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Investor sentiment and earnings management in Brazil

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ABSTRACT

This research analyzes whether there is a temporal association between investor sentiment and earnings management in Brazil. Several studies have investigated the determinants of earnings management, such as factors inside or external to companies and regulatory requirements, but few have considered personal factors, such as investor sentiment in Brazil. With this investigation, it was apparent from the findings that accruals quality is affected by investor sentiment. For participants in the Brazilian capital market, this research reinforces the need for a more careful analysis of the results reported by companies, since managers, in response to investor sentiment, may manage earnings to inflate accounting profit through accruals and influence the market's ability to price shares correctly. It is evident that accounting choices are much more than just financial decisions and are subject to investor sentiments. The effect of investor sentiment should be considered among the determinants of future earnings management. A sample of non-financial Brazilian companies that traded shares on the *Brasil, Bolsa, Balcão* (B3) exchange from 2010 to 2016 was used. The investor sentiment index was calculated according to the methodology of Baker and Wurgler (2007). For earnings management, the models of Kang and Sivaramakrishnan (1995), Kothari, Leone, and Wasley (2005), and Dechow, Hutton, Kim, and Sloan (2012) were used. The estimates were carried out through regressions for pooled panel data, fixed, and dynamic effects using the system generalized method of moments (GMM) estimator. Discretionary accruals are positively associated with investor sentiment in the Brazilian capital market, in a similar way to markets with greater informational efficiency and notwithstanding the code-law system. Analyzing low and high sentiment periods separately, the findings suggest that managers increase accruals after high sentiment and reduce them after low sentiment.

Keywords: behavioral finance, investor sentiment, earnings management, discretionary accruals, operational decisions.

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1. INTRODUCTION

Investor sentiment can be defined as a personal belief of whoever invests regarding future cash flows in risk investments that is not warranted by known facts (Baker & Wurgler, 2007). The literature also defines it as the optimism or pessimism concerning stocks in general, and it has been considered as a phenomenon that affects future performance expectations for companies (Bergman & Roychowdhury, 2008). Investor sentiment varies due to heuristics and cognitive and emotional biases associated with the processing of information, and these psychological factors tend to vary over time for exogenous reasons, leading to different speculative appetites among traders (Baker & Wurgler, 2006; Barberis, Shleifer & Vishny, 1998; Bergman & Roychowdhury, 2008; Daniel, Hirshleifer & Subrahmanyam, 1998; De Long, Shleifer, Summers & Waldmann, 1990; Simpson, 2013).

The literature has documented different empirical evidence regarding the influence of investor sentiment on corporate finance decisions (Baker, Ruback & Wurgler, 2007; Gilchrist, Himmelberg & Huberman, 2005; Miranda, 2018; Polk & Sapienza, 2009), on the formation of overly optimistic or pessimistic accounting profit expectations on the part of analysts and investors (Bergman & Roychowdhury, 2008), and how accounting results forecasts affect the relationship between investor sentiment and stock returns (Hribar & McInnis, 2012; Mian & Sankaraguruswamy, 2012; Seybert & Yang, 2012).

This last aspect is particularly important because it seeks to analyze whether investor sentiment influences the sensitivity of share prices to earnings forecasts made by investors and analysts, since there is evidence that earnings response coefficients (ERCs), a proxy for share price sensitivity to profit information, is greater when sentiment is high and lower when it is low, leading to the positive association between ERC and investor sentiment (Mian & Sankaraguruswamy, 2012).

According to Sloan (1996), share prices behave as if investors "set" accounting profit, treating its different properties in the same way and, consequently, failing to distinguish the different properties of the accruals and cash flow components that form accounting profit. According to the author, distinguishing between the effects of these components is important because the profit expectations contained in share prices do not completely reflect the persistence of higher earnings that may be attributed to the cash flow component and the persistence of lower earnings that may be attributed

to the accruals component. Consequently, companies with relatively high (low) current levels of accruals tend to experience negative (positive) abnormal returns on their shares that are concentrated around future earnings announcements. This means that companies with a high (low) level of accruals tend to report lower (higher) future earnings. This behavior makes the accruals overvalued, since many studies have documented the currently positive association between stock returns and accounting profit.

This phenomenon may be associated with the belief of managers that current accounting profit is more important than cash flow. A survey conducted by Graham, Harvey, and Rajgopal (2005) showed that many financial executives see accounting profit as the main metric to be disclosed to the external public. According to this study, 59% of those interviewed stated that they might avoid starting projects with positive net present value (NPV) if that meant not obtaining the analysts' consensus regarding current quarterly accounting profit. The research also revealed that executives believe that outperforming the analysts' consensus concerning short-term accounting profit builds credibility with the market and helps maintain or increase their company's share price. In contrast, Ali and Gurun (2009) argue that, in periods of high sentiments, investors tend to be more active and pay more attention to the different components of accounting profit, leading to the mispricing of accruals. Thus, managers have a propensity to inflate accruals to exploit their higher value in periods of high sentiment, even if this overvaluation is temporary and reversed *a posteriori*. Also according to the authors, the temporary overvaluation of accruals may have a favorable impact on the remuneration of managers in the case of there being incentives contracts linked to stock options or a stock bonus.

Ali and Gurun (2009) empirically examined the effect of investor sentiment on the accruals anomaly and documented that these are overvalued in periods of high sentiment in comparison with periods of low sentiment. Simpson (2013) also found evidence suggesting that companies use discretionary accruals to report inflated accounting profits in periods of optimism in investor sentiment, but disclose more conservative results during periods of predominantly pessimistic sentiment, as well as documenting the positive association between earnings management (to avoid reporting negative surprises) and investor sentiment.

Together, the findings of Ali and Gurun (2009) and Simpson (2013) suggest that investor sentiment can impose bias on the accounting results estimates made by companies themselves, creating incentives for earning management through accruals. However, due to the relevance of this topic for the capital market and the accounting research agenda, more studies are still needed that document new evidence on the relationship between investor sentiment and earnings management.

Some studies have already addressed this subject in Brazil, but with divergent and inconclusive results. For example, in a preliminary study, Macedo, Pinheiro, and Machado (2017) analyzed a group of 60 Brazilian companies between 2011 and 2014 and did not find evidence of the relationship between sentiment and management via accruals. Based on catering theory, Miranda (2018) investigated whether companies manage earnings by taking advantage of periods of high sentiment on behalf of short-term investors and did not find any direct evidence of this occurrence, but did document: (i) an increase in the level of discretionary accruals due to sentiment when companies with a short-term investment horizon have revenues growth; and (ii) that, when evaluating the isolated effect of revenues growth, there was inhibition of the level of earnings management. Finally, Miranda, Machado, and Macedo (2018) analyzed whether the monitoring carried out by analysts affects the relationship between discretionary accruals and investor sentiment in the Brazilian stock market and found a negative association between sentiment and management.

