To determine the most appropriate panel data model, whether pooled ordinary least squares (POLS), fixed effects or random effects, the Chow, Breusch-Pagan Lagrange multiplier and Hausman tests were run, as indicated by Fávero and Belfiore (2017). To satisfy the assumptions of multiple regression, the Shapiro-Francia and Breusch-Pagan tests were run, in that order, to check that the residuals follow a normal distribution and are homoscedastic. The Pearson correlation matrix was used to check that there were no high or perfect correlations between the independent variables, and the variance inflation factor (VIF) was calculated to check for multicollinearity problems.

maximum value of the growth rate of sales falls from 22.15% to 2.39%.

Regarding the variability of the data, the market value of the shares has the highest standard deviation, which is 4.7 times higher than the average before winsorization, and it can be seen that the averages, both before and after smoothing the observations, are higher than 1. When the market value of the shares is greater than 1, it is assumed that the market value attributes are not fully captured in the accounting (Carvalho et al., 2017).

**Table 2**

Descriptive statistics of the variables for the period from 2010 to 2019

Var.	Obs.	Mean		Standard deviation		Minimum		Maximum	
		Before	After	Before	After	Before	After	Before	After
V	829	1.5457	1.0469	7.2901	1.2860	0.0054	0.0209	146.6898	7.7356
E	829	-0.0141	-0.0097	0.2508	0.1542	-3.5730	-0.9650	1.7910	0.3353
NA	829	0.9294	0.9317	0.0873	0.0745	0.0467	0.6672	1	1
RD	69	0.0238	–	0.0424	–	0.00005	–	0.1597	–vvvv
GO	735	0.1559	0.0868	1.2453	0.3704	-2.7083	-0.8644	22.1515	2.3939
I	755	-0.0273	-0.0262	0.0350	0.0257	-0.4413	-0.1671	0.0250	-0.00006
D	662	0.0283	0.0279	0.0399	0.0369	0	0	0.4003	0.2002
C	714	0.0819	0.0798	0.089	0.0767	0	0	0.9532	0.3829
IR	829	0.0326	0.0315	0.0366	0.0284	0.0110	0.0125	0.4395	0.1881

**Notes:** V is the market value of the shares; E is earnings; NA is total assets net of cash; RD is research and development expense; GO is annual growth rate of sales; I is interest expense; D is total dividend paid; C is available cash; IR is idiosyncratic risk. Var. denotes the variables and Obs. denotes the number of observations. Winsorized at the 1% level.

**Source:** Prepared by the authors.

Available cash (C) has 714 observations and, on average, the firms have 8.2% (before) and 7.9% (after) cash holdings. These percentages are close to those found in other national studies (Ferreira & Vicente, 2020; Ferreira & Zanolla, 2022; Manoel & Moraes, 2022). With respect to other countries, Schauten et al. (2013) found that the average level of cash in the largest European non-financial listed companies was 46.1% in Ireland, 25.4% in Switzerland, 16.4% in Greece, 13.7% in the United Kingdom, 9.3% in Spain, and 5.3% in Austria.

Regarding the classification of observations into family and non-family, 61.63% of the observations are family (498), while 38.37% are non-family (310). The most representative family sectors were Real Estate and Consumer Non-Cyclicals, and the least representative were Healthcare and Academic & Educational Services. For non-family businesses, the most representative sectors were Industrials and Basic Materials, and the least representative were Consumer Non-Cyclicals and Academic & Educational Services.

After winsorization, the average idiosyncratic risk remains just over 3%; the standard deviation drops from 3.7 to 2.8, and the maximum value falls by 0.2514 (0.4395 minus 0.1881). In general, the higher the standard deviation, the more dispersed the data, while the lower the standard deviation, the more concentrated the errors. In this study, it is assumed that in family businesses, the greater the idiosyncratic risk, the greater the credit risk, so family businesses have strong incentives to reduce idiosyncratic risk.

Given the importance of the market value of the shares, available cash, and idiosyncratic risk, descriptive

statistics were estimated for these variables, separating the results into family and non-family. With respect to the market value of the shares variable, the averages, both before and after winsorization, are greater than 1 for family observations (1.92 and 1.09) and less than 1 for non-family observations (0.94 and 0.94). When the market value of the shares is less than 1, it means that the accounting overestimates the value of the firm relative to the market (Carvalho et al., 2017).

