Corporate Governance in Brazil and Opportunistic Behavior in the Use of Insider Information

Ana Flávia Albuquerque Ventura *, Roberto Frota Decourt , Clea Beatriz Macagnan

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Article

Corporate Governance in Brazil and Opportunistic Behavior in the Use of Insider Information

Ana Flávia Albuquerque Ventura [1,*], Roberto Frota Decourt [2] and Clea Beatriz Macagnan [3]

[1] Professor of Accounting Sciences at the Federal University of Rio Grande do Sul (UFRGS)

[2] Professor in the Postgraduate Program in Accounting and Finance at the University of Vale do Rio dos Sinos (Unisinos)

[3] Senior Professor Finance and Accounting Graduate Program - University of Vale do Rio dos Sinos. Visiting Professor at Massachusetts Institute of Technology - MIT - Sloan School of Management

* Correspondence: flavia.ventura@ufrgs.br

Abstract

Losses resulting from the opportunistic use of insider information are detrimental, and therefore it is essential to mitigate this behavior through robust corporate governance practices. This research analyzes the determinants of corporate governance that reduce the signs of opportunistic insider trading, considering the assumptions of information asymmetry and opportunistic behavior. The hypotheses formulated consider that companies listed on the Novo Mercado or Level 2 of Corporate Governance, with independent Boards of Directors and greater female representation, active Fiscal Councils, consolidated ESG practices, non-family firms, robust Audit Committees, and audits not linked to the Big Four, tend to show a lower propensity for opportunistic conduct. 237 firms were analyzed, representing 51% of the firms listed on the [B]3 between 2010 and 2021, with 2,175 observations. The panel data analysis confirmed the proposed hypotheses. Therefore, the theoretical conclusion is that the greater the level of corporate governance practices, the lower the incidence of opportunistic insider trading in the Brazilian capital market. This work contributes to the literature by highlighting the unique characteristics of the largest stock market in Latin America and emphasizing the importance of transparency, formal monitoring, and informal mechanisms, such as social and reputational pressure on insiders, influencing ethical behavior, and restricting the misuse of privileged information.

Keywords: information asymmetry; opportunistic behavior; opportunistic insider trading; corporate governance

1. Introduction

The information asymmetry between the firm and the market provides a time window, allowing insiders to gain an informational advantage over investors and shareholders (Akerlof, 1970; Meulbroek, 1992; Ahern, 2017; Rosenfeld, 2018; Tonindandel & Decourt, 2020; Contreras & Marcet, 2021). This condition allows opportunistic behavior on the part of those holding privileged information, known as insider trading. Insiders, having access to undisclosed information, can use this condition to gain an advantage in the opportunistic buying or selling of shares, to the detriment of outsiders who, without access to the respective information disclosed by the firm, according to market rules (Cohen, Malloy & Pomorski, 2012; Ali & Hirshleifer, 2017; Posylnaya, Cline & Aaron, 2019; Contreras & Marcet, 2021). Consequently, this insider trading behavior can lead to a loss of trust and participation from less informed investors, harming both firms and the stock market (Bhattacharya & Nicodano, 2001). Emerging countries, with more lenient legislation, are more susceptible to this behavior (La Porta et al., 2000), making governance practices essential to reduce opportunism and protect investors and other shareholders.

 doi:10.20944/preprints202512.0315.v1

To mitigate such practices, it is fundamental to implement effective corporate governance so that it can reduce the level of informational asymmetry and, consequently, opportunistic behavior, which can be reflected in increased risk and cost of capital (La Porta et al., 2000; Kwabi; Boateng; Adegbite, 2018; Chung et al., 2019; Rahman, Faff & Oliver, 2020; Arias, Valencia & González, 2021). Therefore, this research aimed to analyze the determinants of corporate governance that mitigate the signs of opportunistic insider trading. The hypothesis was that certain characteristics structuring corporate governance are associated with a lower propensity for opportunistic conduct. These characteristics include the firm being listed on the Novo Mercado or Level 2 of Corporate Governance (Crisóstomo & Brandão, 2019; Esqueda & O'connor, 2020), the existence of independent Boards of Directors (Jaggi & Tsui, 2007; Abid et al., 2018), greater female representation (Jain & Zaman, 2020; Wu, Sorensen & Sun, 2019), active Fiscal Councils (Procianoy & Decourt, 2015; Jain & Zaman, 2020), consolidated ESG practices (Dong et al., 2018; He, Du & Yu, 2022), non-family-owned firms (Crisóstomo & Brandão, 2019; He, Du & Yu, 2022), and the existence of robust audit committees (Borba et al., 2019; Oradi & Izadi, 2022). 2020), audits not linked to the Big Four (Asante-Appiah & Lambert, 2022), and greater monitoring carried out by analysts (Dai, Parwada & Zhang, 2015).

A total of 237 firms were analyzed, corresponding to 51% of the companies listed on the [B]3 (Brasil, Bolsa, Balcão) between 2010 and 2021, totaling 2,175 observations. The Brazilian stock market stands out as the largest and most influential in Latin America, headquartered in São Paulo, where the region's main stock exchange is located, both in size and performance, attracting local and international investors (ANBIMA; Moreira, 2025), with distinct characteristics compared to more developed markets and other markets (Macagnan, 2025). To represent opportunistic insider trading, the measure proposed by Yang, Zhang, and Zhang (2020), called Abnormal Idiosyncratic Volatility (AIV), was adopted as a proxy. This is the idiosyncratic volatility before an information-intensive event, higher than that observed in normal periods. The study variables were analyzed using the unbalanced panel data method with fixed effects.

The results confirm the hypothesis that corporate governance characteristics can mitigate opportunistic insider trading behaviors and corroborate previous studies (Jensen & Meckling, 1976; Fama, 1980; Fama & Jensen, 1983; Williamson, 1988; Hirshleifer, 2017; Javakhadze, Pennathur & Silverstein, 2025), highlighting the importance of monitoring and transparency. Among the characteristics analyzed, the study finds that independent boards of directors, with a greater female presence, combined with the existence of a robust fiscal council and audit committee, reduce the indications of opportunistic insider trading. These findings corroborate the literature, indicating that more efficient governance structures mitigate opportunistic behavior (Chung et al., 2019; Rahman & Faff, & Oliver, 2020; Asante-Appiah & Lambert, 2022). Corporate governance characteristics such as reputation (assessed by the ESG score) and media attention (represented by firm size) also showed a negative relationship with insider trading, suggesting that visibility and the enhancement of the firm's image function as informal mechanisms against opportunism (Gao, Lisic & Zhang, 2014; Hodgson, Seamer & Uylangco, 2020). Furthermore, non-family firms showed a negative correlation with evidence of opportunistic insider trading, reinforcing evidence that family concentration favors the trading of private information before the disclosure of financial reports (Grossman & Stiglitz, 1980; Claessens, Djankov & Lang, 2000; Jaggi & Tsui, 2007; Huang, Hou & Cheng, 2012; Elgammal, El-Kassar & Messarra, 2018; Abid et al., 2018; Rahman, Faff & Oliver, 2020; Yang & Xie, 2024; Arias, Valencia & González, 2021). Conversely, the results demonstrated that firms audited by Big Four firms (Abid et al., 2018; Donelson et al., 2020; Hasnan et al., 2022; Friedrich; Quick, 2023), a characteristic associated with corporate opportunism, such as the republication of financial statements (Ali & Hirshleifer, 2017; Javakhadze, Pennathur & Silverstein, 2025; Martins & Ventura Júnior, 2020), and high volatility (Bhowmik & Wang, 2020) showed a greater propensity for informed trading.

Therefore, theoretically, it can be argued that opportunistic insider trading can be mitigated by corporate governance, whose practices, such as increased monitoring (Rahman, Faff & Oliver, 2020), transparency (Wu, Sorensen & Sun, 2019; Arias, Valencia & González, 2021), ownership structure

 doi:10.20944/preprints202512.0315.v1

(Arias, Valencia & González, 2021), female participation in management and on the board (Wu, Sorensen & Sun, 2019), and social responsibility (Hodgson, Seamer & Uylangco, 2020), reduce information asymmetry. This asymmetry creates an environment of uncertainty, which favors opportunistic behaviors, such as the use of privileged information and the manipulation of results (Arrow, 1963; 1969; Akerlof, 1970; Williamson, 1979; 1991; 1993; Chowdhury, Mollah & Al Farooque, 2018; Javakhadze, Pennathur & Silverstein, 2025). As a contribution, this research highlights the relevance of transparency, formal monitoring, and informal mechanisms, such as social and reputational pressure for ethical conduct, capable of influencing ethical behavior and reducing the misuse of privileged information in the Brazilian stock market.

This article is structured as follows: the next section presents the literature review and the development of the research hypothesis. Next, the third section describes the methodology adopted and the data collected. The fourth section presents the analysis and discussion of the results, while the fifth section presents the final considerations. Finally, the references are listed.

2. Literature Review and Hypothesis

2.1. Information Asymmetry and Opportunism

The separation between ownership and control (Berle & Means, 1932; Jensen & Meckling, 1976; Fama, 1980) generates informational asymmetry, as insiders possess more knowledge than outsiders, leading to market failures (Fama, 1980). This asymmetry causes price distortions and opportunities for abnormal gains (Akerlof, 1970; Myers & Majluf, 1984; Easley & O'Hara, 1987; Williamson, 1991, 1993, 1999). In this context, informational asymmetry generates problems such as adverse selection and moral hazard (Akerlof, 1970; Williamson, 1979, 1988, 1991). Adverse selection occurs when the less informed party avoids risky transactions, leading to prices that do not reflect the true value of the shares. Moral hazard occurs when insiders use their access to information to engage in opportunistic actions, enabling behaviors that result in abnormal gains (Arrow, 1963; Akerlof, 1970). In this context, insider trading that occurs before earnings announcements has a greater impact on stock prices (Chauhan, Kumar & Chaturvedula, 2016). In an environment of uncertainty, information becomes a valuable commodity (Arrow, 1963). Therefore, the importance of disclosing information known to insiders as quickly as possible is highlighted, as this will reduce the informational asymmetry with outsiders, minimizing market failure.