Therefore, based on the available evidence, it is not yet clear whether the relationship between investor sentiment and earnings management through accruals exists in the Brazilian market. This reinforces the need for new studies that address this question in Brazil.

Considering that context, this study investigates the following problem: What is the relationship between investor sentiment and earnings management through accruals in publicly-traded companies listed in Brazil? With this, the paper's main objective is to investigate the temporal association between investor sentiment and discretionary accruals in publicly-traded companies listed in Brazil. That is, it aims to identify if the investor sentiment in a particular period is associated with earnings management practices using accruals in a subsequent period.

For this, it adapted the regression model developed by Simpson (2013), where the proxies for earnings management are associated with the market sentiment index, together with a variety of control variables. In addition, it used the methodology proposed by Baker and Wurgler (2007) in the construction of an investor sentiment index for the Brazilian stock market.

As a country with a code-law system (La Porta, Silanes, Shleifer & Vishny, 1998) is concerned, it is appropriate to study the Brazilian case, since in this environment, in which the capital market is less developed and the legal protection of investors is weaker, earnings management tends to be more accentuated (Lang, Ready & Yetman, 2003; Leuz, Nanda & Wysocki, 2003).

Moreover, as factors associated with the specific characteristics of countries can affect the way companies decide their accounting policies for financial disclosure, studying the Brazilian case enables an analysis of companies that operate in the same institutional, political, and socioeconomic context, ensuring better comparability of accounting information, as well as enabling factors specific to the company level to be controlled more precisely, thus guaranteeing more accurate estimates of the relationship that the aim is to identify.

In light of the above, and considering that there is evidence suggesting that companies strategically adjust their financial disclosure policies in response to the mood of investors, a positive temporal association between the investor sentiment index and earnings management through accruals is expected to be observed in the Brazilian capital market.

In general, the results documented in this study are robust and consistent with this prediction. Based on the pooled panel data analysis with fixed and dynamic effects, using three models to calculate discretionary accruals, evidence was documented suggesting that earnings management through discretionary accruals is positively and temporally associated with the level of investor sentiment.

However, additional tests revealed that, when periods of negative sentiment indices (proxy for low sentiment) and periods of positive sentiment indices (proxy for high sentiment) are analyzed separately, this association is negative in periods of low sentiment and positive in periods of high sentiment. Moreover, the mean of the discretionary accruals is negative and positive, respectively. These findings suggest that managers use discretionary accruals opportunistically to report profits that are coherent with the investor sentiment in periods of high sentiment and increase profit in periods of low sentiment.

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The development of this study contributes in the following ways: it extends the empirical literature and helps in the understanding of earnings management and its determinants by providing additional evidence of the relationship between the investor sentiment index and the discretionary accruals of publicly-traded companies listed in Brazil; in relation to previous studies, it provides a methodological improvement in the estimates made by including an aggregate measure of earnings management through operational decisions, as proposed by Roychowdhury (2006). This control is important, given that, according to Zang (2012), managers use the manipulation of real activities and accruals as substitutes, adjusting the level of earnings management based on accruals and according to the level of manipulation of real activities.

By documenting that the mood of investors can influence the way companies report their earnings, the findings of this study are relevant for participants in the Brazilian capital market (analysts, investors, and regulators) because they reinforce the need for a more careful analysis of the accounting result reported by companies, since managers, in response to investor sentiment, may use accruals opportunistically to adjust accounting profit, inducing investors to overreact to accruals and consequently leading to an unwarranted overvaluation of the share price. In addition, this study indicates to accounting researchers the need to include the investor sentiment index in studies on earnings management and its determinants.

Besides this introduction, the rest of this paper is structured as follows. The second section presents the literature reviewed and used as a basis for the research hypothesis. The third section describes the methodological procedures used. The fourth section is dedicated to presenting and analyzing the results. The paper ends with the concluding remarks.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

There is evidence that noise traders do not follow the advice of market analysts for investment decisions, acting irrationally, as they confuse noise for information, which brings inefficiency to financial markets, but also prevents rational investors from being able to profit exorbitantly with the inefficiency. In addition, noise impedes knowledge of the expected return on a stock or portfolio of investments (Black, 1986; De Long et al., 1990).

The unpredictability of the beliefs of noise traders creates an environment of disproportional risks in the price of assets, enabling them to achieve higher expected returns than rational investors, leading to a scenario in which there is a series of anomalies (De Long et al., 1990).

Unlike noise traders, rational investors have known characteristics, such as aversion to loss, which limit their willingness to assume riskier positions and, consequently, achieve higher returns. Thus, risk aversion can, in itself, seriously limit rational investor arbitrage (De Long et al., 1990).

Therefore, while rational investors form their expectations about the returns on assets in a rational way, noise traders are led by their beliefs (or sentiment), causing excessive volatility in asset prices. In general, investor sentiment can be defined as a belief regarding future cash flows and investment risks that are not justified by clear facts (Baker & Wurgler, 2007; De Long et al., 1990).

Despite not being the first paper to explore the role of investor sentiment in the stock market, Brown and Cliff (2004) developed the most comprehensive study up to that point. Expanding the investor sentiment measures used in previous papers, they addressed it more comprehensively (at least, until that moment), using direct measures created based on data gathered regarding sentiments and a set of proxies as indirect measures of sentiment, statistically examining the causal relationship between the variables and investigating the relationship between sentiments and subsequent returns in the capital market.

According to Baker and Wurgler (2006), the shares of companies with particular characteristics (new, smaller, more volatile, non-profitable, without dividends, in difficultly, with extreme growth potential, or similar characteristics) that are more sensitive to speculative demand, those with more subjective evaluations, tend to be riskier and more costly for arbitrage and, for that reason, are probably more affected by changes in investor sentiment.

The Brazilian literature on investor sentiment is still in its infancy. However, there is a need to mention the doctoral dissertation of Yoshinaga, in 2009, which provided evidence with Brazilian data of a pricing model based on a sentiment index built using indirect measures. With the research object being the empirical investigation of the existence of a relationship between investor sentiment

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and the expected rate of return on the financial assets traded on the Bovespa, the results of Yoshinaga (2009) suggest that investor sentiment is a relevant factor in the pricing of shares in the Brazilian market.

Previous studies have indicated that companies strategically adjust their financial disclosure policies in response to investor sentiment, and that overly optimistic or pessimistic profit expectations can be formed (Bergman & Roychowdhury, 2008; Hribar & McInnis, 2012; Mian & Sankaraguruswamy, 2012). This phenomenon can induce managers to manage earnings so that the predictions regarding the economic performance of companies fit or influence the expectations of investors and analysts.

Along these lines, Hurwitz (2017) investigated the association between investor sentiment and behavioral bias in the annual accounting results forecasts made by managers and found evidence that forecast optimism increases with investor sentiment and that annual earnings estimates are more pessimistic during periods of low sentiment.