Comparing the means of available cash (C), before and after winsorization, it can be seen that the family observations hold more cash on average (8.6% and 8.3%) than the non-family observations (7.2% and 7.1%), as expected. In terms of idiosyncratic risk (IR), the opposite is true, as the family observations on average have a lower idiosyncratic risk (0.031 and 0.030) than the non-family observations (0.035 and 0.034). This result is consistent with the idea that family businesses have strong incentives to mitigate idiosyncratic risk (Lin & Shen, 2015).

The correlations between the independent variables were observed using Pearson's correlation matrix. The values obtained showed that there were no significant high or perfect correlations, as they were less than 0.60 (Hair et al., 2009). The VIF was then used to check that there were no problems of multicollinearity between the independent variables. The results showed individual values equal to or less than 4.30 and a mean of 1.88, with a tolerance of 0.23 to 0.92. According to Gujarati and Porter (2011), the regression is accepted when the VIF is less than 10. It should be noted that the descriptive by family type or not and the correlation matrix were omitted due to lack of space.

## 4.2 Multiple Regression Results

The null hypothesis of a normal distribution and the null hypothesis of constant variance of the residuals were rejected, as indicated by the Shapiro-Francia (p-value = 0.00007) and Breusch-Pagan (p-value = 0.0000) tests. Regarding the most appropriate panel data model, the Chow F (p-value = 0.0000), Breusch-Pagan Lagrangian multiplier (p-value = 0.0000) and Hausman (p-value = 0.0759) tests indicated the random effects model. The results of the multiple regression are shown in Table 3, and since the residuals are not homoscedastic, the model was estimated with robust standard errors clustered by individual.

Table 3 shows that 10 variables are statistically significant, of which 5 have a positive and significant coefficient at the 1% level ( $E_{i,t}$ ;  $dE_{i,t+1}$ ;  $dNA_{i,t+1}$ ;  $dI_{i,t}$ ;  $dC_{i,t+1}$ ), 3 have a negative and significant coefficient at the 1% level ( $dE_{i,t}$ ;  $dGO_{i,t+1}$ ;  $IR_{i,t}$ ), and 2 have a positive

and significant coefficient at the 10% level ( $dNA_{i,t}$ ;  $GO_{i,t}$ ). Given the subject matter and considering only the significant variables, the idiosyncratic risk (IR) is highlighted.

Cash ( $\beta_{16}$ ) has a positive and significant coefficient at the 1% level (p-value = 0.0001), meaning that the higher the cash holdings, the higher the market value of the shares. This result shows that for every R\$1.00 increase in the level of cash, the market value of the shares increases by an average of R\$0.762. The idiosyncratic risk ( $\beta_{19}$ ) has a negative and significant coefficient at the 1% level (p-value = 0.0000), so the higher the idiosyncratic risk, the lower the market value of the shares. The number of observations is 390 and the coefficient of determination is 0.5656. This means that the variations in the statistically significant independent variables explain 56.56% of the variation in the market value of the shares, since in the random effects model the variation between individuals is predominant.

**Table 3**

*Multiple regression results for the sample from 2010 to 2019*

Dependent variable: $V_{i,t}$	
Independent variables	
$E_{i,t}$	6.002*** (1.481)
$dE_{i,t}$	-1.943*** (0.477)
$dE_{i,t+1}$	1.423*** (0.402)
$dNA_{i,t}$	0.385* (0.199)
$dNA_{i,t+1}$	0.630*** (0.159)
$GO_{i,t}$	0.181* (0.104)
$dGO_{i,t}$	-0.001 (0.002)
$dGO_{i,t+1}$	-0.007*** (0.002)
$I_{i,t}$	2.523 (3.995)
$dI_{i,t}$	6.307*** (2.149)
$dI_{i,t+1}$	2.121 (2.109)
$D_{i,t}$	-0.009 (0.024)
$dD_{i,t}$	-0.760 (1.493)