For a transaction to be classified as opportunistic insider trading, certain events must occur, indicating that the insider possessed undisclosed information when buying or selling shares in the market. For example, several studies suggest that insider trading generates abnormally high returns compared with normal trading (Meulbroek, 1992; Ahern, 2017; Ali & Hirshleifer, 2017; Esen, Bilgic & Basdas, 2019; Goergen, Renneboog & Zhao, 2019; Jardak & Matoussi, 2020). Further evidence shows that spreads, trading volume, and volatility increase significantly during insider trading episodes (Degryse, De Jong & Lefebvre, 2014; Lei & Wang, 2014; Vitale, 2018; Posylnaya, Cline & Aaron, 2019; Contreras & Marcet, 2021).

Insiders possess valuable private information about a firm, which gives them an advantage in buying or selling before that information becomes public (Ali & Hirshleifer, 2017). Although they have this informational advantage, the correct course of action for an insider would be to wait for the firm to release its financial reports before trading its shares, that is, when there is informational symmetry for all market participants, as stipulated by current laws and regulations. It is worth highlighting that opportunism, with a focus on personal interest, is the main characteristic of opportunistic insider trading (Akerlof, 1970; Williamson, 1979; 1988; 1991; 1993; 1999; Cohen; Malloy; Pomorski, 2012; Tang, Chen & Chang, 2013; Hillier, Korczak & Korczak, 2015; Gider & Westheide, 2016; Ali & Hirshleifer, 2017; Batten, Loncarski & Szilagyl, 2020; 2020; 2022; Yang & Xie, 2024; Javakhadze, Pennathur & Silverstein, 2025). Therefore, even knowing that they are doing something illegal and that they may be penalized in the future, they may be motivated to trade a volume of shares, the greater the informational asymmetry.

 doi:10.20944/preprints202512.0315.v1

In summary, opportunistic insider behavior, which constitutes moral hazard, is related to information asymmetry (Williamson, 1979; 1988; 1991; 1993; 1999). Abnormal returns to insiders are related to poor quality corporate governance (Ravina & Sapienza, 2010; Jagolinzer et al., 2011). Insider gains increase when there is a reduction in analyst coverage and when regulatory oversight is moderate (Wu, Sorensen & Sun, 2019; Ventura, 2024). Companies with better governance practices enforce policies to restrict the use of privileged information more effectively and are more likely to proactively discipline insiders who conduct transactions before information is disclosed (Lee et al., 2014; Dai et al., 2016; Hodgson, Seamer & Uylangco, 2020; Javakhadze, Pennathur & Silverstein, 2025). Therefore, the quality of corporate governance is fundamental to curbing opportunistic behavior through mechanisms of transparency, monitoring, and corporate accountability.

2.2. Corporate Governance, the Brazilian Stock Market, and Hypothesis Formulation

Effective governance requires transparency, fairness, accountability, and corporate responsibility (Procianoy & Decourt, 2015), principles propagated in various capital markets (Macagnan, 2025). More diverse boards, especially with greater female participation, tend to mitigate opportunistic behavior and improve oversight (Adams & Ferreira, 2009; Jain & Zaman, 2020). Elements such as the existence of a fiscal council (Borba et al., 2019), the size and role of the audit committee (Borba et al., 2019; Oradi & Izadi, 2020), and greater independence of the board of directors (Rahman, Faff & Oliver, 2020; Wu, Sorensen & Sun, 2019) strengthen governance and reduce the risk of opportunistic insider trading. Externally, factors such as laws, regulations, audits, market environment, media coverage, and pressure from financial analysts also influence the behavior of firms, reducing informational asymmetries and detecting possible misuse of resources (Healy & Palepu, 2001; Gao, Lisic & Zhang, 2014; He, Du & Yu, 2022). By disclosing information, financial analysts reduce the informational advantage of insiders, affecting trading dynamics and improving market quality (Hillier, Korczak & Korczak, 2015; Ellul & Panayides, 2018). From the text above, we can formulate the following hypothesis:

H1. *Firms characterized by higher quality corporate governance mitigate the occurrence of opportunistic insider trading.*

In family businesses, where directors are from the same family as the owners, there is a greater risk of expropriation of minority shareholders (Claessens, Djankov & Lang, 2000). To mitigate this, it is recommended to avoid the appointment of most family members and the duality of CEO and chairman of the board (Jaggi & Tsui, 2007; Zaman et al., 2021). This means that corporate governance characterized by the existence of a predominantly family-based board would be subject to greater opportunistic behavior from insiders. The presence of a controlling group, family, or another company, or a shareholders' agreement between a few large controlling shareholders (Claessens, Djankov & Lang, 2000; Jaggi & Tsui, 2007; Abid et al., 2018; Elgammal, El-Kassar & Messarra, 2018; Crisóstomo & Brandão, 2019; He, Du & Yu, 2022), the co-opting of directors (Yang & Xie, 2024), the connection between directors and board members (Yang & Xie, 2024; Ngo & Le, 2021), and social ties between auditors and firm directors (He et al., 2017) can weaken corporate governance practices, creating an environment conducive to unethical behavior. Therefore, the participation of family members on the board of directors can increase the occurrence of insider trading with opportunistic behavior.

Auditing also plays a fundamental role, but it can be compromised by social ties and economic interests (He et al., 2017). The growing emphasis of the Big Four on consulting, to the detriment of auditing, compromises the independence and quality of services (Donelson et al., 2020). Furthermore, poorly conducted audits can lead to fraud and accounting manipulation, harming investors and the market (Healy & Palepu, 2001). Companies hire Big Four consulting services to assist during times of reputational crisis (Asante-Appiah & Lambert, 2022), as occurred with British Petroleum, Google,

 doi:10.20944/preprints202512.0315.v1

and Facebook after ESG scandals (Asante-Appiah & Lambert, 2022). Therefore, firms audited by the Big Four tend to show a greater propensity for opportunistic insider trading practices.

Effective corporate governance practices can reduce problems arising from information asymmetry and may be influenced by the intrinsic characteristics of the market in which the firm operates. The Brazilian stock market is emerging, with few companies listed on the stock exchange, whose source of financing still comes mostly from third-party capital and not from investors, unlike developed markets (Black, Carvalho & Gorga, 2010; Macagnan, 2025). Furthermore, the ownership structure is concentrated, with most Brazilian firms having family control (Black, Carvalho & Sampaio, 2014; Crisóstomo & Brandão, 2019; Macagnan, 2025), and, because of this, it allows for weak shareholder protection, whose conflict of interest occurs between majority and minority shareholders, i.e., principal-principal (La Porta et al., 2000; Black, Carvalho & Gorga, 2010; Black, Carvalho & Sampaio, 2014; Crisóstomo & Brandão, 2019; Teixeira et al., 2025). Another aspect that stands out is the existence of the Fiscal Council, an independent body that guarantees greater representation for minority shareholders through the election of one of its members. This mechanism contributes to reducing informational asymmetry and reinforces transparency in business relations (Procianoy & Decourt, 2015).

Countries with emerging markets, such as Brazil, provide weak legal protection for minority shareholders, demanding more robust laws and greater enforcement (La Porta et al., 2000; Ventura et al., 2024). In this context, governance practices are essential to mitigate the opportunistic behavior of insiders and increase investor protection. To encourage such practices, the [B]3 created, in the late 2000s, differentiated levels of Corporate Governance: Level 1, Level 2, and Novo Mercado, in ascending order of requirements. These levels go beyond legal obligations by promoting greater transparency, fairness, and corporate responsibility. Thus, firms that adhere to these segments signal to the market a commitment to standards higher than those required by law (Crisóstomo & Brandão, 2019; Esqueda & O'Connor, 2020). That is, the decision to self-select at a particular level conveys relevant information about the quality of governance that the firm seeks to ensure. In this way, firms listed on Level 2 or the new market of corporate governance can reduce the occurrence of opportunistic insider trading.

Even with the creation of differentiated governance levels, several cases of opportunistic insider trading have occurred in Brazil among firms that have adhered to these segments. Similarly, although the North American market has more robust regulation, opportunistic conduct has also occurred after the enactment of the SOX law (Ventura et al., 2024). This is because many governance problems are due to corporate misconduct, which is not only related to company management but also to the behavioral factors of employees, resulting in opportunistic attitudes such as accounting fraud, earnings management, and the use of private information for personal gain (Liu, 2016; Chowdhury et al., 2018). The literature shows that personal attributes explain up to one-third of the variability in the performance of opportunistic insider trading and that the insider's personal characteristics, such as year of birth, education, and gender, are more important in firms with greater information asymmetry (Hillier, Korczak & Korczak, 2015). Therefore, ethical values, experiences, and personal traits, professional experience, and personality characteristics affect corporate decisions and business activities. Consequently, managers' attitudes will depend on their ethical values.