Other Brazilian studies are being developed along this same line of research. For example, the results found by Silva (2010) suggest that the pricing of shares is effectively infuenced by market sentiment and that the investor sentiment indices used in the study were able to predict more accentuated effects over assets with a higher annualized risk and lower market value.

Some results in the literature on investor sentiment also reveal that when sentiment is high, investors are more likely to speculate and for that reason they make overly optimistic evaluations of the expected cash flows associated with risky assets, whether by overestimating the size of the cash flows, or by underestimating the risk. Similarly, when sentiment is low, investors make overly pessimistic evaluations of expected cash flows and undervalue shares (Mian & Sankaraguruswamy, 2012).

This variation in investor sentiment leads to the formation of a capital market with speculative characteristics for investors, but also opportunistic characteristics for managers as they perceive that the optimism generated by high investor sentiment provides conditions that are conducive to engaging in earnings management using discretionary accruals, which derive from managers exerting discretionary power over the accounting numbers, within the limits of the accounting rules, in order to influence perceptions regarding the

underlying economic facts reflected in the accounting result measures (Martinez, 2013; Watts & Zimmerman, 1990). For this reason, investor sentiment is expected to work as an incentive for the capital market to adopt earnings management practices. This expectation is even greater due to the previously conducted studies that report that managers are likely to respond in various ways to the expectations driven by investor sentiment, such as through investment (real investment, mergers and acquisitions), funding (issuing shares, dividends, and other securities, procuring financial credits, and capital structure), and corporate disclosure decisions (Baker et al., 2007; Simpson, 2013).

Previous studies (Ali & Gurun, 2009; Hirshleifer, 2001; Hirshleifer & Teoh, 2003; Libby, Bloomfield & Nelson, 2002) indicate that, due to limited attention, investors tend not to be very thorough when analyzing the components of cash flows and accruals when deciding between investment options, which leads to the overvaluation of accruals. This lack of attention in accruals is even greater at times when investor sentiment is high. Therefore, this environment may serve to motivate managers to seek to exploit the high investor sentiment, by managing earnings and using discretionary accruals in order to inflate the components of profit (Ali & Gurun, 2009; Simpson, 2013).

With the aim of examining the relationship between investor sentiment and the attempt by companies to manage earnings using accruals, Simpson (2013) starts from the premise that during periods of high investor sentiment managers portray their company in a way that maximizes its appeal to that sentiment. For that reason, during periods of high sentiment, managers boost accounting results using positive discretionary accruals, in order to fulfill the optimistic expectations of investors in relation to the company's future performance, suggesting a positive association between investors sentiment and the use of discretionary accruals by managers.

The results reported by Simpson (2013) reveal that the use of discretionary accruals by managers, as well as the tendency to meet or outperform the consensus forecast of analysts in a quarter, is significantly associated with investor sentiment, and these results remain the same when control variables are included linked to company characteristics: growth, sets of investment opportunities, profitability, and hiring variables. In addition, Simpson

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(2013) documents the greater tendency of managers to adopt earnings management practices in response to investor sentiment, in relation to stocks that are more sensitive to alterations in this.

The empirical results of Yang, Zhang, and Sun (2014) indicate that when managers use earnings management through discretionary accruals to increase their results, investors quickly recognize the results manipulation and become pessimistic, but when managers use earnings management via operational decisions, investors remain optimistic.

With the aim of examining whether earnings management varies with investor sentiment, Park (2015)

adjusted the methodology of Baker and Wurgler (2007) to build the South Korean investor sentiment index. Park (2015) finds that South Korean companies are more likely to engage in upward earnings management when investor sentiment is low or pessimistic than when investor sentiment is high or optimistic. In other words, companies tend to inflate their earnings in order to increase their share prices during bad economic periods.

Thus, from observing the behavior of companies that operate in the Brazilian market, the following hypothesis can be developed:

H_1: earnings management through discretionary accruals is directly associated with the level of investor sentiment.

3. METHODOLOGICAL PROCEDURES

The sample chosen for the empirical verification of this study consists of non-financial Brazilian companies listed on the Bovespa (current B3 – *Brasil, Bolsa, Balcão*). For this, quarterly data were collected from Economatica®, covering the period from 2010 to 2016 and totaling 28 quarters. Quarterly data were used as this periodicity ensures that the accounting information used in the analysis is compliant with the Accounting Pronouncements Committee (*Comitê de Pronunciamentos Contábeis*)/*International Financial* Reporting Standards (CPC/IFRS). With this, it is hoped that the noise that can be attributed to the change in accounting standards is eliminated.

The use of quarterly accounting information is important to maintain compatibility with the measurement methodology of the investor sentiment index proposed by Baker and Wurgler (2007), besides previous studies revealing accounting earnings management practices in quarterly results (Brown & Caylor, 2005; Burgstahler & Dichev, 1997; Degeorge, Patel & Zeckhauser, 1999; Graham et al., 2005; Matsumoto, 2002), as well as the influence of

investor sentiment over corporate disclosures (Bergman & Roychowdhury, 2008) and over *pro forma* results (Brown, Christensen, Elliott & Mergenthaler, 2012).

Discretionary accruals were measured using three models: (i) Kang and Sivaramakrishnan (1995) (KS); (ii) the performance matched Jones model (PMJM) (Kothari et al., 2005); and (iii) Dechow et al. (2012) (DCW). The estimates were made by quarter and by economic sector, using cross-sectional data and an ordinary least squares (OLS) estimator. In the regressions diagnostic, the leverage procedure and DFFITS estimates (automatically calculated by the Gretl software) were used to identify influential observations and analyze the residuals to detect outliers. A more detailed discussion about leverage can be found in Davidson and MacKinnon (1993) and about DFFITS in Belsley, Kuh, and Welsch (1980).

Balance sheets and other key financial statements were collected in order to run the models, taking into account the particularity of each one. For this, the final sample used for the accruals calculation was limited to the restrictive nature of these models, as can be perceived in Table 1.

Table 1

Companies by economic sector and by earnings management model

Economic sector	Companies (n) per model					
	KS	PMJM	DCW	OCF	PROD	DISX
Industrial goods	28	44	43	42	39	37
Consumer cyclical	36	56	56	54	56	53
Consumer non-cyclical	12	17	17	17	17	17
Electrical energy	2	2	2	7	7	7
Basic materials	21	27	27	26	27	26

Table 1
Cont.

Oil, gas, and biofuels	4	6	6	6	5	5
Health	4	6	6	5	6	5
Information technology	3	3	3	3	3	3
Telecommunications	2	4	4	4	4	4
Public utility	21	34	33	38	41	38
General total	133	199	197	202	205	195
Observations (n)	3,724	5,572	5,516	5,656	5,740	5,460

OCF = abnormal level of operating cash flow; DCW = Dechow et al. (2012); DISX = abnormal level of discretionary expenses; PMJM = performance matched Jones model; KS = Kang and Sivaramakrishnan (1995); PROD = abnormal level of production cost.
Source: *Elaborated by the authors.*

With the aim of measuring the investor sentiment of the Brazilian stock market, data from 2010 to 2016 were collected, whose methodological details are presented below.

