THE PEER EFFECT AND THE RELATIONSHIP WITH THE CASH HOLDINGS OF BRAZILIAN COMPANIES

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1. INTRODUCTION

Organizations' determination of the volume of cash holdings is a complex and crucial issue in the financial context, as it involves analyzing the costs and benefits associated with excess liquidity. Decisions on cash retention policies often face dilemmas between maintaining high liquidity and maximizing profitability (Kim, Mauer & Sherman, 1998; Ye, 2018). According to Gill and Shah (2012), maintaining excess cash may not be economically, financially, or productively justified for the business. There is growing concern among executives about the importance of liquidity, as robust cash reserves are essential to weather adverse economic shocks. Corporate cash retention has attracted considerable interest in finance, especially with economic globalization and the impacts of international crises (Vo, 2017).

Therefore, it is crucial to understand the determinants behind cash retention policies, ensuring that such decisions do not compromise the creation of value for shareholders and avoid moral risks. Much of the cash-holding level literature assumes that companies' financial policy is shaped by the company's status quo, ignoring competitors' decisions. However, recent studies highlight that competitors' strategies are crucial in influencing financial and operational choices. Information about the activities of rival companies is a key factor in formulating financial decisions.

The peer effect, a phenomenon that refers to externalities resulting from mutual influence between companies in the same sector, is a fundamental aspect of corporate decision-making. Understanding how peer effects can mitigate or amplify a company's specific impacts is crucial. These effects are wide-ranging and include executive compensation policies, capital structure, cash reserves, trade credit, dividend distribution, earnings management practices, stock market entry strategies, corporate social responsibility, risk aversion, innovation (research and development), fiscal management, and investment decisions.

Although most studies focus on analyzing companies' determinants and capital structure, impacting their liquidity and cash policy, more must be explored about why organizations retain cash. However, some classic reasons explain companies maintaining liquidity reserves in certain circumstances.

The transaction liquidity motive involves keeping money available for current payments for essential goods and services (Bates, Kahle & Stulz, 2009). The precautionary motive refers to cash reserves as a security measure to face potential financing restrictions (Campello, Graham & Harvey, 2010). In turn, the speculation motive argues that companies maintain cash reserves to take advantage of profitable business opportunities that may arise (Baum, Chakraborty, Han & Liu, 2012).

Although most studies have focused on transaction and precautionary motives to explain cash holdings, the speculation motive still represents an underexplored area. Furthermore, the particular context of Brazilian companies offers significant contributions since most previous research on cash levels has predominantly focused on developed countries (Dutra, Sonza, Ceretta & Galli, 2018). By identifying this gap in the finance literature, this research raises a question based on the motive of speculation through the peer effect. Therefore, does the peer effect affect the cash holdings of Brazilian companies? This study aims to empirically verify whether the proxy variable speculation, one of the reasons for liquidity, influences the cash retention of Brazilian companies listed on B3.

This study contributes to the literature on cash retention and liquidity from at least two perspectives. First, the choice of Brazilian companies, since traditional research is almost always limited to companies from developed countries, with Brazil being a developing country

where the imperfections of the capital market justify retaining cash. Secondly, this research uses a proxy to validate a way of measuring the speculation motive, testing the relationship between cash balance and the peer effect. Thus, this study adds elements to existing theory and practice to add new research directions and further improve organizations' cash retention policy.

2. LITERATURE REVIEW AND HYPOTHESIS
Cash Holding in an Emerging Country and the Reason for Speculation

The word cash refers to the immediate liquid assets available to a company, including maintained monetary resources, balances in bank current accounts, and, according to recent international accounting standards, cash equivalents (Tortoli & da Costa Moraes, 2016); these resources are usable immediately or within very short deadlines. The discussion about the reasons that lead companies to maintain specific cash levels has intensified in the corporate finance literature. Therefore, excess cash as a reserve is not an exclusive characteristic of a given country, as several international surveys show that publicly traded companies around the world maintain a high level of cash holdings, being explained by the similarity between factors that determine cash reserves in developed and developing countries (Al-Najjar, 2013; Hall, Mateus & Mateus, 2014).