Women tend to be less prone to opportunistic practices, as female insiders obtain lower returns due to greater risk aversion, higher regulatory compliance, and higher ethical standards (Wu, Sorensen & Sun, 2019). Gupta et al. (2020) revealed that female CFOs are less likely to issue inaccurate financial reports, an effect moderated by governance mechanisms, institutional ownership, and analyst coverage. This demonstrates that the personal characteristics of managers influence the professional conduct within the firm. Another behavioral characteristic that stands out is reputation, where managers reduce privileged dealings when reputational risk is high. Insiders located in more religious regions have lower returns due to the influence of social norms (Contreras & Marcet, 2021). Corporate reputation, through increased media visibility (Dai, Parwada & Zhang, 2015) and engagement in ESG practices, acts as a disciplinary mechanism, leading companies to improve their

 doi:10.20944/preprints202512.0315.v1

practices to avoid image crises and preserve market confidence (Gao, Lisic & Zhang, 2014; Hillier, Korczak & Korczak, 2015). Consequently, adherence to ESG practices significantly reduces managerial misconduct, as socially responsible companies tend to restrict opportunistic actions (Gao, Lisic & Zhang, 2014; He, Du & Yu, 2022). Therefore, firms with ESG practices are more likely to mitigate the occurrence of opportunistic insider trading.

3. Research Methodology

3.1. Research Design and Variable Definition

The econometric model applied will be analyzed using the unbalanced panel data regression technique for fixed effects. This method allows controlling for unobserved heterogeneity in the cross-sectional units and estimating certain dynamic relationships (Wooldridge, 2010). Furthermore, it has the advantage of using a larger database than would be possible if only the same firms were repeated for all years. Thus, the results may present greater robustness and reliability. Based on the literature studied, a model was developed to test the study hypothesis. This model has as its dependent variable the AIV, which represents the indication of opportunistic insider trading by the firm. Thus, the econometric model that will be estimated is presented, according to equation (1):

$$AIV_{it} = \beta_0 + \beta_1 GC_{it} + \beta_2 PMCA_{it} + \beta_3 CF_{it} + \beta_4 REPB_{it} + \beta_5 TAMCAUD_{it} + \beta_6 AUDB4_{it} + \beta_7 QI_{it} + \beta_8 FNF_{it} + \beta_9 PFCA_{it} + \beta_{10} DY_{it} + \beta_{11} REPM_{it} + \beta_{12} MIDIA_{it} + \beta_{13} IVAZ_{it} + \beta_{14} RENT_{it} + \varepsilon_{it} \quad (1)$$

Equation (1) is presented with the aim of verifying whether aspects of corporate governance mitigate the signs of opportunistic insider trading, as described in the research hypothesis (H1). To increase the reliability of the results, a robustness test was performed. In this test, the variable AIV (Abnormal Idiosyncratic Volatility), which represents the sign of opportunistic insider trading, was replaced by the variable REPM (Tainted Reputation), which is represented by the number of republications of a firm. This variable was chosen because, according to previous studies, republication has already been used as a proxy to measure opportunism, given that firms with opportunistic insiders have a higher incidence of republications (Ali & Hirshleifer, 2017; Javakhadze, Pennathur & Silverstein, 2025; Asante-Appiah & Lambert, 2022). Therefore, equation (2) is presented, which will be tested as a robust measure:

$$REPM_{it} = \beta_0 + \beta_1 GC_{it} + \beta_2 PMCA_{it} + \beta_3 CF_{it} + \beta_4 REPB_{it} + \beta_5 TAMCAUD_{it} + \beta_6 AUDB4_{it} + \beta_7 QI_{it} + \beta_8 FNF_{it} + \beta_9 PFCA_{it} + \beta_{10} MIDIA_{it} + \beta_{11} IVAZ_{it} + \varepsilon_{it} \quad (2)$$

In comparison to equation (1), in addition to the variable Tarnished Reputation (REPM) replacing the variable Abnormal Idiosyncratic Volatility (AIV), other changes occurred. The robustness test is important because it reduces the possibility of endogeneity problems and also strengthens the relationship between the variables studied. The variables used in the study are shown in Table 1 below, which identifies the abbreviation used in the equations, the name of the variables, description, calculation, and theoretical basis. It also classifies the variables as dependent, independent, and control variables.

Table 1. Definition of the variables studied in the research.

VARIABLE	VARIABLE	DESCRIPTION / CALCULATION	SIGN
Dependent Variable			
AIV	Abnormal Idiosyncratic Volatility	It detects evidence of opportunistic insider trading.	
Independent Variables			

 doi:10.20944/preprints202512.0315.v1

GC	Corporate Governance	A dummy variable that takes the value 1 if the firm is part of the Novo Mercado and Level 2 of corporate governance, and 0 otherwise.	-
PMCA	Proportion of Women on the Board of Directors	The number of women on the board of directors is divided by the total number of members.	-
CF	Fiscal Council	A dummy variable that takes the value 1 if the firm has a fiscal council and 0 otherwise.	-
REPB	Good reputation	It is represented by the ESG score. It refers to an overall company score based on self-reported information in the environmental, social, and corporate governance pillars.	-
TAMCAUD	Audit Committee Size	Number of members on the audit committee.	-
AUDB4	Audited by Big Four	A dummy variable that takes the value 1 if the firm is audited by auditing firms, characterized as the Big Four, and 0 otherwise.	+/-
QI	Information Quality	It is represented by the number of analysts who follow the firm.	-
FNF	Non-Family Businesses	A dummy variable that takes the value 1 if the firm is not classified as family-owned, and 0 otherwise.	-
PFCA	Percentage of Family Members on the Board of Directors	Percentage of family member participation on the Board of Directors.	+
Control Variables			
DY	*Dividend Yield*	Value of dividends paid divided by the value of the firm.	+
REPM	Tarnished Reputation	Number of republications performed by the firm.	+
MIDIA	Media Attention	Natural logarithm of total assets.	-
IVAZ	Leaked Information	Volatility.	+
RENT	Profitability	Asset turnover multiplied by net profit margin.	-

Own Production.

The dependent variable used in this research will be AIV (Abnormal Idiosyncratic Volatility), which captures signs of opportunistic insider trading. Research by Yang, Zhang, and Zhang (2020) found a positive relationship between AIV and the intensity of abnormal gains before earnings release. It also revealed that stocks with negative AIV have a lower information risk. It is also noteworthy that AIV is a measure of information risk based on stock price, because when there are insider trading operations, in addition to increased trading intensity, there is also a change in stock prices. Corroborating this statement, the literature shows that insider trading that occurs before earnings announcements has a greater impact on stock prices, because in an environment of uncertainty, information becomes relevant (Arrow, 1963; Chauhan, Kumar & Chaturvedula, 2016).

 doi:10.20944/preprints202512.0315.v1

Therefore, to construct the AIV variable, the following five steps were necessary:

1. Data collection.
2. Calculation of the daily residual based on the previous year.
3. Sum of the daily residuals for each period of PEA and NEA.
4. Calculation of IVpea and IVnea.
5. Calculation of AIV.

The PEA refers to the five business days before disclosure, and the NEA refers to all days for one year, excluding the eleven days surrounding each disclosure of information. That is, the eleven days consist of the day of disclosure, five business days before, and five business days after the disclosure of the information. As explained in the research data, the information we used as a basis for calculating the AIV was the dates and times of disclosure of quarterly and annual financial statements and material facts. Regarding the time, it was defined that: (i) when the firm disclosed between 00:00 and 10:00 am, the date remained the same; (ii) when the firm disclosed between 10:01 am and 11:59 pm, the date changed to the following day. This occurred because disclosure during the stock exchange trading period can negatively impact investors' decisions when trading shares.

After collecting the publication dates for each document, each firm, and each year, the NEA and PEA periods were calculated in an Excel spreadsheet. Following this step, more than one million daily regressions were performed, requiring looping programming in the Stata statistical software and expertise in processing the collected data. This amount of regression occurred because, to obtain the daily residual, it was necessary to perform a regression for each day. That is, 3,024 days, using daily data from the previous 252 days. For this, the three-factor model (FF-3) of Fama and French (1993) was used, as demonstrated:

$$R_{it} - R_{Ft} = \alpha_i + \beta_i MKT_t + s_i SMB_t + h_i HML_t + \varepsilon_{it} \quad (3)$$

where: Rit = Return of firm i on day t; RFt = Risk-free rate, calculated from the 30-day DI Swap; MKT = Difference between the daily returns weighted by the market value of the portfolio on day t; SMB = Return of a portfolio long in stocks with low market capitalization (small) and short in stocks with high market capitalization (large) on day t; HML = Return of a portfolio long in stocks with a high book-to-market ratio and short in stocks with a low book-to-market ratio on day t; ε = Residual of the model referring to portfolio i on day t.

With this information, the idiosyncratic volatility was calculated for the pre-earnings announcement period (IVPEA) and for the days after earnings announcements (IVNEA), using the portfolio return as the logarithm, according to equation (4), considering that there are 252 trading days during a year, according to the following equations:

$$IV_{PEA} = ln \sqrt{\frac{252 \; x \; \Sigma_{j \varepsilon PEA} \varepsilon_j^2}{n_{PEA} - 1}} \quad (4)$$

$$IV_{NEA} = ln \sqrt{\frac{252 \; x \; \Sigma_{j \varepsilon NEA} \varepsilon_j^2}{n_{NEA} - 1}} \quad (5)$$

where: nPEA = number of days before results announcement. nNEA = number of days after results announcement.

