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Effects of Corporate Fraud on the Value Relevance of Brazilian Publicly-Held Companies

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Abstract

Objective: To verify the relationship between signs of corporate fraud and the relevance of accounting information in Brazilian publicly-held companies.
Method: A sample of 126 publicly traded companies listed on the B3 was used, from 2011 to 2020, whether they were involved in different situations that indicate fraud. Fraud was measured by a dummy variable that aimed to capture whether the company was involved in a case of fraud reported in the media or by the existence of a sanctioning administrative process. To analyze this interaction, the econometric model of value relevance, proposed by Collins et al. (1997), complemented Ohlson's model (1995).
Results: Generally, the results denote that profit and equity are relevant to their information. However, when analyzing companies with signs of fraud, the loss of relevance of net income is observed, while the relevance of shareholders' equity started to have "inverse relevance" of its information, as it presented a negative sign.
Contributions: The findings contribute by highlighting the importance of considering the occurrence of corporate fraud when interpreting accounting information. The loss of relevance of net income may indicate questionable accounting practices, which undermines investor confidence and negatively affects the ability to assess the performance and value of companies. In addition, the "inverse relevance" of equity suggests that corporate fraud can distort the financial reality of companies, making accounting information less reliable and valuable for users.

Keywords: Corporate Fraud; Relevance of Accounting Information; Quality of Accounting Information.

How to cite

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Introduction

An organization's financial statements represent the last stage of the accounting cycle's execution, indicating its financial position and performance within a given period. The practices of analysis, registration, classification, summary, and disclosure of an entity's information are the procedures that characterize this cycle (Albrecht et al., 2015). Accounting information is still the main foundation for identifying deviations that may compromise the veracity of the information reported in the statements (Bertomeu et al., 2021).

Such distortions constitute disguising information and falsifying data, resulting in accounting and financial fraud. According to Kanapickien and Grundien (2015), fraud usually occurs to show that society continues to grow and fulfill its legal obligations. The authors also point out that research uses financial indexes that aim to signal aspects of the motivation of managers and employees of society to commit fraud.

In the conception of Albrecht et al. (2015) and Eckert et al. (2014), fraud embedded in financial statements is based on a composure that negatively affects individuals, organizations, and society. In addition, the occurrence of fraudulent financial acts is harmful to investors, and to a greater extent, to the organization's long-term shareholders (Shi et al., 2017).

In this context, the information disclosed through the financial statements carries potential importance to the interests of the reporting entity's investors in a way in which they can develop their stimuli for risk analysis and fraud identification (Brazel et al., 2015).

The issue of illicit behavior practiced in an organization's environment has been commonly debated and analyzed by different literature; this occurs because, as Petra and Spieler (2020) explain, financial statement fraud is diversified in each case, causing explanations about the problem to be prolonged.

It is considered that accounting information when it honestly reflects corporate facts in its financial reports and as close as possible to reality, can become a device capable of inhibiting fraud behavior. For example, published audited financial statements enable safer decision-making by creditors and investors of a company since auditor's attribute credibility to what was reported, legitimizing the information present in financial reports, which minimizes the possibility of what information was distorted (Rezaee, 2005).

In this sense, relevance, defined as information that is capable of influencing the decision-making of accounting information users (Committee of Accounting Pronouncements [CPC], 2019), becomes one of the main attributes that contribute to increasing the quality of information, consequently, increasing its reliability and enabling a reduction in the opportunity for fraud to occur in the preparation of financial statements.

However, the conjuncture of the research developed during this scenario sought, mainly through the information in the financial statements, to understand ways to detect and even measure the information and behaviors of doubtful bias, presenting models capable of predicting possible fraud situations. The study by Ines (2017) analyzed the effects of fraud on the relevance of accounting information in the French context and showed that fraudulent conduct negatively affects the price and return of shares. However, until now, no studies have been found that deal specifically with fraud's effects on the relevance of accounting information in the Brazilian market.