3.1 Measurement of the Investor Sentiment Index

The methodology of Baker and Wurgler (2007) was used with the aim of achieving the purposes of this study. By means of it, the principal components factor analysis exploratory technique could be used as a method for obtaining a common component of six proxies for investor sentiment: closed-end fund discount (CEFD), share turnover (TURN), number of initial public offerings (NIPO), *first-day return* of initial public offerings (RIPO), dividend premium (PDND), and equity share in new issues (S).

However, due to the absence of representative data for the CEFD proxy for the Brazilian market, this was discarded and no other proxy was inserted to substitute it, in order to strictly follow the approach of Baker and Wurgler (2007). This difficulty was also reported in previous studies (Silva, 2010; Yoshinaga, 2009). Table 2 presents the variables that compose the investor sentiment index.

Table 2
Proxies for investor sentiment

Proxy	Equation	Equation variables	Source
NIPO	-	-	Bovespa
RIPO	-	-	Bovespa
S	$S_t = \dfrac{Sh_t}{A_t + D_t + NP_t}$	Sh_t = shares D_t = debentures PN_t = promissory notes	CVM
TURN	$TURN_t = \dfrac{n_t}{N_t}$	n_t = number of shares N_t = outstanding shares	CVM
PDND	$PDND_t = ln\left(\dfrac{TA_{D,t} - NE_{D,t} + MV_{D,t}}{TA_{D,t}}\right) - ln\left(\dfrac{TA_{ND,t} - NE_{ND,t} + MV_{ND,t}}{TA_{ND,t}}\right)$	TA_t = total assets NE_t = net equity MV_t = market value	Economática

Note: *The proxies are described in the text.*
Source: *Elaborated by the authors.*

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The higher the value is of the investor sentiment index variable (SENT), the more positive or optimistic the investor sentiment will be; however, the lower this value is, the more negative or pessimistic the investor sentiment will be. For the purposes of classifying the groups from low to high sentiment, the investor sentiment observations were separated, with the negative index observations being denominated low sentiment, and the positive index observations being denominated high sentiment.

3.2 Detection of Earnings Management through Discretionary Accruals

With the aim of detecting earnings management practices through discretionary accruals, the KS, PMJM, and DCW models were chosen.

The KS model is defined according to equation 1.

$$AB_{it} / A_{it-1} = \varnothing_0 + \varnothing_1 (\delta_1 REV_{it}) / A_{it-1} + \varnothing_2 (\delta_2 EXP_{it}) / A_{it-1} + \varnothing_3 (\delta_3 PPE_{it}) / A_{it-1} + \mu_t \qquad \boxed{1}$$

in which AB_{it} is the accrual balance in period t; A_{it-1} is the total assets in period t-1, REV_{it} is the net revenue in period t, EXP_{it} are the operational expenses in period t, PPE_{it} are the fixed assets in period t, and μ_t is the error term of the regression in period t.

The PMJM model is calculated according to equation 2.

$$TA_{it} = \delta_0 + \delta_1 \left(\frac{1}{A_{t-1}}\right) + \delta_2 \Delta REV_{it} + \delta_3 PPE_{it} + \delta_4 ROA_{it} + \varepsilon_{it} \qquad \boxed{2}$$

In turn, the DCW model is calculated as described in equation 3.

$$TA_t = \alpha_1 + \alpha_2 \left(\frac{1}{A_{t-1}}\right) + \alpha_3 (\Delta REV_t - \Delta REC_t) + \alpha_4 (PPE_t) + \alpha_5 (TA_{t-1}) + \varepsilon_t \qquad \boxed{3}$$

For the PMJM and DCW models, TA_t are the total accruals in period t scaled by the total assets in period $t - 1$, ΔREV_t is the variation in net revenues between periods $t - 1$ and t scaled by the total assets in period $t - 1$, ΔREC_t is the variation in client receivables between periods $t - 1$ and t scaled by the total assets in period $t - 1$, PPE_t are the fixed assets in period t scaled by the total assets in period $t - 1$, TA_{t-1} are the total accruals in period $t - 1$ scaled by the total assets in period $t - 2$, ROA_{it} is the return on assets in period t, A_{it} are the total assets in period t, and ε_{it} is the error term of the regression in period t.

In this paper, we chose to use the KS model because it is one of the most popular ones in research on earnings management in Brazil, together with the PMJM model. The latter, in its various versions, has also been one of the most adopted in international research. The PMJM model is an advancement in relation to the original one as it seeks to recognize firm performance (measured by ROA) in the discretionary accruals estimate, since companies with high performance are expected to have accruals that are different from 0 (Kothari et al., 2005). In turn, the DCW model is the most up-to-date version of the PMJM and considers the reversions of accruals in the current period.

3.3 Econometric Procedures for Empirically Verifying the Research Hypothesis

The empirical model, adapted from Simpson (2013), which served to test the research hypothesis, relates the investor sentiment index with earnings management, considering the temporality with investor sentiment together with a variety of controls that, according to previous studies, are associated with earnings management practices. It assumes the following form:

$$ABACC_{it} = \lambda_0 + \lambda_1 SENT_{t-1} + \lambda_2 MB_{it-1} + \lambda_3 ROA_{it-1} + \lambda_4 SIZE_{it-1} + \lambda_5 LEV_{it-1}$$
$$+ \lambda_6 \Delta ROA_{it+1} + \lambda_7 QTR4_{it} + \lambda_8 R\_RM_{it-1} + \mu_{it} \qquad \boxed{4}$$

in which $ABACC_{it}$ are the discretionary accruals measured using the residuals of equations 1, 2, and 3, $SENT_{t-1}$ is the market sentiment index in quarter t-1 measured as described in section 3.1, MB_{t-1} is the ratio between the company's market value and net equity, ROA_{t-1} is the proxy for the incentive plan hypothesis and is given by the ratio between net income and total assets, $SIZE_{t-1}$ measures the company's size and symbolizes the political costs hypothesis, and is calculated as the Napierian (natural) logarithm of the company's market value, LEV_{t-1} represents the debt level hypothesis and is calculated as the ratio between total liabilities and net equity, ΔROA_{it+1} represents the future variation in ROA of the quarter and serves to mitigate concerns that the proxies for earnings management capture omitted variables correlated with the company's future

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operational performance, *QTR4* is a dummy variable to identify the fourth quarter, and *R_RM* is an aggregate measure of earnings management through operational decisions and represents the sum of the individual proxies of the models developed by Roychowdhury (2006) – OCF_{it}, $PROD_{it}$, and $DISEXP_t$.