After finding the volatility for the two periods, according to equations (4) and (5), these two components were subtracted to find the idiosyncratic volatility component that is related to information risk surrounding the disclosure of company earnings, according to the following model:

$$AIV = IV_{PEA} - IV_{NEA} \quad (6)$$

Considering that AIV refers to the difference in idiosyncratic volatility between periods before information disclosure and periods without disclosure, and that insider trading occurs before a disclosure period, it is believed that AIV can capture evidence of opportunistic insider trading, according to a study by Yang, Zhang, and Zhang (2020). To test the research hypothesis, variables

 doi:10.20944/preprints202512.0315.v1

representing aspects of monitoring, oversight, and transparency of corporate governance were included in the model, since, according to the literature on the subject (Ravina & Sapienza, 2010; Tang, Chen & Chang, 2013; Ali & Hirshleifer, 2017; Jacob, 2019; Rahman, Faff & Oliver, 2020; Wu, Sorensen & Sun, 2019; Javakhadze, Pennathur & Silverstein, 2025; Contreras & Marcet, 2021), governance has aspects that can mitigate the opportunistic behavior of insiders.

The variable GC (Corporate Governance) was included in the model because some research indicates that governance mechanisms mitigate opportunistic behavior (Shleifer & Vishny, 1997; La Porta et al., 2000; Ali & Hirshleifer, 2017; Contreras & Marcet, 2021; Javakhadze, Pennathur & Silverstein, 2025). Conversely, adherence to differentiated levels of governance does not influence the improvement of governance practices (Black, Carvalho & Gorga, 2010; Ventura et al., 2024). Furthermore, depending on the culture and legislation, corporate governance mechanisms are not as effective in minimizing opportunism (Ventura et al., 2024; Macagnan, 2025). Given this context, it is believed that a firm assuming obligations that go beyond legal requirements may reduce unethical behavior within the firm.

Additionally, other variables representing monitoring, oversight, and transparency practices were included in the model, considering the behavioral aspect. It is expected that the variables proportion of women on the Board of Directors (PMCA), existence of a Fiscal Council (CF), and size of the audit board (TAMCAUD) will mitigate the indications of opportunistic insider trading, since, according to the literature, these three factors provide greater monitoring within the firm (Dash, 2012; Procianoy & Decourt, 2015; Elgammal, El-Kassar & Messarra, 2018; Borba et al., 2019; Rahman, Faff & Oliver, 2020; Gupta et al., 2020; Jain & Zaman, 2020; Wu, Sorensen & Sun, 2019; Ngo & Le, 2021).

Furthermore, regarding monitoring and oversight, there is the variable of firms audited by Big Four (AUDB4), in which some studies show that audit quality is better when performed by one of the largest firms (Francis & Yu, 2009; Eshleman & Guo, 2014). However, more recent studies show that the Big Four have been providing consulting services to firms involved in scandals (Abid et al., 2018; Donelson et al., 2020; Hasnan et al., 2022; Friedrich & Quick, 2023). Therefore, the relationship between the Big Four and audit viability can be positive, considering that audit quality decreases when they provide consulting services, or the relationship can be negative, since larger audit firms will have more resources to carry out greater oversight and monitoring.

Increasingly, managers are concerned about the risk to the firm's reputation and how their opportunistic behavior ex ante could cause ex-post reputational damage (Gao, Lisic & Zhang, 2014). In this sense, considering that a firm's ESG score, which is an intangible asset that helps promote self-discipline among managers (Gao, Lisic & Zhang, 2014), was included as a proxy for the Good Reputation variable (REPB). Considering the firm's fear of being involved in scandals related to opportunistic insider trading, as well as the concern about the firm's image in the market, it is believed that firms with ESG scores adopt ethical practices within the company.

Given that greater transparency reduces information asymmetry and, consequently, the insider's informational advantage, the variable "number of analysts covering the firm" was added to the model as a proxy for Information Quality (IQ). Analyst coverage corresponds to the absolute number of analysts who followed each firm in each period analyzed. Some studies have used this variable as a proxy for information asymmetry between insiders and outsiders in companies without analyst coverage (Hillier, Korczak & Korczak, 2015; Ellul & Panayides, 2018). Therefore, it is expected that IQ will reduce the signs of opportunistic insider trading.

Rahman, Faff, and Oliver (2020) showed that board independence restricts opportunistic insider trading in Australian firms. However, family-owned firms with high shareholding control may dilute board independence, reducing the effectiveness of monitoring (Jaggi & Tsui, 2007). Additionally, it was revealed that in the emerging market of Taiwan, family-owned firms engage in many insider trading transactions (Tang, Chen & Chang, 2013). Furthermore, according to the authors, firms with high ownership and shareholding control tend to leverage their control to manipulate results to engage in insider trading. Given this context, it is expected that Non-Family Firms (NFF) will reduce

 doi:10.20944/preprints202512.0315.v1

the likelihood of opportunistic activities and that the Proportion of Family Members on the Board (PFCA) will mitigate monitoring, thereby increasing the possibilities of misconduct for self-interest.

Considering informational asymmetry, several control variables that demonstrate firm information to the market were included in the model. Dividend payment, represented by the Dividend Yield (DY) variable, is directly related to the organization's future (Pietro Neto, Decourt & Galli, 2011). In this sense, shareholders who trust the firm prefer not to receive dividends so that investments can be made. On the other hand, when shareholders do not see prospects for the firm, they demand to receive the payment (La Porta et al., 2000). Furthermore, Simon, Procianoy, and Decourt (2019) found that low profitability in institutions may be related to a high distribution of dividends, due to the intention of signaling good future results through dividend policy. Thus, a positive relationship between DY and AIV is expected. The following equation was used to calculate Dividend Yield:

$$DY = \frac{D}{P_{t-1}} \tag{7}$$

where: DY = dividend yield. D = amount of dividends paid per share; and Pt-1 = value of the company's share on the day before the announcement date.

The variable Tarnished Reputation (REPM) is represented by the number of republications of financial statements. This variable was chosen because firms that exhibit opportunistic behavior in manipulating results and have characteristics of low financial performance are equated with firms with high republication rates (Ali & Hirshleifer, 2017; Javakhadze, Pennathur & Silverstein, 2025; Martins & Ventura Júnior, 2020). Furthermore, the occurrence of republications has been used in several studies as a proxy for misconduct (Ali & Hirshleifer, 2017), thus justifying the use of this variable for the robustness test. Regarding the main model, a positive relationship is expected between REPM and AIV.

The asset's natural logarithm will be a proxy for the Media Attention (MEDIA) variable, considering that the size of the company influences the attention received from the media, as well as from the most attentive analysts (Hodgson, Seamer & Uylangco, 2020). Another recent study also used firm size as a proxy for the level of media coverage (Asante-Appiah & Lambert, 2022). Furthermore, the literature (Vasconcelos, Gadi & Monte-Mor, 2016; Ali & Hirshleifer, 2017; Borochin, Ghosh & Huang, 2019) indicates that smaller firms are more likely to adopt insider trading policies, as well as to perform greater earnings management. Therefore, it is believed that concern about the firm's impact on society and the market inhibits managers from engaging in opportunistic actions.

Volatility was chosen to be part of the model because it is related to the uncertainty of the financial market and, consequently, affects investors' decisions. Volatility is a measure used for risk and constitutes the rate of change in the price of a security at a given moment (Bhowmik & Wang, 2020). Therefore, the higher the volatility, the greater the chance of gain or loss in the short term, increasing the risk of the asset in question. Thus, volatility will be used as a proxy for Leaked Information (IVAZ) and its calculation was performed according to equation (8):

$$VOLAT_{i,t} = \sqrt{\frac{\sum(S_{i,d} - \bar{S})^2}{n}} \tag{8}$$

where, VOLATi,t = Volatility of the closing price of corporation i's stock in year t. Sd = natural logarithm of (Pd / Pd-1); where d = 1...n and Pd = closing price of the stock on day d. $\bar{S}$ = Average of Sd in the year. n = Number of quotation days in the year.

The risk of information leaks is associated with trading involving information that has not yet been disclosed (Kacperczyk & Pagnotta, 2019). That is, an increase in the number of people involved in such activity, or if a firm is about to announce mergers and acquisitions, will increase the risk of information leaks to the public. Therefore, the market will pay closer attention to the company and, therefore, demand higher returns for assuming the legal risk. In this sense, Kacperczyk and Pagnotta (2019) argue that the volatility of asset prices and abnormal trading reflects private information to the

 doi:10.20944/preprints202512.0315.v1

public, which subsequently determines the action of carrying out illegal trades with privileged information. Therefore, it is expected that Information Leaks (IVAZ) are directly related to evidence of opportunistic insider trading.

The control variable representing Profitability (RENT) is measured by asset turnover multiplied by net profit margin. It is important to add this variable to the model to control effects related to the firm's financial performance. Given that managerial opportunism is negatively associated with accounting and performance-based measures of the firm, a negative relationship is expected between profitability and firm misconduct. The results found will be presented, analyzed, and discussed below.

3.2. Data and Sample

To achieve the proposed objective, it was necessary to select the study population and sample. Thus, the population consisted of all firms listed on the [B]3 stock exchange, between the continuous periods of 2010 and 2021, totaling a period of 12 years. This period was chosen due to the change in accounting standards in 2009. Also, from 2010 onwards, firms were required to disclose information in their Reference Reports. Regarding the sample definition, firms that conducted an IPO in 2021 were excluded because they did not present the necessary data for the study. Another exclusion factor was the absence of daily returns. This occurred due to the calculation of the daily residual for the construction of the AIV (Annual Variable Income). Therefore, the company must have daily returns starting from 2009. Considering that the first business day of the sample is 04/01/2010, then the regression was calculated for the period from 05/01/2009 to 04/01/2010. After the necessary exclusions, the final sample resulted in 340 firms, as shown in Table 2.