**Table 3**  
Cont.

Dependent variable: $V_{i,t}$	
$dD_{i,t+1}$	-0.836 (1.315)
$dV_{i,t+1}$	-0.057 (0.037)
$dC_{i,t+1}$	0.762*** (0.288)
$C_{i,t} * dC_{i,t}$	-2.849 (6.410)
$F_{i,t}$	-0.171 (0.105)
$IR_{i,t}$	<b>-0.603***</b> <b>(0.117)</b>
$IR_{i,t} * dC_{i,t}$	0.008 (0.323)
$F_{i,t} * IR_{i,t} * dC_{i,t}$	-0.372 (0.343)
Constant	-2.855*** (0.506)
Observations	390
R <sup>2</sup> (within)	0.5300
R <sup>2</sup> (between)	0.5656
R <sup>2</sup> (overall)	0.5149

**Notes:**  $V$  is the market value of the shares;  $E$  is earnings;  $NA$  is total assets net of cash;  $GO$  is annual growth rate of sales;  $I$  is interest expense;  $D$  is total dividend paid;  $C$  is available cash;  $F$  is the family business dummy, (1) for family businesses and (0) for non-family businesses;  $IR$  is idiosyncratic risk. The variable  $X_t$  represents the level of  $X$  in year  $t$  standardized by total assets in year  $t$ , i.e.  $(X_t / TA_t)$ ; the variable  $dX_t$  corresponds to the change in the level of  $X$  from year  $t-1$  to year  $t$  standardized by total assets in year  $t$ , i.e.,  $((X_t - X_{t-1}) / TA_t)$ ; and the variable  $dX_{t+1}$  is the change in the level of  $X$  from year  $t+1$  to year  $t$  standardized by total assets in year  $t$ , i.e.,  $((X_{t+1} - X_t) / TA_t)$ .

\*\*\* Statistically significant at the 1% level ( $p$ -value  $< 0.01$ ); \*\* at the 5% level ( $p$ -value  $< 0.05$ ); \* at the 10% level ( $p$ -value  $< 0.10$ ). Robust standard errors in parentheses.

**Source:** Prepared by the authors.

### 4.3 Results of the Quantile Regressions

The Shapiro-Francia test ( $p$ -value = 0.00001) showed that the dependent variable, the market value of the shares before and after the data treatment, does not have a normal distribution. In view of this, the quantile regression technique was also used, with the percentile functions predefined at 0.10, 0.25, 0.50, 0.75 and 0.90, in order to confirm and complement the results obtained so far.

Since the residuals do not follow a normal distribution, the non-parametric Mann-Whitney U test was used. The  $p$ -value obtained ( $p$ -value = 0.0065) indicates that the null hypothesis of equal medians is rejected at the

95% confidence level, and therefore it is concluded that the medians of the market value of shares are different for family and non-family businesses.

The results of the quantile regressions are presented in Table 4. Note that the variables  $C_{i,t} * dC_{i,t}$ ,  $F_{i,t}$ ,  $IR_{i,t} * dC_{i,t}$  and  $F_{i,t} * IR_{i,t} * dC_{i,t}$  became statistically significant in at least one percentile. The variable  $C_{i,t} * dC_{i,t}$  ( $\beta_{17}$ ) measures the value of the change in the level of cash for the different volumes of available cash, i.e. whether the market value of cash decreases or increases as the volume of cash increases and vice versa. The results in Table 4 show that the market value of cash is sensitive to the level of cash and that a higher level of cash results in a higher market value of cash.