The variables that compose this measure were defined as follows:

$$OCF_{it}/A_{it-1} = \alpha_0 + \alpha_1(1/A_{it-1}) + \beta_1(S_{it}/A_{it-1}) + \beta_2(\Delta S_{it}/A_{it-1}) + \varepsilon_t \qquad \boxed{5}$$

in which OCF_{it} is the operating cash flow in period t, A_{it-1} are the lagged total assets in period t for company i, S_{it} is the net revenue in period t, ΔS_{it} is the variation in net revenue from period t to period $t-1$, and ε_{it} is the error term of the regression in period t.

The $PROD_{it}$ model of earnings management through operational decisions consists of an analysis of the abnormal level of production. Thus, the model defined by Roychowdhury (2006), chosen in this study, which empirically verifies the normal production costs, is defined as

$$PROD_{it}/A_{it-1} = \alpha_0 + \alpha_1(1/A_{it-1}) + \beta_1(S_{it}/A_{it-1}) + \beta_2(\Delta S_{it}/A_{it-1}) + \beta_3(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t \qquad \boxed{6}$$

in which $PROD_{it}$ are the production costs in period t, A_{it-1} are the total assets in period $t-1$, S_{it} is the net revenue in period t, ΔS_{it} is the variation in net revenue from period t to period $t-1$, ΔS_{it-1} is the variation in net revenue from period $t-1$ to period $t-2$, and ε_{it} is the error term of the regression in period t.

$$DISEXP_{it} / A_{it-1} = \alpha_0 + \alpha_1(1/A_{it-1}) + \beta(S_{it-1}/A_{it-1}) + \varepsilon_t \qquad \boxed{7}$$

in which $DISEXP_{it}$ are the discretionary expenses in period t, A_{it-1} are the total assets in period $t-1$, S_{t-1} is the net revenue in period $t-1$, and ε_{it} is the error term of the regression in period t.

With the exception of the aggregate measure of earnings management through operational decisions, implementation of the control variables is also adopted by Simpson (2013), Yang et al. (2014), and Park (2015). Table 3 shows the expected signs for each one of the variables that compose equation 4.

Table 3

Theoretical expectation for the signs of the independent variables of equation 4

Variables	Expected sign	Reference
$SENT_{t-1}$	+	Ali and Gurun (2009), Simpson (2013)
MB_{t-1}	+	Dechow et al. (1995), Healy and Wahlen (1999), Fields et al. (2001), Bergman and Roychowdhury (2008), Cohen and Zarowin (2010), Simpson (2013)
ROA_{t-1}	– / +	Healy and Wahlen (1999), Fields et al. (2001), Bergman and Roychowdhury (2008), Cohen and Zarowin (2010)
$SIZE_{t-1}$	– / +	Bergman and Roychowdhury (2008), Dechow et al. (2010)
LEV_{t-1}	– / +	Healy and Wahlen (1999), Fields et al. (2001), Cohen and Zarowin (2010)
ΔROA_{it+1}	– / +	Simpson (2013)
R_RM	–	Roychowdhury (2006), Cohen and Zarowin (2010), Zang (2012)
$QTR4$	–	Jeter and Shivarkimar (1999), Bown and Pinello (2007), Simpson (2013)

Note: *The variables are described in the text.*
Source: *Elaborated by the authors.*

4. RESULTS ANALYSIS AND DISCUSSION

4.1 Descriptive and Multivariate Analysis of the Investor Sentiment Index

The first round of the principal components analysis, whose aim is to understand the temporality of the proxies in relation to the first principal component, used the five contemporary proxies and their lags, setting up the first stage of the investor sentiment index with 10 factor loadings.

Subsequently, the second procedure was carried out, also with the aim of verifying the temporality of the contemporary and lagged proxies using the correlation analysis, in which it was possible to idenitfy those that

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have more correlation with the first stage index, which is the first principal component. According to the results reported in Table 4, the proxies chosen for the next round

of the principal components factor analysis to build the investor sentiment index for the Brazilian stock market are $RIPO_t$, $NIPO_t$, S_t, $TURN_t$, and $PDND_{t-1}$.

Table 4

Correlations of the proxies with the first principal component (temporality of the proxies)

Proxies for investor sentiment	First principal component	
	Pearson	Sig.
$RIPO_t$	0.146	
$NIPO_t$	0.151	0.442
S_t	**-0.552***	**0.002**
$TURN_t$	**0.898***	**0.000**
$PDND_t$	**0.688***	**0.000**
$RIPO_{t-1}$	-0.046	0.815
$NIPO_{t-1}$	-0.007	0.972
S_{t-1}	**-0.532***	**0.004**
$TURN_{t-1}$	**0.862***	**0.000**
$PDND_{t-1}$	**0.738***	**0.000**

Note: *The proxies are described in the text. Values in bold mean a significant correlation between the proxy for investor sentiment and the first principal component.*
*, **, *** = test significant at the 1, 5, 10% confidence level, respectively.
Source: *Elaborated by the authors.*

The second and last round of executing the principal components analysis aims to build a simple investor sentiment index, using as original variables the proxies whose temporalities showed a higher level of correlation with the first stage of the investor sentiment. With the aim of knowing the degree of fit of using the factor analysis in

this last round of principal components, an analysis of the Bartlett sphericity and anti-image matrix tests was carried out. As the results of the Bartlett sphericity test reported in Table 5 present a significance level with p = 0.000, it is possible to reject the null hypothesis, which supports the use of factor analysis.

Table 5

Analysis of fit and commonalities

Proxies for investor sentiment	MSA	Commonalities
$RIPO_t$	0.532	0.913
$NIPO_t$	0.557	0.911
S_t	0.604	0.753
$TURN_t$	0.504	0.825
$PDND_{t-1}$	0.614	0.650
Bartlett Test	**67.376***	
Sig.	**0.000**	

Note: *The proxies are described in the text. Values in bold mean that the variables in the correlation matrix of the population are not correlated; that is, the factor anlaysis model is appropriate.*
MSA = measurement system analysis.
* = test significant at the 1% confidence level.
Source: *Elaborated by the authors.*

From the results in Table 5, it can be observed that the measurement system analysis (MSA) is greater than 0.50 for all the variables, which ensures the maintenance of all the proxies for executing the principal components factor analysis. The results in Table 5 also report the

commonalities found based on the factor extraction, which is an index of the total variability explained by all the factors of each variable. Therefore, from analyzing the results in Table 5, it can be perceived that all the variables have a strong relationship with the retained factors.

Table 6 presents the eigenvalues results, which, based on the latent root criterion or Kaisser criterion, indicate the retention of two factors that can explain 81.035% of the variance of the data.