Table 2. Criteria for excluding firms from the sample.

Total Number of Stock Forms with Shares Traded on the [B]^3 in 2021	456
(-) Companies with data Only from 2021 onwards	(32)
(-) Companies without daily returns (2009 a 2021)	(187)
(=) Final number of firms included in the survey sample	**237**

Source: Research data.

For this research, the years 2010 to 2021 will be analyzed, totaling 2,175 observations. It is worth noting that some firms do not appear in all years, considering that they began trading on the stock exchange after 2010, and there is also a lack of data for the study period. Therefore, an analysis was performed using unbalanced panel data. Even so, studying for twelve years may be enlightening in helping to find a more reliable and robust result for this research.

The databases used to gather information regarding accounting reports were Economatica® and Refinitiv. Governance information was retrieved from the Comdinheiro database, and information on shareholding composition was collected from the Fundamentus website (2023) to construct the non-family firm's variable. Data relating to the three factors used in the Fama and French model (1993), MKT, SMB, and HML, were obtained daily from NEFIN (Brazilian Center for Research in Financial Economics of the University of São Paulo). The following information was collected from the CVM website for the calculation of Abnormal Idiosyncratic Volatility:

a) Date and time of publication of the Quarterly Financial Statements.

b) Date and time of publication of the Annual Financial Statements.

c) Date and time of publication of Material Facts.

Regarding the relevant facts, these were chosen to compose the research based on the relevance of the disclosed theme, which may influence the change in the firm's stock price (Meulbroek; 1992; Lei & Wang, 2014; Borochin, Ghosh & Huang, 2019; Goergen, Renneboog & Zhao, 2019). These are: (i) merger, spin-off, and incorporation; (ii) partnership agreements; (iii) acquisition and/or discovery of natural resources for potential economic-financial exploitation; (iv) termination and/or prohibition

 doi:10.20944/preprints202512.0315.v1

of natural resource exploitation; (v) business plan or projections; (vi) judicial reorganization; and (vii) bankruptcy. The data were processed and organized using spreadsheets, and panel data regressions, as well as specification tests, were performed using the Stata statistical software.

4. Empirical Results

4.1. Descriptive Statistics

To meet the statistical assumptions, it was necessary to process the data to avoid distortions in the estimations. Therefore, continuous variables were normalized by transforming them into natural logarithms or square roots. Regarding the treatment of outliers, win score reduction at 1% was performed, except for dummy variables which did not receive any statistical treatment. Thus, Table 3 presents the basic descriptive statistics of the variables used in the study for the period from 2010 to 2021.

Table 3. Descriptive analysis of the sample. 2010-2021.

Variables	Notes	Mean	Std. Err.	[95% Conf. Interval]	
AIV	2,175	0,105752	0,380739	-2,808517	1,86598
GC	2,175	0,694252	0,460829	0	1
PMCA	2,175	0,195989	0,222871	0,010000	0,89448
CF	2,175	0,664367	0,472319	0	1
REPB	2,175	2,444709	3,423881	0,010000	9,33813
TAMCAUD	2,175	0,691869	0,878047	0,010000	2,44951
AUDB4	2,175	0,769655	0,421150	0	1
QI	2,175	1,200000	2,920599	0	13
FNF	2,175	0,362298	0,480775	0	1
PFCA	2,175	0,277199	0,439584	0,010000	1,00005
DY	2,175	3,521512	9,619947	0	339,518
REPM	2,175	1,383448	0,695697	0	7
MIDIA	2,175	15,16533	2,054572	3,258097	21,03749
IVAZ	2,175	5,229824	2,636889	0,010000	21,77653
RENT	2,175	1,992001	13,64294	-226,1382	125,3015

AIV = Abnormal Idiosyncratic Volatility; GC = Corporate Governance; PMCA = Proportion of Women on the Board of Directors; CF = Fiscal Council; REPB = Good Reputation; TAMCAUD = Audit Committee Size; AUDB4 = Firms audited by Big Four; QI = Information Quality; FNF = Non-Family Firms; PFCA = Proportion of Family Members on the Board of Directors; DY = Dividend Yield; REPM = Tarnished Reputation; MIDIA = Media Attention; IVAZ = Leaked Information; RENT = Profitability. Source: Research results (2025).

The Abnormal Idiosyncratic Volatility (AIV) variable represents evidence of opportunistic insider trading, with descriptive statistics showing a maximum value of 1.86 and a minimum of -2.81, where the higher the AIV value, the greater the indication of opportunistic insider behavior. This is because abnormal returns in the period before the release of results are higher compared to returns after the release of information (Seyhun, 1986).

Regarding the corporate governance (CG) variable, which consists of firms listed on the Novo Mercado and Level 2, the results showed that, on average, 70% of the firms in the sample are listed at the highest levels of corporate governance. This data shows that most firms listed on the [B]3 comply with the requirements imposed for adherence to governance levels, demonstrating to the market that they follow rules that exceed what the law requires. In this sense, the literature (Lee et al., 2014; Dai et al., 2016; Hodgson, Seamer & Uylangco, 2020; Javakhadze, Pennathur & Silverstein,

 doi:10.20944/preprints202512.0315.v1

2025) explains that firms with better governance practices impose policies to restrict opportunistic insider trading activities more effectively, as they have more effective monitoring.

The variable Proportion of Women on the Board of Directors (PMCA) showed that at most one woman is part of the board, and in the sample, only 20%, on average, do firms have gender diversity. It is worth noting that this variable underwent winsorization and, therefore, the result may present a small variation. Even so, the number of women members on the boards of the firms is questionable. Mainly because it has already been demonstrated in previous studies that the presence of female members can increase monitoring, since they are more conservative and make more ethical decisions (Adams & Ferreira, 2009; Ngo & Le, 2021). The variable representing the existence of the Fiscal Council (FC) showed that, on average, 66% of the firms in the sample have this body. This result is positive, considering that the function of the fiscal council is to oversee the actions of the administrators, give an opinion on the annual management report, and report opportunistic actions to the management bodies or the general assembly, suggesting useful measures (Brazil, 1976).

Regarding the Good Reputation (REPB) result, Table 2 shows that the highest score for ESG practices is 9. However, only 2%, on average, of Brazilian firms adopt these practices. This result shows that adherence to ESG standards is still incipient when compared to other countries (Gao, Lisic & Zhang, 2014; He, Du & Yu, 2022). As for the variable (AUDB4), on average, 77% of the sample is audited by the Big Four, showing that most firms prefer to be audited by large auditing firms.

Furthermore, Table 3 shows that the number of analysts following the firms, represented by the variable (QI), varies from 0 to 13, with firms followed by analysts. This result demonstrates a discrepancy in relation to the attention given to the firms. In this sense, the variable (MEDIA), represented by the size of the company, also showed a substantial difference between the minimum (3.26) and the maximum value (21.04). These results corroborate a recent study that showed that the size of the firm influences the attention received from analysts and the media in general (Hodgson, Seamer & Uylangco, 2020). This difference between the minimum and maximum also occurred with the variable Leaked Information (IVAZ), represented by volatility, whose result pointed to a minimum of (0) and a maximum of (22), for an average of (5%).

The results found regarding Non-Family Firms (NFF) demonstrate that, on average, only 36% are not family-owned. This result shows how concentrated ownership is, corroborating previous studies that address the characteristics of the Brazilian market (Crisóstomo & Brandão, 2019; Yang & Xie, 2024; Arias, Valencia & González, 2021; Macagnan, 2025). Additionally, the variable Proportion of Family Members on the Board of Directors (PFCA) shows that, on average, 28% of the firms have at least one family member participating on the Board of Directors. In this sense, the presence of family members participating in the firm's governing bodies significantly reduces the effectiveness of monitoring (Jaggi & Tsui, 2007).

Regarding the Tarnished Reputation Index (PRI), represented by the number of republications of reports, on average, 1.4% of the firms republish reports. However, the results showed that there was a maximum of (7) republications of the same document. This fact may signal to the market that the firm may have problems with corporate misconduct. This is because the firm may republish due to error or fraud. In the latter case, the firm is obliged to correct the statements (Dechow, Ge & Schrand, 2010; Ali & Hirshleifer, 2017; Javakhadze, Pennathur & Silverstein, 2025). In short, the results indicate that, basically, the research sample consists of firms listed at the highest levels of corporate governance, audited by Big Four firms, and with ownership concentrated in a family group. Table (3), below, shows the Pearson correlation matrix. This test is important to analyze whether the study variables contain the autocorrelation problem. According to Wooldridge (2014), a correlation between two variables above 0.80 represents the multicollinearity problem. As observed in Table 4, no multicollinearity problem occurred, given that the correlations between the variables are below the proposed level.

 doi:10.20944/preprints202512.0315.v1

Table 4. Pearson Correlation Matrix. 2010-2021.