Although cash is highly liquid, it generally offers lower profitability than other assets. Maintaining reduced amounts of cash may result in missed future opportunities and greater exposure to operational risks. On the other hand, an excess of cash can lead to the unnecessary accumulation of resources, negatively affecting the company's development, reducing its profitability, or decreasing its competitiveness in the market (Ye, 2018). Excess cash is characterized by the amount of resources that the company maintains after satisfying its financial responsibilities, these obligations being rent/lease, raw materials, salaries, and dividends (Banjade & Diltz, 2022)

The starting point for this discussion is Keynes' (1937) and Modigliani's and Miller's (1958) argument about the irrelevance of companies' cash balances in their investment and financing decisions if they have access to perfect capital markets. Under these ideal conditions, companies can obtain capital quickly and at reasonable costs to finance their investment opportunities without having a significant interest in accumulating cash (Amess, Banerji & Lampousis, 2015). The seminal article by Fazzari, Hubbard, and Petersen (1988) highlights a correlation between companies' investments and their cash flow. In a perfect market, such a relationship should not exist, as companies would carry out all projects with a positive net present value, regardless of random fluctuations in their cash flow (Booth, Ntantamis & Zhou, 2015).

In the real world, however, most companies accumulate cash, as shown by a growing trend in previous studies (Kim, Mauer & Sherman, 1998; Opler *et al.*, 1999; Ozkan & Ozkan, 2004; Bates, Kahle & Stulz, 2009; Song & Lee, 2012; Joo, Yang & Yang, 2016). However, imperfections in financial markets, such as asymmetric information, agency problems, and transaction costs, often lead firms to prefer using their cash resources rather than seeking external financing (Jensen & Meckling, 1976; Myers & Majluf, 1984; Jensen, 1986; Hall, Mateus & Mateus, 2014).

These market failures are associated with discrepancies in institutional elements between countries and are particularly pronounced in emerging countries, such as Brazil and other Latin American countries (Pinkowitz, Stulz & Williamson, 2006; Campello, 2012; Al-Najjar, 2013; Al-Hadi, Eulaiwi, Al-Yahyaee, Duong & Taylor, 2020). The Brazilian economic context, characterized by inflation and high interest rates (Chalhoub, Kirch & Terra, 2015), can significantly impact companies' cash management due to the reduction in consumption and investment opportunities, especially in times of crisis. Consequently, Brazilian companies

operating in a national market that is still developing face more severe financial challenges (Manoel & da Costa Moraes, 2018).

The strategic decision of companies to maintain substantial cash reserves has been a central theme in the financial literature, as it is argued that this practice strengthens the ability of companies to avoid high costs associated with external financing. According to the work of Booth, Ntantamis, and Zhou (2015) and Dutra, Sonza, Ceretta, and Galli (2018), deciding between holding cash and seeking loans from external sources represents a significant challenge in the imperfect capital market environment where many companies in certain times they are in a situation of financial constraints. Ferreira and Vilela (2004) observe a trade-off between the costs associated with invested capital and the benefits of reducing the risk of insolvency, continuing investment policies in the face of financial restrictions, and minimizing funding costs. Of external resources or the sale of assets (Dahrouge & Saito, 2013).

Harford (1999) argues that cash is crucial in enabling companies to operate efficiently in imperfect capital markets, as liquidity reserves represent a valuable resource for investment opportunities. Maintaining cash liquidity is based on retaining available capital to take advantage of profitable future investments (Ye, 2018; Nunes & Kayo, 2023).

The motivation behind this speculation is associated with investors' caution in committing their resources due to fear of missing out on more advantageous opportunities in the future (Alves, Alves, Carvalho & Pais, 2022). This strategy aims to achieve returns superior to the market based on privileged and asymmetric information about future events. Therefore, by maintaining a substantial volume of cash, companies can take advantage of emerging opportunities and make strategic investments in more favorable market periods (Kim, Mauer & Sherman, 1998; Baum *et al.*, 2012).

Such opportunities may arise due to asset price fluctuations, economic environment changes, or industry-specific crises. As noted by Nunes and Kayo (2023), accumulating monetary reserves allows companies to be ready to act quickly and capture these opportunities, increasing their chances of obtaining significant returns. According to Gill and Shah (2012), maintaining a high level of cash for speculation provides organizations with financial flexibility to acquire assets at reduced prices, whether through acquisitions of competitors in difficulty or purchases of depreciated assets in the market.

Thus, the liquidity speculation strategy depends on the investment options available to companies and how they manage their cash holdings. Cash retention enables increased investments and prepares companies to take advantage of future investment opportunities that could be lost due to a lack of available capital (Denis & Sibilkov, 2010). Therefore, adopting this strategy requires a meticulous analysis of the risks and benefits involved and a precise understanding of the prospects of the market and the sector in which the company operates.