Table 6
Eigenvalues of the components of the investor sentiment index

Component	Eigenvalue	Variance (%)	Cumulative (%)
1	2.161	43.218%	43.218%
2	1.891	37.817%	81.035%
3	0.565	11.298%	92.333%
4	0.287	5.736%	98.069%
5	0.097	1.931%	100%

Source: *Elaborated by the authors.*

Finally, the first principal component is defined as SENT, which is able to explain 43.218% of the sample variance, enabling it to be concluded that it is a relevant fraction that captures a substantial part of the common variance of the variables. According to the methodology of Baker and Wurgler (2007), the procedures adopted lead to the following simple investor sentiment index for the Brazilian stock market:

$$SENT_t = 0.441RIPO_t + 0.439NIPO_t + 0.250S_t + 0.170TURN_t + 0.110PDND_{t-1}$$

4.2 Descriptive and Multivariate Analysis of the Hypothesis Test

With the aim of examining the relationship between investor sentiment and earnings management, regressions with pooled panel data and with fixed effects were run initially. In the main analysis, only companies with all the information available between 2010 and 2016 were included. Thus, the final sample used to test the research hypothesis was formed of a panel of 114 companies and 27 quarters, totaling 3,004 company-quarter observations. No variable was excluded due to discrepant values or the presence of outliers. Even though no problems with influential observations or outliers were identified, analyses were carried out using winsorization of the data at 1-99% and 5-95%. As the results of the coefficients of the regressions did not alter in terms of significance or sign, we chose to present the results considering all the observations available in the final sample. Tables 7 and 8 summarize the main descriptive statistics and the correlations between the variables of the model.

Table 7
Descriptive statistics of the variables

Variables	Mean	Median	Standard deviation	Minimum	Maximum	5% Perc.	95% Perc.	Interquartile
SENT	-0.027	-0.227	1.016	-1.533	3.543	-1.200	1.575	0.931
MB	0.127	0.759	14.088	-428.100	31.765	-0.571	3.629	1.042
ROA	0.003	0.008	0.045	-0.919	0.433	-0.047	0.042	0.021
SIZE	14.194	14.468	1.887	7.907	19.556	10.809	16.925	2.617
LEV	2.933	2.239	17.035	-321.520	501.200	-1.204	7.036	1.294
ΔROA	0.000	0.000	0.054	-0.762	0.888	-0.037	0.037	0.014
R_RM	0.008	-0.002	0.357	-3.226	2.786	-0.367	0.427	0.053
QTR4	0.258	0.000	0.438	0.000	1.000	0.000	1.000	1.000
KS	-0.077	-0.030	1.580	-24.477	9.347	-2.187	1.891	1.240
PMJM	0.000	-0.003	0.133	-1.667	1.185	-0.176	0.195	0.069
DCW	0.003	0.000	0.896	-10.438	11.002	-1.159	1.216	0.504

Note: *The variables are described in the text.*
DCW = Dechow et al. (2012); PMJM = performance matched Jones model; KS = Kang and Sivaramakrishnan (1995).
Source: *Elaborated by the authors.*

Table 8

Correlation matrix of the variables

	SENT	*MB*	*ROA*	*SIZE*	*LEV*	*ΔROA*	*R_RM*	*QTR4*	*KS*	*PMJM*	*DCW*
SENT	1	0.013	-0.009	0.000	0.029	0.035	-0.018	-0.089***	0.025	0.033	0.024
MB	0.013	1	0.090***	0.171***	0.020	-0.010	0.000	0.000	0.084***	0.013	0.026
ROA	-0.009	0.090***	1	0.342***	0.004	-0.157***	0.040*	-0.017	0.072***	0.005	0.049***
SIZE	0.000	0.171***	0.342***	1	-0.034	-0.014	-0.051***	-0.003	0.014	-0.010	0.009
LEV	0.029	0.020	0.004	-0.034	1	-0.020	-0.014	-0.012	0.012	-0.002	-0.016
ΔROA	0.035	-0.010	-0.157***	-0.014	-0.020	1	0.054***	0.061***	-0.008	-0.117***	-0.073***
R_RM	-0.018	0.000	0.040*	-0.051***	-0.014	0.054***	1	-0.115***	0.007	0.029	0.031
QTR4	-0.089***	0.000	-0.017	-0.003	-0.012	0.061***	-0.115***	1	-0.012	-0.087***	-0.081***
KS	0.025	0.084***	0.072***	0.014	0.012	-0.008	0.007	-0.012	1	0.068***	0.079***
PMJM	0.033	0.013	0.005	-0.010	-0.002	-0.117***	0.029	-0.087***	0.068***	1	0.862***
DCW	0.024	0.026	0.049***	0.009	-0.016	-0.073***	0.031	-0.081***	0.079***	0.862***	1

Note: *The variables are described in the text.*

DCW = Dechow et al. (2012); PMJM = performance matched Jones model; KS = Kang and Sivaramakrishnan (1995).

*** = statistical significance at 1%.

Source: *Elaborated by the authors.*

As Table 7 records, in the three models, the mean of the residuals tends toward 0; however, the KS model presents a greater dispersion (standard deviation of 1.580) and negative mean (-0.077). In the PMJM and DCW models, the mean is practically 0 (0.003 and 0.000, respectively) and they present almost no dispersion (standard deviation of 0.003 and 0.000, respectively). It should be clarified that the higher the value of the residuals in absolute terms, whether positive or negative discretionary accruals, the greater the tendency for earnings management. Positive residuals indicate earnings management to increase profits, and negative ones indicate earnings management to reduce profits.

Table 8 shows that all the proxies for accruals are correlated with each other, but the KS model presents a low correlation with the others and the PMJM and DCW models are highly correlated. This may be due to the fact that the last two derive from the Jones model. It is important to highlight, however, that the existence of a correlation between them indicates convergence between the models, even with only the DCW model working with reversions of accruals and the KS model presenting a negative mean.

The *R_RM* variable, which represents the aggregate of the proxies for management through operational decisions, does not have a correlation with the accruals estimates. This may be due to the fact that managers tend to substitute the former for the latter in their management decisions, as foreseen by the literature (Zang, 2012). Also in Table 8, the *MB*, *ROA*, *ΔROA*, and *QTR4* variables showed a correlation with at least one proxy for earnings management, both through accruals and through operational decisions. It is interesting to note that the *R_RM* variable is correlated with four control variables (*ROA*, *SIZE*, *ΔROA*, and *QTR4*), signaling a potential multicollinearity problem in this preliminary analysis. Of the accruals models, DCW is the one that most presented a correlation with the control variables (*ROA*, *ΔROA*, and *QTR4*). The *SENT* variable did not present a correlation with the management proxies. This preliminary descriptive finding is incompatible with the research hypothesis.

Tables 9 and 10 report the estimates made using the regressions models for data in a pooled panel and fixed effects, respectively, adopted to study the relationship between investor sentiment and earnings management through accruals in the Brazilian stock market.