	AIV	GC	PMCA	CF	REPB	TAMCAUD	AUDB4
AIV	1						
GC	-0.1842*	1					
PMCA	-0.0364	-0.0678*	1				
CF	-0.0542*	0.1074*	0.0147	1			
REPB	-0.2617*	0.3429*	0.1179*	0.1945*	1		
TAMCAUD	-0.1551*	0.2642*	0.0244	0.0405	0.3587*	1	
AUDB4	-0.0338	0.3788*	-0.0281	0.0921*	0.2416*	0.2406*	1
QI	-0.2397*	0.2297*	0.2116*	0.1521*	0.4018*	0.2489*	0.1261*
FNF	-0.0680*	0.0393	0.0488*	0.1792*	0.2011*	0.2638*	0.1534*
PFCA	0.0314	0.0168	-0.0005	-0.0943*	-0.0855*	-0.1278*	-0.0487*
DY	0.0507*	-0.0572*	0.0721*	0.0008	0.0057	0.0003	0.0086
REPM	0.0575*	0.0674*	-0.0557*	-0.0085	-0.0083	0.0928*	0.0944*
MIDIA	-0.2270*	0.4001*	0.0314	0.2705*	0.6608*	0.4113*	0.4167*
IVAZ	-0.0902*	0.3010*	-0.0639*	0.0363	0.1075*	0.0818*	0.0807*
RENT	-0.0463*	0.0295	0.0837*	-0.0053	0.0880*	0.0433*	0.1684*

	QI	FNF	PFCA	DY	REPM	MIDIA	IVAZ
QI	1						
FNF	0.0905*	1					
PFCA	-0.0615*	-0.4583*	1				
DY	-0.0126	0.0121	-0.0115	1			
REPM	-0.0468*	0.0740*	-0.0522*	0.0069	1		
MIDIA	0.3478*	0.2184*	-0.0891*	0.0275	0.1412*	1	
IVAZ	0.1428*	0.0105	-0.0169	-0.1030*	-0.0049	0.0910*	1
RENT	0.0689*	0.0249	-0.0075	0.1022*	-0.0119	0.1227*	-0.1648*

	RENT
RENT	1

AIV = Abnormal Idiosyncratic Volatility; GC = Corporate Governance; PMCA = Proportion of Women on the Board of Directors; CF = Fiscal Council; REPB = Good Reputation; TAMCAUD = Audit Committee Size; AUDB4 = Firms audited by Big Four; QI = Information Quality; FNF = Non-Family Firms; PFCA = Proportion of Family Members on the Board of Directors; DY = Dividend Yield; REPM = Tarnished Reputation; MIDIA = Media Attention; IVAZ = Leaked Information; RENT = Profitability.Source: Research results (2025).

The variable corporate governance (CG) showed a correlation with firms audited by Big Four (AUDB4) of (37.88%) and (40%) with the variable media attention (MEDIA). The variable good reputation (REPB) and the size of the audit board showed a correlation of 35.87%. Information quality (QI) and good reputation (REPB) correlated (40.18%). The variable audited by Big Four (AUDB4) showed a positive correlation with media attention (MEDIA) of 41.67%. Among all the variables, the one that showed the highest correlation with the dependent variable, abnormal idiosyncratic volatility (AIV), had a good reputation (REPB), with a negative percentage of (26.17%). Thus, it is found that there are no multicollinearity problems.

4.2. Corporate Governance as a Mechanism for Mitigating Opportunistic Insider Trading

Specification tests for panel data models indicated that the fixed effects model is the most suitable for estimating equation (1). After this step, regression was performed with unbalanced panel

 doi:10.20944/preprints202512.0315.v1

data for fixed effects. According to Belsley, Kuh, and Welsch (2005), if the centered variance inflation (VIF) factors are less than 10, there will be no multicollinearity problems. These factors were calculated for the independent variables of the model, and as shown in Table 4, the factors had an average of 1.36, coinciding with the result of the correlation matrix regarding the absence of the multicollinearity problem. Table 5 below shows the result of the equation estimation for the hypothesis test of this study, which indicates that aspects of corporate governance mitigate the signs of opportunistic insider trading, in accordance with the research objective. Thus, the first column shows the variables of the study, the second column the result of the VIF test, and the third column shows the coefficients with their respective significance levels.

Table 5. Results of the estimation of corporate governance aspects that mitigate indications of opportunistic insider trading using the Fixed Effects Panel. 2010-2021.

AIV	(1)	VIF	(2)	VIF	(3)	VIF
GC	-0,335748***	1,31	-0,301724***	1,35	-0,307789***	1,45
PMCA	-0,118513**	1,07	-0,094597**	1,07	-0,099387**	1,09
CF	-0,059629**	1,05	-0,042815**	1,12	-0,049856**	1,12
REPB	-0,016855***	1,42	-0,010072*	1,99	-0,011446**	1,99
TAMCAUD	-0,030828**	1,21	-0,023818	1,32	-0,026833*	1,32
AUDB4	0,054478**	1,21	0,068827**	1,32	0,073703**	1,35
QI	-0,014681***	1,28	-0,009736***	1,30	-0,010559***	1,31
FNF			-0,064125	1,40	-0,075573*	1,40
PFCA			0,042049	1,27	0,045660*	1,27
REPM			0,042596***	1,06	0,043177***	1,06
MIDIA			-0,068199***	2,32	-0,061287***	2,33
DY					0,001829**	1,03
IVAZ					0,012757***	1,16
RENT					-0,001146*	1,09
_cons	0,438916***	1,22	1,347894***	1,41	1,188087***	1,36
Nº Obs	**2.187**		**2.181**		**2.175**	
Nº de Groups	**240**		**238**		**237**	
R^2 (within)	**0,0662**		**0,0828**		**0,0908**	
F	**19,65**		**15,85**		**13,73**	
Prob. F	**0,0000**		**0,0000**		**0,0000**	

AIV = Abnormal Idiosyncratic Volatility; GC = Corporate Governance; PMCA = Proportion of Women on the Board of Directors; CF = Fiscal Council; REPB = Good Reputation; TAMCAUD = Audit Committee Size; AUDB4 = Firms audited by Big Four; QI = Information Quality; FNF = Non-Family Firms; PFCA = Proportion of Family Members on the Board of Directors; DY = Dividend Yield; REPM = Tarnished Reputation; MIDIA = Media Attention; IVAZ = Leaked Information; RENT = Profitability. Source: Research results (2025). Note: The values presented represent the regression coefficients. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

The variables representing aspects of corporate governance about increased monitoring and oversight, namely corporate governance (CG), proportion of women on the board of directors (PMCA), existence of a fiscal council (FC), and size of the audit committee (TAMCAUD), showed statistical significance and a negative relationship with the AIV variable, at 1%, 5%, 5%, and 10%, respectively. This result corroborates the literature, as opportunistic behavior can be mitigated by a more efficient governance structure with greater monitoring (Williamson, 1988; 1999; Chung et al., 2019; Rahman, Faff & Oliver, 2020). Therefore, considering more effective monitoring, other studies

 doi:10.20944/preprints202512.0315.v1

have also found that the participation of women on the board of directors can reduce corporate misconduct, given that women are less predisposed to engage in opportunistic behavior, are more compliant with legislation, are more risk-averse, have greater ethics, and are more likely to participate in corporate governance monitoring committees (Adams & Ferreira, 2009; Cumming, Leung & Rui, 2015; Gupta et al., 2020; Jain & Zaman, 2020; Wu, Sorensen & Sun, 2019).

Previous studies have found that the size of the audit committee and the presence of the fiscal council contribute to greater monitoring within the firm (Borba et al., 2019; Oradi & Izadi, 2020; Ngo & Le, 2021), coinciding with the findings of this research. Therefore, although the audit committee and the fiscal council are distinct bodies, they are important for monitoring and overseeing management and, especially, for analyzing financial statements to ensure that these documents accurately reflect the firm's reality, increasing the transparency and reliability of accounting information.

The variable "number of analysts" used as a proxy for information quality (IQ) showed a negative relationship with the AIV at 1%. Considering that insiders have an informational advantage over other investors (Akerlof, 1970; Myers & Majluf, 1984; Easley & O'Hara, 1987; Williamson, 1991, 1993, 1999; Masson & Madhavan, 1991; Wang, 1993; Shleifer & Vishny, 1997; Easley & O'Hara, 2004), the information disclosed by analysts can reduce information asymmetry. In this sense, the result found is in line with the literature, since financial analysts reduce the informational advantage of insiders, thus reducing market failure (Hillier, Korczak & Korczak, 2015; Cline, Gokkaya & Liu, 2016; Ellul & Panayides, 2018; Wu, Sorensen & Sun, 2019).

The variable "non-family firms" (NFF) showed a negative relationship at 10% with indications of opportunistic insider trading, represented by the AIV. This result corroborates previous studies that demonstrated that family-controlled ownership and higher shareholding concentration foster the trading of private information before the disclosure of financial reports (Grossman & Stiglitz, 1980; Claessens, Djankov & Lang, 2000; Jaggi & Tsui, 2007; Huang, Hou & Cheng, 2012; Elgammal, El-Kassar & Messarra, 2018; Abid et al., 2018; Rahman, Faff & Oliver, 2020; Arias, Valencia & González, 2021; Yang & Xie, 2024). This is because privileged information flows through strong social ties based on family, friends, and geographical proximity (Ahern, 2017).

Shleifer and Vishny (1997) explain that one of the central problems of governance relates to the concentration of ownership, which can expropriate the assets of non-controlling shareholders, thus legitimizing the result found in this work (Jaggi & Tsui, 2007; Elgammal, El-Kassar & Messarra, 2018). The variable proportion of family members on the board of directors (PMCA) showed a positive relationship with the AIV at 10%, in accordance with the literature on the subject. In this sense, a higher proportion of independent directors moderates the positive association between insider trading and earnings management (Jaggi & Tsui, 2007). Similarly, the variable representing firms audited by Big Four firms showed a positive relationship at 5% for indications of opportunistic insider trading. This result is not surprising, given that previous studies have found that firms audited by Big Four firms are generally involved in fraud scandals, earnings management, and opportunistic insider trading (Healy & Palepu, 2001; He et al., 2017; Abid et al., 2018; Javakhadze, Pennathur & Silverstein, 2025).