Peer Effect and the Hypothesis

The reasons that lead to imitation can be broadly classified into theories based on obtaining information and competitiveness (Lieberman & Asaba, 2006). Thus, companies imitate the cash reserves of their competitors or peers to acquire new knowledge about future investment opportunities or market prospects. On the one hand, information-based theories suggest that managers imitate the policies of peers they consider leaders, aiming to understand market uncertainties and, consequently, reduce the effort and costs associated with searching for information (Leary & Roberts, 2014; Francis, Hasan & Kostova, 2016; Fairhurst & Nam, 2020).

Denis and Sibilkov (2010) argue that peers' actions influence the decision to maintain cash reserves. Increased liquidity allows companies with financial constraints to invest in projects that add value since their competitors can invest without such restrictions. The study by Chen, Chan, and Chang (2019) corroborates this idea by demonstrating that cash retention

is crucial for companies facing financial constraints and with significant R&D expenses, as these companies are vulnerable if their competitors decide to increase investments and may lose comparative advantages in obtaining new information or insights. Therefore, these companies strategically imitate the decisions of their peers to avoid or reduce the effort and costs associated with searching for information (Lieberman & Asaba, 2006), highlighting the importance of increasing cash retention.

Consistent with this proposition, several studies present empirical evidence indicating that the peer effect is more frequent among companies with a greater incentive to learn from their peers (Foucault & Fresard, 2014; Francis, Hasan & Kostova, 2016). Specifically, smaller, less profitable companies that do not distribute dividends and do not have a risk rating show a more robust incentive to imitate their competitors to acquire new knowledge (Leary & Roberts, 2014).

In our context, the accumulation of cash reserves would increase a company's ability to finance investment opportunities (financial flexibility) aiming to improve its position in the market (Aghion, Bloom, Blundell, Griffith & Howitt, 2005; Machokoto, Chipeta & Ibeji, 2021; Nunes & Kayo, 2023). Thus, increases in cash retention by competing companies or peers can encourage a company to follow the same path. By mimicking the liquidity level of peer companies, a company can sustain or strengthen its competitive position in the market, sending a more robust and reliable signal to competing companies about potential future investment opportunities (Chen, Chan & Chang, 2019). Therefore, companies imitate the cash reserves of their rivals or peers to learn or acquire new insights into future investment opportunities or market prospects.

In this context, we formulate and test the following hypothesis:

H₁: As a variable that causes speculation, the peer effect positively impacts the cash reserve of publicly traded Brazilian companies.

3. METHODOLOGICAL PROCEDURES
Sample

This study uses a sample of publicly traded Brazilian companies listed on B3 (Brasil, Bolsa, Balcão) from the 1st quarter of 2010 to the 4th quarter of 2019. The information was collected from the Capital IQ database, chosen for its reliability to ensure robust data analysis, sample construction, and definition of variables. The 2010 period was selected due to the adoption of international accounting standards (IFRS) by Brazilian companies, while the end in 2019 aims to avoid the impact of the COVID-19 pandemic on companies, an exogenous event that could influence cash retention according to the precautionary reason.

The sample was selected by excluding companies in the financial sector and focusing only on non-financial companies. This exclusion is justified by the particularities of the financial statements and the business's specific characteristics, where cash plays different roles. An example of this peculiarity is cash composition, which includes customer deposits that support withdrawals.

The sectoral classification adopted in this study is based on the types and uses of products or services developed by companies. In this way, the classification is based on the SIC (Standard Industrial Classification) in a detailed analysis of the economic activities of companies, allowing a precise and relevant categorization for the research objectives. The SIC code has a hierarchical structure that follows an organization from top to bottom, starting with general characteristics and then going into detail. The first two digits of the code indicate the primary industrial sector to which a company belongs. The subsequent third and fourth digits provide information about the subclassification of the business group and the specialization within that group.

Econometric Model and Variables

For this study, we applied linear regression models estimated by the Ordinary Least Squares (OLS) method, also known as OLS (Ordinary Least Squares). This method is characterized by minimizing the sum of squares of residuals, seeking to determine optimal intercepts and angular coefficients. The data were organized in a short, unbalanced panel, where the number of individuals exceeds the number of years.

We opted for a static panel model, excluding the lagged cash balance variable (stochastic time effect), to precisely analyze the impact of independent variables over time. We use this model to investigate the preference for cash liquidity, explore transaction motives, and test relevant hypotheses.

$$CashHold_{i,t} = \alpha + \beta_1 SPEC_{-i,j,t-1} + \gamma X_{i,t} + e_{i,t} \tag{1}$$

The indices i and j correspond to the company, sector, and year.