Table 9

Pooled regressions [pooled ordinary least squares (OLS)]

Variables	KS Model	MPJ Model	DCW Model	VIF
	Coefficient	Coefficient	Coefficient	
Constant	0.122	0.002	0.023	-
$SENT_{it-1}$	0.050**	0.008***	0.070***	1.077
	(0.021)	(0.002)	(0.015)	
MB_{it-1}	0.009***	0.000***	0.002***	1.030
	(0.002)	(0.000)	(0.000)	
ROA_{it-1}	2.313*	-0.166	0.146	1.163
	(1.350)	(0.137)	(0.337)	
$SIZE_{it-1}$	-0.015	0.000	0.000	1.161
	(0.084)	(0.001)	(0.008)	
LEV_{it-1}	0.000	0.000	0.000	1.005
	(0.003)	(0.000)	(0.001)	
ΔROA_{it+1}	0.800	0.287**	0.795***	1.032
	(0.534)	(0.138)	(0.307)	
R_RM_{it-1}	0.005	-0.013***	-0.013	1.013
	(0.091)	(0.004)	(0.025)	
$QTR4$	-0.047	-0.027***	-0.179***	1.076
	(0.058)	(0.007)	(0.051)	
Adjusted R²	0.011	0.029	0.014	

Notes: *The variables are described in the text. Standard errors are in parentheses. The regressions were estimated with robust standard errors.*
DCW = Dechow et al. (2012); PMJM = performance matched Jones model; KS = Kang and Sivaramakrishnan (1995); VIF = variance inflation factor.
*, **, *** = statistical significance at 10, 5, and 1%, respectively.
Source: *Elaborated by the authors.*

As can be noted in Table 9, the coefficient of the $SENT_{it-1}$ variable is positive and statistically significant in all the models, denoting consistency of the estimates. These findings give support to the hypothesis that management through accruals accompanies variations in investor sentiment. This may suggest that managers act opportunistically, influenced by market sentiment and making accounting choices so that the result reported in the accounting statements is coherent with the level of sentiment perceived. From this perspective, the results suggest that managers may increase/decrease accruals (income increasing/income decreasing) in periods of high/low sentiment using discretionary accruals. The evidence found is consistent with the results documented in previous studies (Ali & Gurun, 2009; Simpson, 2013).

Table 10

Panel data regressions with fixed effects

Variables	KS Model	PMJ Model	DCW Model
	Coefficient	Coefficient	Coefficient
Constant	-1.229	-0.003	0.112
$SENT_{it-1}$	0.053**	0.008***	0.070***
	(0.020)	(0.002)	(0.015)
MB_{it-1}	0.002***	0.000	0.000
	(0.001)	(0.000)	(0.000)

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Table 10
Cont.

ROA $_{it-1}$	0.723	-0.183	0.068
	(0.463)	(0.208)	(0.429)
SIZE $_{it-1}$	0.081	0.001	-0.006
	(0.063)	(0.003)	(0.030)
LEV $_{it-1}$	-0.001	0.000	0.000
	(0.001)	(0.000)	(0.002)
ΔROA $_{it+1}$	0.737	0.281***	0.759***
	(0.533)	(0.129)	(0.285)
R_RM $_{it-1}$	0.030	-0.012***	-0.009
	(0.087)	(0.004)	(0.024)
QTR4	-0.050	-0.027***	-0.180***
	(0.057)	(0.007)	(0.051)
Within R^2	0.010	0.027	0.014
Durbin-Watson	1.312	2.534	2.151

Notes: *The variables are described in the text. Standard errors are in parentheses. The regressions were estimated with robust standard errors.*
DCW = Dechow et al. (2012); PMJM = performance matched Jones model; KS = Kang and Sivaramakrishnan (1995);
VIF = variance inflation factor.
*, **, *** = statistical significance at 10, 5, and 1%, respectively.
Source: *Elaborated by the authors.*

In addition, this study also documented, in a consistent way, that the coefficient of the *QTR4* variable in all the regressions used for the PMJM and DCW models is negative and statistically significant. This finding is compatible with the one empirically documented by Simpson (2013) and consistent with the argument that the mean of the discretionary accruals should be negative in the fourth quarter (Jeter & Shivarkimar, 1999), as managing earnings to avoid negative surprises is less common in that period and the process for preparing annual reports is more rigorous (Brown & Pinello, 2007).

The Δ*ROA* variable presented significance and a positive association with the accruals in the PMJM and DCW models. This result suggests that the models may be temporarily capturing omitted variables correlated with the companies' future operational performance (Simpson, 2013).

Finally, the PMJM model was the only one that captured significance for the *R-RM* variable, which controls the trade-off between management through accruals and real activity. The sign is in accordance with expectations. This result is coherent with the expectation that managers use the manipulation of real activities and accruals as substitutes in earnings management (Cohen & Zarowin, 2010; Zang 2012).

Given the dynamic relationship between earnings management and investor sentiment, it is natural for possible endogeneity problems to arise, caused by the omission of relevant variables in the model or even simultaneity between the dependent and independent variables. In the presence of endogeneity, the estimates made using the models for data in a pooled panel and fixed effects are not valid due to their estimators. For that reason, new estimates were made using the model for dynamic panel data with the system GMM (generalized method of moments) estimator as this can mitigate the endogeneity problem producing more consistent estimates. Table 11 summarizes the results.

Table 11

Dynamic panel regressions (two-stage system GMM [generalized method of moments estimator])

Variables	KS Model	PMJ Model	DCW Model
	Coefficient	Coefficient	Coefficient
Constant	0.191	0.005	0.038
$SENT_{it-1}$	0.036**	0.007***	0.071***
	(0.016)	(0.002)	(0.016)
MB_{it-1}	0.006***	0.000	0.0013
	(0.002)	(0.000)	(0.000)
ROA_{it-1}	1.206	-0.196	0.522
	(1.028)	(0.144)	(0.550)
$SIZE_{it-1}$	-0.007	0.001***	0.004***
	(0.008)	(0.000)	(0.001)
LEV_{it-1}	-0.001	-0.000	-0.001
	(0.001)	(0.000)	(0.002)
ΔROA_{it+1}	0.625	0.268**	0.683**
	(0.453)	(0.114)	(0.333)
R_RM_{it-1}	0.0201	-0.014***	-0.002
	(0.091)	(0.004)	(0.044)
$QTR4$	-0.049	-0.030***	-0.193***
	(0.046)	(0.008)	(0.047)
AR(2) z-test: p-value	0.833	0.812	0.576
Hansen test: p-value	0.300	0.242	0.271
Hanssen-difference: p-value	0.653	0.743	0.770

Notes: *The variables are described in the text. Standard errors are in parentheses. The regressions were estimated with robust standard errors. To eliminate second-order serial correlation problems, in the performance matched Jones (PMJ) and Dechow et al. (2012) (DCW) models, the dependent variable was placed in four lags on the right side of the regression. The null hypothesis of the AR(2) test is the absence of a second-order autocorrelation, that of the Hansen test is validity of the instruments, and that of the Hansen-difference test is exogeneity of the instruments. In the DCW model, the dependent variable was included on the right side of the regression with five lags.*
KS = Kang and Sivaramakrishnan (1995).
*, **, *** = statistical significance at 10, 5, and 1%, respectively.
Source: *Elaborated by the authors.*

As can be observed in Table 11, the $SENT_{it-1}$ and *QTR4* variables continue to be statistically significant with the expected sign. The use of the dynamic panel with GMM helps mitigate the endogeneity problem, gives robustness to the estimates, and enables it to be demonstrated that the findings of this study are independent of the econometric approach adopted and support the initial estimates. In addition, it reinforces the convergence of the results obtained using the PMJ and DCW models. However, by treating the endogeneity, these models positively captured significance for the *SIZE* variable, indicating that for the companies in the sample, size temporally affects the discretionary accruals estimate. This finding is compatible with previous studies.