**Table 4**  
Quantile regression results for the sample from 2010 to 2019

Independent variables	Dependent variable: $V_{i,t}$					
	OLS	P10	P25	P50	P75	P90
$E_{i,t}$	6.002*** (1.481)	10.759*** (1.533)	8.808*** (1.640)	7.675*** (0.995)	10.144*** (0.890)	7.804*** (1.574)
$dE_{i,t}$	-1.943*** (0.477)	-1.429 (1.277)	-0.964 (1.366)	-1.244 (0.829)	-3.823*** (0.742)	-3.068** (1.311)
$dE_{i,t+1}$	1.423*** (0.402)	0.444 (0.947)	0.572 (1.013)	1.239** (0.615)	1.686*** (0.550)	1.653* (0.973)
$dNA_{i,t}$	0.385* (0.199)	0.312 (0.498)	0.539 (0.532)	0.222 (0.323)	0.594** (0.289)	0.728 (0.511)
$dNA_{i,t+1}$	0.630*** (0.159)	0.758** (0.331)	0.413 (0.354)	0.388* (0.215)	0.414** (0.192)	0.489 (0.340)
$GO_{i,t}$	0.181* (0.104)	-0.062 (0.210)	-0.007 (0.225)	-0.048 (0.136)	0.220* (0.122)	-0.165 (0.216)
$dGO_{i,t}$	-0.001 (0.002)	0.007 (0.009)	0.006 (0.010)	-0.0008 (0.006)	-0.001 (0.005)	0.005 (0.010)
$dGO_{i,t+1}$	-0.007*** (0.002)	-0.008 (0.007)	-0.002 (0.008)	-0.010** (0.005)	-0.006 (0.004)	-0.013* (0.007)
$I_{i,t}$	2.523 (3.995)	-15.060*** (4.416)	-11.977** (4.724)	-9.121** (2.867)	-11.426*** (2.565)	-3.609 (4.536)
$dI_{i,t}$	6.307*** (2.149)	-1.345 (6.496)	4.277 (6.950)	3.028 (4.218)	5.355 (3.774)	2.631 (6.672)
$dI_{i,t+1}$	2.121 (2.109)	4.179 (5.598)	-2.360 (5.990)	-4.686 (3.635)	-4.655 (3.253)	-2.480 (5.751)
$D_{i,t}$	-0.009 (0.024)	-0.027 (0.039)	0.028 (0.042)	0.064** (0.025)	-0.019 (0.023)	-0.019 (0.040)
$dD_{i,t}$	-0.760 (1.493)	-0.116 (3.309)	-2.626 (3.540)	-0.075 (2.148)	1.958 (1.922)	2.061 (3.399)
$dD_{i,t+1}$	-0.836 (1.315)	-6.067** (2.863)	-1.421 (3.063)	-0.620 (1.859)	1.652 (1.663)	2.461 (2.941)
$dV_{i,t+1}$	-0.057 (0.037)	0.430*** (0.104)	0.315*** (0.112)	0.193*** (0.068)	0.130** (0.060)	0.047 (0.107)
$dC_{i,t+1}$	0.762*** (0.288)	0.500 (1.020)	1.712 (1.091)	0.945 (0.662)	0.508 (0.592)	0.417 (1.048)
$C_{i,t} * dC_{i,t}$	-2.849 (6.410)	-20.963 (14.503)	-0.221 (15.518)	<b>19.427**</b> (9.417)	<b>17.810**</b> (8.427)	18.878 (14.897)
$F_{i,t}$	-0.171 (0.105)	<b>0.203*</b> (0.116)	-0.029 (0.124)	<b>-0.165**</b> (0.075)	<b>-0.186***</b> (0.067)	-0.126 (0.119)
$IR_{i,t}$	<b>-0.603***</b> (0.117)	<b>-1.168***</b> (0.240)	<b>-1.103***</b> (0.257)	<b>-1.217***</b> (0.156)	<b>-1.062***</b> (0.139)	<b>-0.872***</b> (0.246)
$IR_{i,t} * dC_{i,t}$	0.008 (0.323)	0.597 (1.008)	0.197 (1.078)	<b>1.326**</b> (0.654)	0.329 (0.585)	0.874 (1.035)
$F_{i,t} * IR_{i,t} * dC_{i,t}$	-0.372 (0.343)	<b>-2.402**</b> (1.033)	-0.215 (1.105)	-0.686 (0.670)	0.188 (0.600)	0.143 (1.061)
Constant	-2.855*** (0.506)	-6.805*** (0.986)	-5.545*** (1.055)	-5.168*** (0.640)	-4.734*** (0.572)	-3.446*** (1.012)

**Notes:**  $V$  is the market value of the shares; OLS = Ordinary Least Squares;  $E$  is earnings;  $NA$  is total assets net of cash;  $GO$  is annual growth rate of sales;  $I$  is interest expense;  $D$  is total dividend paid;  $C$  is available cash;  $F$  is the family business dummy, (1) for family businesses and (0) for non-family businesses;  $IR$  is idiosyncratic risk. The variable  $X_t$  represents the level of  $X$  in year  $t$  standardized by total assets in year  $t$ , i.e.,  $(X_t / TA_t)$ ; the variable  $dX_t$  corresponds to the change in the level of  $X$  from year  $t-1$  to year  $t$  standardized by total assets in year  $t$ , i.e.,  $((X_t - X_{t-1}) / TA_t)$ ; and the variable  $dX_{t+1}$  is the change in the level of  $X$  from year  $t+1$  to year  $t$  standardized by total assets in year  $t$ , i.e.,  $((X_{t+1} - X_t) / TA_t)$ .