The speculation expectation variable (Spec) is a conceptual construct intended to measure the impact of an effect through a proxy indirectly, that is, an approximate variable. This speculation variable is composed by calculating the median CAPEX of sector j in period t-1, excluding company i itself, and subtracting the CAPEX of company i. This means that the construction of the variable considers the influence of peers in determining its value. The capital expenditure indicator (CAPEX) is calculated as the proportion of capital expenditure to total assets. The relevance of CAPEX lies in its ability to provide the market with insights into the company's future profits, which are only partially captured by current profits. In this way, investment decisions reflect business management's responses to information about demand and future costs.

When organizations decide to increase or decrease their CAPEX investments, they send positive or negative signals to their peers regarding their investment plans. This justifies using companies' industries to capture individual differences in capital expenditures relative to competitors.

In addition to the previously mentioned variable, the analysis incorporates control variables (vector X) to mitigate their effects on the leading coefficients analyzed concerning the hypotheses. The model's control variables can influence companies' cash retention and potentially interfere with the relationship between the main independent variables investigated and the dependent variable. These control variables include:

- Cash Holdings (CashHold): obtained by summing Cash and Cash Equivalents and divided by Total Assets;
- Cash Flow (CF): obtained by summing EBITDA, and divided by Total Assets;
- Net Working Capital (NWC): subtraction of Current Assets by Cash and Cash Equivalents minus Current Liabilities, and subsequently divided by Total Assets.
- Research and Development (RD): measured by dividing Research and Development Expenses and Total Assets.
- Tobin's Q (Q): obtained by the difference between Total Assets and Shareholders' Equity, plus the Company's Market Value, divided by Total Assets.
- Leverage (Lev): calculated by the ratio between Total Debts and Total Assets;
- Size: obtained by the natural logarithm (Ln) of Total Assets;
- Tangibility: calculated by the sum of Fixed Assets divided by Total Assets;
- Dividend: dummy variable which takes on a value equal to 1 in the years in which the company paid dividends and 0 otherwise;
- Brazilian Crisis: dummy variable which takes a value equal to 1 for the years 2014 and 2015 and 0 otherwise;

Two econometric models were estimated to test hypothesis H_1 of this study. The first model is represented by equation 2, while the second model, which incorporates lagged variables, is represented by equation 3. Below are the formulations of these two equations:

$$CashHold_{i,t} = \alpha + \beta 1 SPEC_{-i,j,t-1} + \beta 1 CF_{i,t} + \beta 2 NWC_{i,t} + \beta 3 RD_{i,t} + \beta 4 Q_{i,t} + \beta 5 Lev_{i,t} + \beta 6 Size_{i,t} + \beta 7 Tangibility_{i,t} + \beta 8 Dividend_{i,t} + \beta 9 Brazilian\ Crisis_{i,t} + e_{i,t} \qquad (2)$$

$$CashHold_{i,t} = \alpha + \beta 1 SPEC_{-i,j,t-1} + \beta 1 CF_{i,t-1} + \beta 2 NWC_{i,t-1} + \beta 3 RD_{i,t-1} + \beta 4 Q_{i,t-1} + \beta 5 Lev_{i,t-1} + \beta 6 Size_{i,t-1} + \beta 7 Tangibility_{i,t-1} + \beta 8 Dividend_{i,t-1} + \beta 9 Brazilian\ Crisis_{i,t-1} + e_{i,t} \qquad (3)$$

Table 1 presents the expected signs for the variables and the authors who support these expectations.

<div align="center">Table 1 – Signs of Regressions</div>

Variables	Abbreviation	Expected Signal	Authors
Cash Holdings	CashHold	NA	Bates, Kahle & Stulz (2009)
Cash Flow	CF	-	Bates, Kahle & Stulz (2009)
Net Working Capital	NWC	-	Opler *et al.* (1999), Bates, Kahle & Stulz (2009), Manoel & da Costa Moraes (2018)
Research and Development	RD	+	Dittmar, Mahrt-Smith & Servaes (2003), Bates, Kahle & Stulz (2009)
Tobin's Q	Q	+	Dittmar, Mahrt-Smith & Servaes (2003), Harford, Mansi & Maxwell (2008), Bates, Kahle & Stulz (2009)
Leverage	Lev	-	Almeida, Campello & Weisbach (2004), Bates, Kahle & Stulz (2009)
Size	Size	-	Kim, Mauer & Sherman (1998), Opler *et al.* (1999), Dittmar, Mahrt-Smith & Servaes (2003), Ozkan & Ozkan (2004), Pinkowitz *et al.* (2006), Bates, Kahle & Stulz (2009)
Tangibility	Tangibility	-	Bates, Kahle & Stulz (2009)
Dividend	Dividend	+	Opler *et al.* (1999), Harford, Mansi, & Maxwell (2008), Manoel & da Costa Moraes (2018)
Brazilian Crisis	*Brazilian Crisis*	+	Manoel, da Costa Moraes, Santos & Neves (2019)