The analysis of the Brazilian environment is essential for investors and other stakeholders of these companies who wish to obtain a broader and more grounded understanding of the Brazilian business environment and the level of reaction of this market to fraudulent practices. In addition, many developing countries, such as Brazil, face similar challenges regarding the level of transparency, regulation, and their corporate governance practices; therefore, observing market reactions to cases of fraud in the Brazilian environment may be able to protect stakeholder interests and promote greater transparency and governance for companies beyond the country.

What is the relationship between the evidence of fraud and the relevance of accounting information in Brazilian publicly-held companies? Given this question, this study aims to verify the relationship between the evidence of fraud and the relevance of accounting information in Brazilian publicly-held companies. Thus, the study aims to contribute by providing insights into the possible effects of evidence of fraud on the relevance of the accounting information of companies included in the Brazilian capital market.

The present work can be justified from three dimensions: academia, the object of study, and society. It is justified for the academy, as it addresses a topic of great relevance and contributes to the discussion that has recently arisen in other researches related to corporate fraud. Regarding the universe of study, the work provides results that demonstrate the possible effects caused by the behaviors practiced by managers, supervisors, and professionals, which do not faithfully reflect the managerial/financial performance of large organizations, in addition to showing the relationship of these behaviors with a qualitative characteristic of the reported information. Finally, it can contribute to the social understanding of the deviant behaviors present in companies.

The study aims to contribute to the various users of accounting information reported by companies listed on the Brazilian stock exchange, as it can signal to the market that companies that engage in fraud present accounting information without relevance, which can compromise the reliability and usefulness of this information, for its various agents. Therefore, it becomes relevant to highlight the importance of considering corporate fraud when interpreting such information, as the loss of relevance in these situations may suggest a distorted reality for these users of accounting information.

2 Theoretical Framework

2.1 Fraud: previous concepts and studies

The concept of fraud can be established when there is, on the part of internal and external agents, the intention to act covertly (Pinheiro & Cunha, 2003). Toms (2019) complements this by stating that a financial scandal can be established when resources are applied in a questionable and unethical way, resulting in severe consequences for non-anonymous third parties.

In addition, fraud can be considered a systematic process of actions over time. Thus, observing the reasons that motivate fraudulent behavior by the agents involved and how schemes that develop in this scenario are maintained can contribute to a better understanding of this process (Costa & Wood, 2012).

In this context, when a regulatory body identifies a situation of occurrence of fraud, a moment of agitation can be established in the corporate environment, giving rise to the responsibility of dealing with the consequences of these acts and attempts to mitigate the problem and reestablish the trust of the external agents about the information present in their statements.

In this regard, Marcel and Cowen (2014) highlight the role of boards of directors in an attempt to mitigate corporate failures and their way of acting from this moment of restructuring because managers with greater economic power tend to suffer less administrative pressure than those in the opposite situation.

The procedure adopted by many studies on fraud is limited to developing classification techniques for analysis between a Fraudulent Financial Statement (FFS) and one that is not (Gaganis, 2009). According to Humphrys et al. (2011), intentional distortions and omissions that are part of a FFS do not compare with the definition of errors, as the latter's purpose is to deceive users. In addition, according to the authors, although problems in financial statements are introduced at various levels in organizations, the distortions found in financial reports are generally committed by internal agents of the organization's management.

Humpherys et al. (2011) also summarize in their study the main types of fraud found in the annual reports (10-Ks) required by the Securities and Exchange Commission of the United States (SEC), highlighting: the overvaluation of revenues; the combination of exaggerated income and understated expenses; disclosure problems; overstocking; other income-increasing effects; and understatement of provisions for loan loss reserves.

The hypothesis created by Cressey (1953), known as the “Fraud Triangle,” studies the deviant behavior of managers in organizations under the prism of three dimensions: pressure, opportunity, and rationalization. Based on this idea, Wuerges and Borba (2014) developed a correction model for undetected fraud in American companies based on the analysis of 118 companies accused of fraud by the SEC. The authors used 28 variables under the prism of the 3 study factors that form the conjuncture of the fraud triangle. The results indicated that few cases of fraud are detected, noting that a company that presents fraud in its financial statements has a probability of 1.43% of being caught.