Furthermore, earnings management is widespread in family businesses, and auditors from the Big Four do not moderate the relationship between family firm control and earnings management (Abid et al., 2018; Javakhadze, Pennathur & Silverstein, 2025). For example, the auditing firm that was monitoring Americanas was PricewaterhouseCoopers Auditores Independentes Ltda ("PwC"), which found no irregularities in the firm and, according to a relevant fact published by the company on June 28 of this year, was replaced by an auditing firm that is not a Big Four member.

The variable "good reputation" (REPB), represented by the ESG score, showed a negative and significant relationship at 5% with the AIV. This result confirms that the behavioral factor, through concern for reputation, can be an informal enforcement mechanism against opportunism (Williamson, 1988; 1993; 1999). Previous studies have shown that companies that adhere to ESG practices establish codes of ethical conduct, encouraging ethical behavior through an organizational

 doi:10.20944/preprints202512.0315.v1

culture focused on social, environmental, and corporate responsibility, thus discouraging insiders from adopting opportunistic attitudes (Gao, Lisic & Zhang, 2014; Hillier, Korczak & Korczak, 2015; Lu, 2023).

From this same perspective, the variable MEDIA, which represents media attention to the firm, showed a negative relationship at 10% with indications of opportunistic insider trading, corroborating the literature that points out that smaller firms tend to be more prone to opportunistic actions (Vasconcelos, Gadi & Monte-Mor, 2016; Ali & Hirshleifer, 2017; Borochin, Ghosh & Huang, 2019; Hodgson, Seamer & Uylangco, 2020). Larger firms, on the other hand, due to their greater media visibility and market attention, seek to focus on the quality of governance as a means of avoiding opportunistic actions within the firm (Javakhadze, Pennathur & Silverstein, 2025).

Media coverage of opportunistic insider behavior can affect public opinion and perpetuate the perception of widespread misconduct, exacerbating reputational damage (Dai, Parwada & Zhang, 2015). Furthermore, the media can play a more effective role in a society where people share viewpoints on social media and firm interaction with stakeholders is frequent and important (Dai, Parwada & Zhang, 2015; Hodgson, Seamer & Uylangco, 2020). In this way, media coverage can play a role in corporate governance through news disclosure, as insiders may avoid trading with privileged information for fear of negative exposure.

The DY variable showed a positive relationship of 5% with AIV, indicating that firms with opportunistic problems need to pay higher dividends to shareholders to compensate for the risk they face, given the uncertainty about the firm's future, corroborating previous studies (Pietro Neto, Decourt & Galli, 2011; Simon, Procianoy & Decourt, 2015; Javakhadze, Pennathur & Silverstein, 2025). In this context of projecting a negative image to the market, the republication variable, as a proxy for tarnished reputation (REPM), showed a significant and positive relationship for indications of insider trading at 1%. This result confirms previous studies, which indicate that the more republications a firm performs, the greater the likelihood of misconduct having occurred within the firm (Benyoussef & Khan, 2017; He et al., 2017; Ali & Hirshleifer, 2017; Elgammal, El-Kassar & Messarra, 2018; Martins & Ventura Júnior, 2020; Oradi & Izadi, 2020; He, Du & Yu, 2022).

Furthermore, the result of the leaked information variable (IVAZ), represented by volatility, showed a positive and significant relationship at 10% with indications of opportunistic insider trading. This result is confirmed by the literature (Degryse, De Jong & Lefebvre, 2014; Lei & Wang, 2014; Vitale, 2018; Posylnaya, Cline & Aaron, 2019; Contreras & Marcet, 2021; Ryu, Yang & Yu, 2022), which reports that when there is high volatility in a given stock, there are likely indications of trading with information that has not yet been disclosed, given that the value traded before the disclosure of the information does not contain the fair price, due to the informational asymmetry between the insider and other investors (Akerlof, 1970; Williamson, 1988; 1999).

Finally, the profitability control variable (RENT) showed an inverse relationship with the AIV of 10%, meaning that firms less likely to engage in opportunistic insider trading behaviors inspire greater confidence in the market and thus have higher profitability (Fama, 1978; Myers & Majluf, 1984; Verrecchia, 2001; Elgammal, El-Kassar & Messarra, 2018; Javakhadze, Pennathur & Silverstein, 2025). Firms with efficient corporate governance, which mitigates opportunism, encourage value creation (Jacob, 2019; Contreras & Marcet, 2021). In this context, opportunistic behavior can have negative effects on firm value. As Williamson (1999) states, opportunistic behavior increases the risk of contracts.

Thus, the results showed that the research hypothesis was not rejected. Furthermore, the expected signs of the variables were confirmed. Therefore, aspects of corporate governance, through increased monitoring and transparency, are necessary to combat opportunistic behavior and reduce information asymmetry, consequently mitigating signs of opportunistic insider trading (Jensen & Meckling, 1976; Fama, 1980; Fama & Jensen, 1983; Williamson, 1979; 1988; 1991; 1993; 1999; Ali & Hirshleifer, 2017; Javakhadze, Pennathur & Silverstein, 2025). The robustness test is presented and analyzed below.

 doi:10.20944/preprints202512.0315.v1

4.3. Robustness Tests

For the robust test, equation (1) was re-estimated, replacing the variable AIV, which represents the indication of opportunistic insider trading, with the variable tarnished reputation REPM, which represents the republication of the firm's financial statements. This substitution was made because the literature reports that republication can represent opportunistic behavior by the firm (Benyoussef & Khan, 2017; He et al., 2017; Ali & Hirshleifer, 2017; Elgammal, El-Kassar & Messarra, 2018; Oradi & Izadi, 2020; He, Du & Yu, 2022). Furthermore, republication as a proxy for corporate misconduct has already been used in previous studies (Ali & Hirshleifer, 2017; Javakhadze, Pennathur & Silverstein, 2025; Asante-Appiah & Lambert, 2022). Therefore, it is expected that the results obtained from this robustness test will confirm the findings of this research.

As demonstrated in Table 6, three models were estimated to perform the robustness test. First, we tested the dependent variable tarnished reputation (REPM) only with the variables representing aspects of corporate governance, as per estimate (1), whose results are shown in the third column of the table. For this estimate, a significant and negative relationship is shown between tarnished reputation (REPM) and the variables corporate governance (CG), fiscal council (FC), and good reputation (REPB). At the same time, tarnished reputation (REPM) showed a positive and significant relationship at 5% with firms audited by Big Four (AUDB4). Even though the variables proportion of women on the board of directors (PMCA), size of the audit committee (TAMCAUD), and quality of information (QI) did not show a statistical relationship with REPM, the result showed a similarity, mainly in relation to the sign, with the findings when related to AIV.

For the second estimation, the following variables were added to the model: non-family firms (NFF), proportion of family members on the board of directors (PFCA), media attention (MEDIA), and leaked information (IVAZ). In this estimation, tarnished reputation (REPM) showed a negative and significant relationship with the same governance variables as the first model, as well as with the leaked information variable (IVAZ). Furthermore, the positive relationship with firms audited by Big Four (AUDB4) remained positive at 5%. The final model includes all the variables that were tested with evidence of opportunistic insider trading (AIV), the result of which was the same as that found in the second estimation.

Table 6. Robustness test results using the Fixed Effects Panel. 2010-2021.

		(1)		(2)		(3)
REPM	**VIF**	**Coef.**	**VIF**	**Coef.**	**VIF**	**Coef.**
GC	1,31	-0,41058***	1,45	-0,39454***	1,45	-0,39426***
PMCA	1,07	-0,0522	1,08	-0,05575	1,09	-0,0553517
CF	1,05	-0,10503**	1,12	-0,10192**	1,12	-0,10251**
REPB	1,42	-0,0432***	1,96	-0,04225***	1,96	-0,0423***
TAMCAUD	1,22	-0,02848	1,32	-0,02624	1,32	-0,02629
AUDB4	1,21	0,12428**	1,32	0,12249**	1,35	0,12252**
QI	1,28	-0,00798	1,30	-0,00678	1,30	-0,00679
FNF			1,40	0,04586	1,40	0,04564
PFCA			1,27	-0,03754	1,27	-0,03753
MIDIA			2,26	-0,01517	2,27	-0,01461
IVAZ			1,12	-0,01393*	1,16	-0,01403*
DY					1,03	-0,00001
RENT					1,09	-0,00014
_cons	1,22	1,78776***	1,42	2,06805***	1,37	2,06083***
Nº Obs		**2.175**		**2.175**		**2.175**
Nº de Groups		**237**		**237**		**237**

 doi:10.20944/preprints202512.0315.v1

R^2 (within)	**0,0297**	**0,0315**	**0,0315**
F	**8,44**	**5,70**	**4,82**
Prob. F	**0,0000**	**0,0000**	**0,0000**

REPM = Tarnished Reputation; GC = Corporate Governance; PMCA = Proportion of Women on the Board of Directors; CF = Fiscal Council; REPB = Good Reputation; TAMCAUD = Audit Committee Size; AUDB4 = Firms audited by Big Four; QI = Information Quality; FNF = Non-Family Firms; PFCA = Proportion of Family Members on the Board of Directors; DY = Dividend Yield; MIDIA = Media Attention; IVAZ = Leaked Information; RENT = Profitability. Source: Research results (2025).Note: The values presented represent the regression coefficients. ***, ** and * correspond to statistical significance at the 1%, 5% and 10% levels respectively.