Source: Prepared by the authors, 2024.

To deal with outlier problems, winsorization techniques were used on all variables except dummy variables. This procedure does not remove outlier observations from the sample but reduces their impact on the regression results.

The Hausman test was applied to choose the most appropriate panel data model to estimate the regressions (POLS, Fixed Effects, or Random Effects). This test checks whether the intercepts are correlated with the explanatory variables. The result of the Hausman test was a p-value of 0.0000 for a significance level of 1%, indicating that the null hypothesis must be rejected. Therefore, the Fixed Effects (FE) model was considered the most appropriate for equation 2. Additionally, the robust tool was appropriately used to deal with possible statistical problems arising from heteroscedasticity.

After specifying the panel data models and meeting the regression assumptions, the Shapiro-Francia test was applied to verify the normality of the residuals. The test revealed that

the residuals do not follow a normal distribution, with a p-value of 0.00001 (1% significance level), which led to the rejection of the null hypothesis of normality. However, given the number of observations (9,052), the non-normality of the residuals in equation 2 can be considered problematic for this study, especially in economic and financial models.

Subsequently, the VIF (Variance Inflation Factor) was calculated to verify the presence of multicollinearity between the explanatory variables. The test indicated no significant multicollinearity problems in the data analyzed in this study.

4. RESULTS ANALYSIS AND DISCUSSION
Descriptive Statistics

The total number of observations in the sample examined is 12,200, comprising 305 companies for 40 quarters between 2010 and 2019. The descriptive statistics of the data used in the analyses are presented in Table 2.

Table 2 – Descriptive analysis of variables.

Variables	Comments	Average	Median	Standard deviation	Minimum	Maximum
CashHold_w	12,200	0.085	0.058	0.087	0.000	0.493
CF_w	12,200	0.022	0.022	0.025	-0.046	0.106
NWC_w	12,200	0.028	0.025	0.226	-0.666	0.590
RD_w	12,200	0.000	0.000	0.001	0.000	0.007
Lev_w	12,200	0.284	0.293	0.187	0.000	0.733
Size_w	12,200	8,177	8,139	1,858	3,820	13,719
Tangibility_w	12,200	0.229	0.168	0.236	0.000	0.870
Q_w	12,200	1,313	1,043	0.876	0.309	5,530
Spec	12,200	-0.003	0.000	0.012	-0.073	0.036

Source: Prepared by the authors, 2024.

Table 2 shows companies' average cash holdings are 8.5% of assets. The average value suggests increased cash retention for opportunities that benefit the company's performance, considering the company's sector, type of business, and investments. Cash liquidity points to companies' future planning since, following the statements of Mohammadi, Kardan, and Salehi (2018), there may be a tendency for growth and, consequently, internal investment opportunities.

The leverage value is, on average, equal to 28.4% of the companies' assets, resulting in a low average value of the companies' debt. The Tobin Q variable has an average of 131%, with a market value of companies of 1.313 times the value of their assets. This demonstrates a reasonable valuation of Brazilian companies in the sample regarding their balance sheet. However, this variable has a high variability, with a standard deviation of 0.876, which shows the dependence on each company's sector and its specificities.

It is essential to highlight that the standard deviation of some variables presents values more significant than the average, showing the variables' variability over time. The consequence of this variation is a high difference between the minimum and maximum of these variables, which may be the consequence of the specificities of the market sectors and companies in the sample.

The correlation matrix of the variables presented in Table 3 aims to understand the association relationship and the impact of the relationship between the variables. The dummy variables Dividend and Brazilian Crisis will be disregarded from this analysis, and Table 2 shows the Spearman correlation coefficients found.