\*\*\* Statistically significant at the 1% level ( $p$ -value < 0.01); \*\* at the 5% level ( $p$ -value < 0.05); \* at the 10% level ( $p$ -value < 0.10). Robust standard errors in parentheses.

**Source:** Prepared by the authors.

In terms of values, the coefficient ( $\beta_{17}$ ) shows, at the 5% significance level (p-value = 0.0398 and p-value = 0.0352), that for every R\$1.00 increase in the level of cash, the market value of cash increases by an average of R\$19.43 (P50) and R\$17.81 (P75). This result shows a substantial effect in the largest firms and is consistent with studies that follow the traditional idea that the higher the level of cash, the lower the market value of cash (Caprio et al., 2020; Cheung, 2016). According to the authors, the stock market tends to discount the additional value of cash when the amount of cash held is higher.

The  $F_{i,t}$  ( $\beta_{18}$ ) dummy became statistically significant at the 0.10, 0.50, and 0.75 percentiles. At P10, the coefficient is positive and significant at the 10% level (p-value = 0.081), while at P50 and P75, the coefficients are negative and significant at the 5% (p-value = 0.028) and 1% (p-value = 0.006) levels, respectively. This sign duality between the coefficients indicates that there are differences between the family and non-family observations with respect to the market value of shares. Looking at Table 4, it can be seen that among the companies with the lowest market value of shares (P10), the market value of the shares of family businesses is R\$0.20 higher than that of non-family businesses. When it comes to the companies with the highest market value of shares (P50 and P75), the market value of the shares of family businesses is R\$0.16 and R\$0.19 lower than that of non-family businesses, respectively.

In the quantile regressions, the coefficients of the variable  $IR_{i,t}$  ( $\beta_{19}$ ) remained negative and statistically significant at the 1% level, so the higher the idiosyncratic risk, the lower the market value of the shares. Given that from P10 to P75 the coefficients obtained are greater than 1, there is a substantial and relevant relationship between idiosyncratic risk and the market value of shares.

The previously non-significant variable  $IR_{i,t} * dC_{i,t}$  ( $\beta_{20}$ ) became statistically significant at the 5% level (p-value = 0.043) at the 0.50 percentile (median). The  $\beta_{20}$  coefficient indicates that the variation in idiosyncratic risk moderates the value of changes in cash, so it can be seen that an increase in idiosyncratic risk increases the market value of cash. As a result, the first research hypothesis ( $H_1$ ) that idiosyncratic risk negatively affects the market value of cash is rejected because the median companies have a positive effect.  $H_1$  is based on the assumption that as the risk increases, firms hold more cash (Pinkowitz et al., 2016), and when firms hold more cash, shareholders tend to discount the market value of cash (Faulkender & Wang, 2006; Park & Jang, 2019).

Finally, the variable  $F_{i,t} * IR_{i,t} * dC_{i,t}$  ( $\beta_{21}$ ), which indicates whether there is a difference between family and

non-family observations when the market value of cash is moderated by idiosyncratic risk, also became statistically significant at the 5% level (p-value = 0.0206) at the lowest percentile (P10). This means that for small firms, the effect is smaller when the firm is family-owned. In monetary terms, the results indicate that the market value of cash, moderated by idiosyncratic risk, is R\$2.40 lower for family businesses than for non-family businesses. Therefore, the second research hypothesis ( $H_2$ ) that the market value of cash, moderated by idiosyncratic risk, is lower for family businesses than for non-family businesses is not rejected.

#### 4.4 Discussion of the Results

The empirical evidence indicates that the higher the level of cash, the higher the market value of cash; that an increase in idiosyncratic risk leads to an increase in the market value of cash; and that the market value of cash, moderated by idiosyncratic risk, is lower for family businesses than for non-family businesses. In relation to the Brazilian stock market evaluating the additional value of cash with an increase as the level of cash increases, it is believed that this valuation of excess cash by shareholders can be explained by the precautionary, transactional and speculative reasons related to the regulatory, political, economic and social aspects of Brazil.