Therefore, according to the robustness test performed, the result found in the main model is confirmed, which is in accordance with the literature on aspects of corporate governance that can mitigate opportunism and reduce information asymmetry, to avoid signs of opportunistic insider trading (Arrow, 1963; 1973; Akerlof, 1970; Myers & Majluf, 1984; Easley & O'Hara, 1987; Williamson, 1988; 1991; 1993; 1996; 1999; Masson & Madhavan, 1991; Wang, 1993; Shleifer & Vishny, 1997; Jensen & Meckling, 1976; Fama; 1980; Fama & Jensen, 1983; Gao, Lisic & Zhang, 2014; Hillier, Korczak & Korczak, 2015; Lu, 2023; Lee et al., 2014; Dai et al., 2016; Hodgson, Seamer & Uylangco, 2020; Javakhadze, Pennathur & Silverstein, 2025). The final considerations of this research are presented below.

5. Final Considerations

The Brazilian stock market is an emerging market with a small number of companies listed on the stock exchange, whose main source of financing still comes mostly from debt capital rather than investors. Furthermore, the ownership structure is concentrated, with most Brazilian firms having family control. As a result, when scandals involving opportunistic insider trading occur, investors who do not have access to privileged information end up being harmed. In this context, opportunistic attitudes can produce negative effects on the firm's value, as explained by Williamson (1996). This occurs because opportunistic insiders tend to disclose incomplete or distorted information in an unreliable manner and frequently fail to fulfill all the promises made. Therefore, opportunism is configured as a behavioral characteristic capable of influencing corporate activities, resulting in losses for the firm (Williamson, 1988; 1991; 1993; 1999).

Therefore, aligning transactions through governance structures can mitigate these problems, infusing order into a relationship where potential conflict threatens to undo opportunities for mutual gain, reducing bounded rationality, while protecting transactions against the risks of opportunism (Williamson, 1988; 1999). Furthermore, theoretical literature shows that a more efficient governance structure can mitigate these opportunistic attitudes through its mechanisms (Akerlof, 1970; Arrow, 1973; Williamson, 1988, 1996).

Given the above, this article analyzed which aspects of corporate governance mitigate the signs of opportunistic insider trading, considering the behavioral assumptions of bounded rationality and opportunism in an environment of uncertainty. To this end, the Abnormal Idiosyncratic Volatility (AIV) metric was employed, which detects signs of opportunistic insider trading in the context of an influential emerging market. The results showed that more rigorous monitoring, evidenced by greater representation of women on the Board of Directors, the presence of a Fiscal Council, and a more robust Audit Committee, along with greater transparency through the disclosure of company information by analysts, can reduce the signs of opportunistic insider trading.

Additionally, the results revealed that, beyond strengthening monitoring and transparency aimed at mitigating information asymmetry and opportunism, insiders express concern about their respective reputations in the market and society. Thus, variables reflecting this apprehension, such as good reputation (REPB), represented by the ESG score, and media attention, represented by firm size, showed a negative relationship with indications of opportunistic insider trading. This finding corroborates the literature suggesting that behavioral factors, through the valuation of reputation,

 doi:10.20944/preprints202512.0315.v1

can operate as an informal enforcement mechanism against opportunism (Williamson, Williamson, 1988; 1993; Gao, Lisic & Zhang, 2014; Hillier, Korczak & Korczak, 2015; Lu, 2023). On the other hand, variables indicating opportunistic traits in firms showed a positive correlation with evidence of opportunistic insider trading. This is because the more republication a firm performs, the greater the likelihood of misconduct within the firm. Furthermore, high volatility may indicate transactions based on undisclosed information.

Therefore, the research hypothesis was confirmed, and the results obtained corroborate the findings of previous studies. In this context, the results of this study represent relevant contributions to literature and the market, considering several factors. Firstly, Abnormal Idiosyncratic Volatility (AIV), a measure of information risk based on stock prices, was used as a proxy for detecting signs of opportunistic insider trading. This measure is based on the difference in a company's idiosyncratic volatility between the periods before and after the announcement of results and the disclosure of relevant facts. The information captured by AIV is associated with the expected return on shares. Additionally, AIV is correlated not only with reported variations in returns but also with insider trading practices, short selling, and institutional trading activities (Yang, Zhang & Zhang, 2020).

Furthermore, the results show that stricter legislation alone is not sufficient. If legal regulation alone could eradicate opportunistic actions, there would be no occurrences of opportunistic insider trading in countries with stricter regulations and legislation. Consequently, this research fills a gap in the literature by demonstrating that, in addition to increased monitoring and transparency, which are fundamental to mitigating signs of opportunistic insider trading, it also brings an innovation by highlighting that informal enforcement mechanisms against opportunistic attitudes, through increased internal pressure for ethical conduct among insiders, aiming to avoid negative repercussions in both the market and society, have the potential to mitigate signs of opportunistic insider trading.

It is also worth noting that regulators should exercise oversight and monitoring of the use of insider information. Furthermore, they should encourage greater disclosure of information by companies to reduce the risk of opportunistic behavior and thus create a more protected environment less prone to future losses. Therefore, considering the significant role of the Brazilian stock market in Latin America and its distinct characteristics, this thesis offers a contribution by incorporating the behavioral perspective of insiders and emphasizing which aspects of corporate governance reduce the motivation for engaging in insider trading.

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Appendix A

Table A1. Definition of the variables studied in the research.

ABBREVIATION	VARIABLE	DESCRIPTION / CALCULATION	THEORETICAL BASIS
Dependent Variable			
AIV	Abnormal Idiosyncratic Volatility	It detects evidence of opportunistic insider trading.	(Williamson, 1979; 1988; 1991; 1993; 1999; Fama, 1980; Akerlof, 1970; Grossman & Stiglitz, 1980; Yang, Zhang & Zhang, 2020)
Independent Variables			
GC	Corporate Governance	A dummy variable that takes the value 1 if the firm is part of the Novo Mercado and Level 2 of corporate governance, and 0 otherwise.	(Shleifer & Vishny, 1997; La Porta et al., 2000; Ravina & Sapienza, 2010; Jagolinzer *et al.*, 2011; Lee *et al.*, 2014; Ali & Hirshleifer, 2017; Contreras & Marcet, 2021; Javakhadze, Pennathur & Silverstein, 2025).
PMCA	Proportion of Women on the Board of Directors	Number of women on the board of directors divided by the total number of members.	(Cumming, Leung & Rui, 2015; Gupta *et al.*, 2020; Jain & Zaman, 2020; Wu, Sorensen & Sun, 2019; Ngo & Le, 2021)
CF	Fiscal Council	A dummy variable that takes the value 1 if the firm has a fiscal council and 0 otherwise.	(Procianoy & Decourt, 2015; Elgammal, El-Kassar & Messarra, 2018; Borba et al., 2019; Jain & Zaman, 2020)
REPB	Good reputation	It is represented by the ESG score. It refers to an overall company score based on self-reported information in the environmental, social, and corporate governance pillars.	(Dechow, Ge & Schrand, 2010; Gao, Lisic & Zhang, 2014; Ali & Hirshleifer, 2017; Elgammal, El-Kassar & Messarra, 2018; Javakhadze, Pennathur & Silverstein, 2025)
TAMCAUD	Audit Committee Size	Number of members on the audit committee.	(Dash, 2012; Borba et al., 2019; Rahman, Faff & Oliver, 2020; Ngo & Le, 2021)

 doi:10.20944/preprints202512.0315.v1

AUDB4	Audited by Big Four	A dummy variable that takes the value 1 if the firm is audited by auditing firms, characterized as the Big Four, and 0 otherwise.	(Healy & Palepu, 2001; Francis & Yu, 2009; Eshleman & Guo, 2014; He et al., 2017; Abid et al., 2018; Donelson et al., 2020; Hasnan et al., 2022; Friedrich & Quick, 2023)
QI	Information Quality	It is represented by the number of analysts who follow the firm.	(Healy & Palepu, 2001; Ellul & Panayides, 2018; Wu, Sorensen & Sun, 2019)
FNF	Non-Family Businesses	A dummy variable that takes the value 1 if the firm is not classified as family-owned, and 0 otherwise.	(Grossman & Stiglitz, 1980; Claessens, Djankov & Lang, 2000; Abid et al., 2018; Rahman, Faff & Oliver, 2020; Yang & Xie, 2024; Arias, Valencia & González, 2021)
PFCA	Percentage of Family Members on the Board of Directors	Percentage of family member participation on the Board of Directors.	(Grossman & Stiglitz, 1980; Jaggi & Tsui, 2007; Elgammal, El-Kassar & Messarra, 2018; Abid et al., 2018)
Control Variables			
DY	*Dividend Yield*	Value of dividends paid divided by the value of the firm.	(La Porta et al., 2000; Pietro Neto, Decourt & Galli, 2011)
REPM	Tarnished Reputation	Number of republications performed by the firm.	(He et al., 2017; Ali & Hirshleifer, 2017; Elgammal, El-Kassar & Messarra, 2018; ORADI; IZADI, 2020; He, Du & Yu, 2022)
MIDIA	Media Attention	Natural logarithm of total assets.	(Dai, Parwada & Zhang, 2015; Elgammal, El-Kassar & Messarra, 2018; Contreras & Marcet, 2021).
IVAZ	Leaked Information	Volatility.	(Lei & Wang, 2014; Vitale, 2018; Posylnaya, Cline & Aaron, 2019; Contreras; Marcet, 2021; Ryu; Yang; Yu, 2022)
RENT	Profitability	Asset turnover multiplied by net profit margin.	(Fama, 1978; Myers & Majluf, 1984; Verrecchia, 2001; Elgammal, El-Kassar & Messarra, 2018; Javakhadze, Pennathur & Silverstein, 2025)

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