Table 3 – Correlation Matrix Spearman between the variables

Variables	CashHold_w	CF_w	NWC_w	RD_w	Lev_w	Size_w	Tangibility_w	Q_w	Spec
CashHold_w	1,000								
CF_w	0.126	1,000							
NWC_w	-0.090	0.096	1,000						
RD_w	0.087	0.075	0.064	1,000					
Lev_w	0.112	0.118	-0.185	0.015	1,000				
Size_w	0.020	0.057	-0.283	0.069	0.333	1,000			
Tangibility_w	0.072	0.213	0.016	0.092	0.174	-0.098	1,000		
Q_w	0.126	0.377	0.023	0.056	-0.038	0.047	-0.097	1,000	
Spec	-0.050	-0.156	0.010	-0.055	-0.030	-0.121	-0.255	-0.060	1,000

Source: Prepared by the authors, 2024.
***, ** = significant correlation at 1% and 5%

Table 3 presents the correlation between the study variables. The dependent variable, CashHold, has a weak and adverse relationship with the independent variables, net working capital and speculation. The other variables have a positive sign: cash flow, research and development, debt, size, tangibility, and Tobin's Q. Among the control variables with a positive sign, cash flow, and Tobin's Q have a value of 0.126. Furthermore, Lev presented linear correlations of 0.112.

Regarding the evidence, in the first analysis, cash holdings have a weak negative relationship with the explanatory variable speculation. It is noteworthy that the Spearman matrix presents an association between the variables. The problem of this research is related to the regression models that will be explained below.

Regression model results

Next, the regression results of equation 2 are shown in Table 4 and analyzed.

Table 4 – Estimation of Cash Holdings (FE) Regressions

Variables	FE robust (CashHold) 1	FE robust (CashHold) 2	FE robust (CashHold) 3
Constant	0.083*** (0.000)	0.285*** (0.000)	0.286*** (0.000)
Spec	-0.471*** (0.002)	-0.454*** (0.001)	-0.446*** (0.001)
CF		0.256*** (0.004)	0.249*** (0.004)
NWC		-0.190*** (0.000)	-0.190*** (0.000)
RD		0.123 (0.927)	-0.047 (0.973)
Lev		0.011 (0.619)	0.012 (0.592)
Size		-0.023*** (0.000)	-0.023*** (0.000)
Tangibility		-0.137*** (0.000)	-0.137*** (0.000)

Q		0.009** (0.019)	0.009** (0.022)
Dividend			0.004* (0.086)
BrazilCrisis			-0.001 (0.682)
Prob > F	0.000	0.000	0.000
Mean dependent var	0.085	0.085	0.085
R-squared	0.005	0.151	0.152
F-test	9,427	10,498	8,842
SD dependent var	0.088	0.088	0.088
N	9054	9054	9054

Source: Prepared by the authors, 2024.
Note: *** Statistically significant at the 1% level (p-value < 0.01); ** Statistically significant at the 5% level (p-value < 0.05); * Statistically significant at the 10% level (p-value < 0.10). Values of the t statistic are in parentheses.

Regression model 1 shows the use of the panel data method with a robust fixed effect. In the model adopted with only Spec, the explanatory variable, the coefficient demonstrated is -0.471 with a significance level of 5%. The value of R² is 0.005, representing the proportion of variance for a dependent variable explained by one or more independent variables in a regression model. Therefore, the panel data regression with a fixed effect has an explanatory power of 0.5% of the model variation.

Column 2 of Table 4 presents a panel data regression with the model's independent variables and without the dummy. In this context, the variables Spec, CF, NWC, Size, and Tangibility are significant for p < 0.01, the significance of p < 0.05 is seen in the variable Q, and finally, the variables RD and Lev present non-significant values at any of these significance levels. Therefore, this regression shows an explanatory capacity with an R² of 15.1%.

The last column shows the regression with all variables, where the significant elements for 1% are Spec, CF, NWC, Size, and Tangibility. For the 5% level, Tobin's Q and Dividend are significant for 10%. The variables RD, Lev, and BrasilCrise have values of 0.973, 0.592, and 0.682, which are not significant. This regression has an R² of 15.2%, that is, a capacity to explain the variability of the model.

Columns 1 to 3 of Table 4 present the results of the regressions using the same cash retention measures. The coefficient on Spec is negative and statistically significant across the three box specifications with coefficients of -0.471, -0.454, and -0.446, respectively. The coefficients assigned to the Spec variable in the regressions reflect the magnitude of the effect and indicate a decrease in cash in model 1 of 47.1%, model 2 of 45.4%, and model 3 of 44.6% for companies. Negative values suggest a negative relationship between the Spec variable and the CashHold result. The *t-* t-statistic of the 3 values has a statistical significance of the coefficient for a significance level of 1%, indicating in this case that the variable is statistically different from zero and significant to the model.