Between 2014 and 2016, Brazil experienced a period of significant economic instability, characterized by a decline in consumption, distrust among investors and entrepreneurs, an 8.33% decrease in gross domestic product (GDP), and an increase in inflation and corruption cases (Marques et al., 2022). Thus, holding high levels of cash can lead to greater internal financial flexibility, lower transaction costs, and greater independence from external financing (Caprio et al., 2020; Ozkan & Ozkan, 2004).

Regarding idiosyncratic risk and the market value of cash, it was expected that the greater the idiosyncratic risk, the greater the cash holdings and therefore the lower the market value of cash ( $H_1$ ). However, the results indicated that the greater the idiosyncratic risk, the greater the value that shareholders assign to each R\$1 added to cash. A possible explanation for this result could be that, according to Chakraborty et al. (2017), greater idiosyncratic risk increases the risk of firm bankruptcy, so managers may choose to increase precautionary cash balances and also value excess cash.

Considering that the cost of cash shortages is higher for firms with greater investment opportunities due to the possible failure to take advantage of profitable opportunities (Ferreira & Vilela, 2004), another possible explanation would be that although innovative activities

are risky, they also provide the potential for future growth (Chen et al., 2020), so the stock market may view corporate innovation as a profitable investment opportunity and consequently value the additional cash.

Regarding the moderating effect of idiosyncratic risk on the market value of cash between family and non-family businesses, the results indicate that family businesses

have lower incremental value, as predicted by  $H_2$ . Given that family businesses are more conservative, have less diversified investments, and are more risk averse (Caprio et al., 2011, 2020; Chen & Wang, 2019), this non-rejection may also indicate that the Brazilian stock market considers non-family businesses to be more capable of creating value with cash assets than family businesses.

## 5. CONCLUDING REMARKS

The results show that idiosyncratic risk negatively affects all firms, but for medium firms, i.e., firms that are neither large nor small, cash mitigates and compensates for this risk; that for smaller family businesses, having cash and having risk is bad because cash depresses the market value of shares and the firms are small and vulnerable to problems; that smaller firms have greater risk and the market perceives and prices this poorly; and that for medium firms, those that are neither large and complex nor small and vulnerable, cash compensates for this risk.

Although family businesses have many positive factors such as quick decision making, lower monitoring costs, a well-defined culture, and better future planning, it is necessary to consider the potential negative factors associated with family ownership such as autocracy, nepotism, and emotional conflicts between family members (Alim & Khan, 2016).

Furthermore, Feldman et al. (2016) state that family businesses aim to provide employment opportunities for family members, as well as to preserve the legacy, the founder's inheritance, harmony, and social status. Thus, given that the market is generally uncertain about the quality of family management, especially when it comes to the qualifications and skills of the heirs (Caprio et al., 2020), proving whether family control causes a different effect on the market value of firms' cash, moderated by idiosyncratic risk, is an emerging issue that affects several relevant and important areas of the firm (Alim & Khan, 2016).

In addition to the differences between family and non-family businesses in terms of corporate cash

management, there are also differences within family businesses (Caprio et al., 2020). Therefore, since family involvement affects decisions on cash policy, it is important to compare the market value of cash, moderated by idiosyncratic risk, by separating Brazilian firms into family and non-family businesses, especially since Brazil is an emerging country with a nascent stock market, particularly when compared to the North American and European markets (Manoel & Moraes, 2019).

The limitations of this study include the small number of observations, since the regression technique measures the average variations of the independent variables, which are arranged in a single empirical model, and the measurement of some variables uses information with a one-year lag ( $t-1$ ); the need to use an alternative proxy for the R&D variable; and the time window analyzed, which is relatively short when compared to other international studies on the subject.

Although family businesses are constantly associated with a homogeneous group, there are complex dynamics at work within it that can affect corporate liquidity decisions (Caprio et al., 2020). In this sense, we suggest analyzing idiosyncratic risk with the market value of cash, comparing family businesses managed by a family CEO with those managed by a non-family CEO. Another suggestion for future research would be to examine, in addition to the level, whether the type of risk affects the average percentage of firm liquidity and the value of additional cash. We also recommend examining whether corporate governance affects the market value of cash when comparing family businesses with non-family businesses.

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