4.2.1 Additional analysis

In the main analysis, we sought to evaluate the association between the investor sentiment index and discretionary accruals (proxy for earnings management). The results found indicate that accruals respond positively to variations in the sentiment index. This may suggest that managers opportunistically adjust accruals to increase them in periods of high sentiment and reduce them in periods of low sentiment, for which reason it is important to carry out additional analyses to try and find evidence of this strategy.

Adapting Simpson (2013), based on the regression used in the main analysis, another two were specified. A dummy variable was included in one for when the

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sentiment index is negative (proxy for low sentiment) and a dummy variable was included in another for when the sentiment index is positive (proxy for high sentiment). The intention was to evaluate how the accruals behave in periods of high and low sentiment, separately. In total, 18 regressions were run, one for each accruals model and panel data model. The full results were omitted, but tables 12 and 13 summarize some relevant information.

Table 12

Partial statistics for the negative sentiment index

Variables	Low (negative)				High (positive)			
	SENT	KS	PMJM	DCW	SENT	KS	PMJM	DCW
Mean	-0.5688	-0.1254	-0.0102	-0.0479	1.0555	0.0186	0.0208	0.1060
Standard deviation	0.3910	1.6269	0.1304	0.9372	1.0154	1.4772	0.1356	0.7968
Observations (n)	2,002				1,002			

DCW = Dechow et al. (2012); PMJM = performance matched Jones model; KS = Kang and Sivaramakrishnan (1995); SENT= investor sentiment index.
Source: *Elaborated by the authors.*

Table 13

Partial data from the dynamic panel regressions (two-stage system GMM [generalized method of moments]), including the dummies for negative and positive sentiment

		KS	JMAD	DCW			KS	JMAD	DCW
Low sentiment dummy	Coefficient	-0.137	-0.034	-0.085	High sentiment dummy	Coefficient	0.139	0.028	0.089
	Standard error	0.039	0.007	0.030		Standard error	0.033	0.005	0.028
	p-value	0.000	0.000	0.005		p-value	0.000	0.000	0.002
	t	-3.550	-4.860	-2.870		t	4.210	5.630	3.190

DCW = Dechow et al. (2012); PMJM =performance matched Jones model; KS = Kang and Sivaramakrishnan (1995); SENT= investor sentiment index.
Source: *Elaborated by the authors.*

Table 12 shows that in the observations with low sentiment the mean of the accruals in the three models is also negative. In contrast, in the group of observations with high sentiment, the mean of the accruals is positive.

Table 13 only shows the statistics of the coefficient of the dummy variable included in the regression models. As can be observed, it was significant in both scenarios and in all the models, but with opposing signs. The results suggest that, in the group of low sentiment observations, the managers tend to reduce accruals. In contrast, in the group of high sentiment observations, the accruals positively accompany the sentiment index. A more detailed analysis, using quantile regression, dividing the samples into five quantiles, confirmed this trend in the PMJM and DCW models. In all the quantiles, the coefficients of the dummies are significant, and negative in the low sentiment scenario and positive in the high sentiment scenario. These complementary results were also omitted from the article.

Analyzed together, the results in tables 12 and 13 signal that the companies may adopt upward earnings management strategies when the sentiment index is both negative and positive. This procedure is coherent with the results of the research conducted by Graham et al. (2005), who suggest that managers use accruals strategically to try to increase the share price in periods of low sentiment and to keep the price high in periods of high sentiment.

These results are also compatible with those documented in Simpson (2013), as the author identified that in periods of low sentiment companies report more conservative results and that upward earnings management increases with the level of investor sentiment.

However, as Mian and Sankaraguruswamy (2012) explain, when sentiment is high, investors are more likely to speculate, attributing overly optimistic evaluations to the expected cash flows associated with risky assets. In contrast, when sentiment is low, investors attribute overly pessimistic evaluations to expected cash flows and undervalue shares. In this situation, using accruals to inflate earnings in periods of low sentiment may be a way of mitigating the pessimism of investors and of trying to influence the share price upward, since, as Sloan (1996)

suggests, the market does not adequately price accruals, meaning that in the short term the share value reacts positively to the increase in accruals. This scenario may explain the results documented in this study.

5. CONCLUDING REMARKS

This study aimed to investigate the association between investor sentiment and earnings management practices via discretionary accruals in the Brazilian stock market. It was identified that, in Brazil, managers increase their profits in periods after those in which investor sentiment was high, but they report relatively conservatively in subsequent periods in which investor sentiment was low.

The documented results are compatible with those recorded in previous international studies and consistent for a variety of econometric models and established controls, giving robust support to the hypothesis that the general level of investor sentiment is directly associated with earnings management through discretionary accruals.

Standing out among the implications of the findings is the strategic use of discretionary accruals by managers with the aim of matching accounting profits with investor expectations. Earnings management through discretionary accruals feeds back into investor sentiment, accommodating expectations and avoiding a surprise and break in sentiments. When sentiment is positive, managers tend to manage earnings upward (income increasing); however, if sentiment is negative, managers manage earnings downward (income decreasing).

Investors and analysts need to incorporate the effects of behavioral bias over reported profits in order to fully understand the value of companies. In addition, as Brazil experienced quite a prolonged recession in recent years, reported profits should be interpreted carefully during economic crises, since investor sentiment may be reflected in more conservative reports.

From the study, it was clear that in Brazil there is a link between accounting choices and investor sentiment. It also reveals the need for boards, auditors, and regulators to pay more attention to earnings management to increase profits during periods of high investor sentiment. Auditors may wish to be aware of managers' incentives to respond to investor sentiment. Regulators might consider increasing financial scrutiny when the entire market sentiment is higher, since it is precisely in these periods that managers have a higher probability of resorting to earnings management to increase profits.

In summary, in light of the findings, the study is useful for deepening the understanding of the effect of investor sentiment on earnings management. Besides having implications for investors, regulatory bodies, and gatekeepers, it provides evidence regarding the incentives that may induce managers to engage in earnings management practices. In addition, as a marginal contribution, it demonstrates that earnings quality in Brazil is partially affected by investor sentiment.

Finally, we suggest that future studies investigate whether there is a relationship between investor sentiment and earnings management through operational decisions. This study showed that accruals quality is affected by investor sentiment, but the effect of investor sentiment on earnings management through operational decisions is a research question that remains to be addressed in Brazil.

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