The control variables NWC, Size, and Tangibility have coefficients with negative signs, as expected from the literature. Even though the RD variable is not significant, it presents a positive value in column 2. In column 3, it is negatively associated with cash holdings, although with a low value (-0.047).

The negative and significant coefficients are contrary to H_1; that is, the median CAPEX of the pairs, being smaller than the individual CAPEX of the companies, provides a negative Spec, which means that on the median, the competing companies are investing less than the company. This negative value influences, via the peer effect, the companies' investment decisions and, therefore, provides a decrease in the level of *cash holdings*. The evidence

corroborates the articles by (Riddick & Whited, 2009 Chen *et al.*, 2019, and Al-Hadi *et al.*, 2020) that show the relationship between CAPEX and organizations' cash holdings. The increase in investment can lead companies to save less money temporarily; furthermore, capital expenditures can create assets that can be used as collateral, which increases debt capacity and reduces the demand for cash (Riddick & Whited, 2009).

The negative and significant relationship between net working capital and *cash holdings* reflects the inverse relationship of the definition of net working capital itself (Chen *et al.*, 2019). The variable leverage (Lev) and cash reserve (CashHold) are considered substitute sources of financing due to the negative coefficient, according to studies by Almeida, Campello, and Weisbach (2004) and Bates, Kahle, and Stulz (2009). However, our finding, even without significance, corroborates the studies by Ozkan and Ozkan (2004) and Han and Qiu (2007), which prove that more leveraged companies have more significant cash reserves. The company size coefficient (Size) is negative and significant, corroborating the findings of Ozkan and Ozkan (2004), implying that small companies are more vulnerable to capital market imperfections.

The Q coefficient is significantly positive, consistent with results in the literature (Dittmar *et al.*, 2003; Bates *et al.*, 2009). In the work of Bates *et al.* (2009), it is observed that organizations with better investment opportunities and higher Q prefer to retain more cash because financing via external capital is costly for them.

Checking other regression control elements, we see that the result indicates a positive relationship between dividends and the accumulated cash level. The trade-off theory can support this positive relationship. According to Harford, Mansi, and Maxwell (2008) and Manoel and da Costa Moraes (2018), institutions with a good frequency of dividend payments have a higher level of cash, as they demand more capital to make payments. However, we did not analyze the relationship depending on the magnitude of the payment.

The results of the binary variable used to represent the crisis of the Brazilian economy (BrazilCrise) were insignificant. However, they present a negative sign, with the same work occurring Manoel *et al.* (2019). The coefficient suggested by the literature indicates that the effects of this crisis have a small impact on cash levels.

The analysis of the regression results of equation 3 with the variables lagged in the first difference is presented in Table 5.

Table 5 – Estimation of Cash Holdings Regressions (lagged variables)

Variables	FE robust (CashHold) 1	FE robust (CashHold) 2	FE robust (CashHold) 3
Constant	0.084*** (0.000)	0.273*** (0.000)	0.273*** (0.000)
Spec | L1.	-0.316 * (0.084)	-0.259 (0.111)	-0.260 (0.111)
CF_w | L1.		0.377*** (0.001)	0.376*** (0.001)
NWC_w | L1		-0.126*** (0.000)	-0.126*** (0.000)
RD_w | L1.		0.622 (0.684)	0.648 (0.672)
Lev_w | L1.		0.024 (0.258)	0.025 (0.251)
Size_w | L1		-0.023*** (0.000)	-0.023*** (0.000)

Tangibility_w | L1.		-0.096*** (0.001)	-0.096*** (0.001)
Q_w | L1.		0.006 (0.149)	0.006 (0.152)
Dividend | L1.			0.000 (0.986)
BrazilCrisis | L1.			-0.001 (0.668)
Prob > F	0.000	0.000	0.000
Mean dependent var	0.085	0.085	0.085
R- squared	0.002	0.089	0.089
F-test	3015	8647	7058
SD dependent var	0.087	0.087	0.087
N	6700	6700	6700

Source: Prepared by the author, 2024.
Note: *** Statistically significant at the 1% level (p-value < 0.01); ** Statistically significant at the 5% level (p-value < 0.05); * Statistically significant at the 10% level (p-value < 0.10). Values of the t statistic are in parentheses.

According to Table 5, the results obtained through applying a panel data model with a robust fixed effect with a lagged explanatory variable revealed that the lagged variable (Spec L1.) presented statistical significance at the 10% level. Furthermore, the value of the coefficient of determination (R^2) was 0.002, which indicates that only 0.2% of the variance of the dependent variable (CashHold) was explained by the explanatory variables in the regression model. Therefore, it can be concluded that the regression (Column 1) has an explanatory power limited to a small proportion (0.2%) of the variation in the model in question. Compared with the regression (Column 1) of Table 3, it is noted that the coefficient of the lagged Spec variable (Table 5) is smaller in modulus, with a value of -0.316. The regression R^2 value is also lower (0.002). This denotes that the regression (column 1) of Table 4 has a slightly better ability to explain the model's variability than the regression (column 1) of Table 5.

Spec variable is no longer statistically significant, with a value slightly higher than 0.10 (p-value > 0.10); however, the variable coefficients decrease in magnitude compared to the model in Table 4 in all columns (columns 1, 2 and 3), highlighting the negative sign of the coefficients of the Spec variable. Once again, we see that with the lagged variables, there is a decrease in modulus in the value of the negative Spec coefficient and that the model presents a sharp drop in R^2, which is 0.089 (8.9%) in columns 2 and 3.

In Tables 4 and 5, cash flow presents positive coefficients; that is, more significant cash generation in organizations increases the level of cash by a more significant amount (Opler *et al.*, 1999). The abundance of cash capital can provide greater financial freedom as it presents greater discretion to business managers and mitigates risks. Table 4 (lag in first difference) showed a higher positive coefficient in columns 2 and 3 concerning the same columns in Table 4. It is worth noting that the positive cash flow coefficient is not aligned with the statement by Bates *et al.* (2009), who states that this variable must present a negative relationship with the change in cash.

Finally, the comparison between Tables 4 and 5 shows a change in the Spec variable within the regression, including the lagged variables. There is a non-significance with cash holding. This could be due to the low sample that exists in the regressions in Table 4. This suggests that H_1 cannot be corroborated since investment expectations, measured via peer effects (Spec), do not have the power to influence cash retention in the model with lagged explanatory and independent variables.

5. FINAL CONSIDERATIONS

The objective of this study was to investigate the influence of the speculation motive, through the peer effect, on the levels of cash holdings of Brazilian companies. To achieve this objective, a sample of 305 companies was selected. To carry out the analysis, a panel data regression with fixed effects was used, aiming to examine the relationship between the explanatory variable, representing the speculation motive, and the independent variables, in addition to using variables related to the characteristics of the organizations as controls.

The existing literature on the peer effect reveals that companies' investment decisions are influenced by decisions made within their sector of activity. Previous studies have shown that the decision to retain cash depends on peers' effect on investments. The results revealed a significant negative relationship between investment expectations and organizations' cash holding levels. These findings corroborate the adopted premises and are in line with previous studies, including Riddick and Whited (2009), Chen *et al.* (2019), and Al-Hadi *et al.* (2020). This negative relationship can be attributed to increased investments, or the possibility of investing may lead companies to hold less cash. Therefore, based on the results found, hypothesis H $_1$ of this study is rejected.

Regarding the tested hypothesis, the estimates obtained indicate that Brazilian companies do not retain cash (increase) based on the speculation motive (sector median CAPEX). Furthermore, the results suggest that companies' cash retention is not a strategy to take advantage of investment opportunities since cash in financially constrained markets is considered a lower-cost, lower-cost means of financing compared to external capital. No, so cash is prioritized for other liquidity situations or reasons.

The conclusion of this study is of great relevance, as the results suggest that there is no possible relationship with the liquidity motive of speculation. This indicates that companies increase their cash liquidity levels for reasons other than future investment opportunities. These findings highlight that investment speculation may not be justified in markets with (emerging) restrictions on cash accumulation for new investments.

This study has some limitations that must be considered. First, the results cannot be generalized due to the non-probabilistic nature of the sample used. According to the analysis period (2010-2019), it is relatively short compared to international studies on the topic. Third, the proxy used to measure the explanatory variable has only been adopted by some researchers in the area; therefore, it needs to be validated through future investigations.

For future research, expanding the sample to include companies from other emerging countries is suggested. Furthermore, new ways of measuring cash retention should be explored to test the Spec variable. Finally, it is crucial to investigate the relationship between restricted and unrestricted companies regarding cash holdings.

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