In summary, fraud is conceived at different levels in the corporate environment and aims to distort data intentionally. That said, this study starts from the problem present in organizations that are detected in situations of fraud, more specifically, regarding the dissimulation of information disclosed in the financial statements, as it is understood that this directly reflects on the credibility of what is disclosed, being possible that the relevance of such information made available is affected.

2.2 Relevance of accounting information

According to the Basic Conceptual Pronouncement CPC 00 (R2) (CPC, 2019), for financial information to benefit its users, it must consider compliance with the qualitative characteristics of financial information, which is constituted by the relevance and faithful representation of what it intends to disclose.

The qualitative characteristic of relevance is defined by the CPC (2019) as being the information that is capable of influencing the decision-making of users of accounting information, subject to the condition regarding its predictive value (future forecast) and confirmatory value or both (if they provide feedback for analysis of previous projections).

It is understood that the engagement of a corporation's stakeholders is associated with the relevance of its accounting information (Batistella et al., 2021). Therefore, it is noted that relevant accounting information generates a more significant impact on the decisions of the various users of information interested in this corporation. Therefore, relevant reports are crucial for the best interactivity of its stakeholders.

The studies by Ball and Brown (1968) and Beaver (1968) initiated value relevance research, having as a starting point the search to understand the influence that accounting behaviors could exert on the prices of shares traded in the capital market. About these studies, Duarte et al. (2017) point out that shareholders' equity and net income, as well as stock returns, are measures used in the models initially described by them and that the adjustment quality measure (coefficient of determination, the R^2) was taken as a parameter for carrying out the tests.

Badu and Appiah (2018) denote that financial statements provide useful information to investors for making investment decisions, which makes the stock price vary according to each entity's publication. Following the model proposed by Ohlson (1995), his findings show that equity values and profits represent a 68% variation in the stock price of Ghanaian companies from 2005 to 2014.

The study by Collins et al. (1997) aimed to investigate whether there have been significant changes in how investors use earnings and book value information over the last forty years. The findings obtained in his study denote that in some periods, profit was considered more relevant for investors, while in other moments, equity became more important.

The dependence on information about earnings and the value of net worth so that investors feel more convinced in their investment decisions can justify the significant variation in the price of shares of companies included in the capital markets (Almujamed & Alfraih, 2019).

From the perspective of one of the qualitative characteristics of accounting information, Chen et al. (2020) identified that accounting comparability improved the relevance of the accounting earnings value of U.S. firms with a variation of 25.2% but did not influence the relevance of the companies' net asset value. The authors explain that these results depend on financial reports and audit opinions in additional analyses.

An opportunistic action that seeks its benefit from managerial profits can be weighed from the perspective of corporate governance. Since the presence of an effective board of directors assumes the role of curbing such behavior, thus legitimizing accounting information and making it more relevant to users, especially shareholders, who require financial information so that it helps in the assessment of organization performance (Alfraih et al., 2015).

On the other hand, in the absence of an effective board of directors, managers can take advantage of the situation and mischaracterize the legitimacy of the financial information disclosed by making changes that mislead investors (Alfraih et al., 2015). In this context, managers may have greater advantages in earnings management concerning third parties due to their position within the company (Barth et al., 2023).

The adoption of regulatory procedures that authenticate the reported financial reports improves a company's information system, corresponding to the interests of investors and attracting other new stakeholders, which, in a way, improves the relevance of the value of profits and shareholders' equity of publicly-held companies (Almujamed & Alfraih, 2019; Alfraih, 2016).

Therefore, the loss of relevance of profits and equity of a publicly-held company may be related to the disclosure of unreliable financial reports, as this may harm the confidence and credibility that investors have and attribute to these societies (Almujamed & Alfraih, 2019).

That said, it can be expected from the literature presented that the information reported by publicly-held companies expresses too much importance to the capital market, and any indication of a situation of fraud may lead to a loss of reliability on the part of investors and, consequently, the decline in the relevance of accounting information.

Because of this, taking into account the above that managers are free to distort financial information, mainly regarding profits, the degree of interest of investors in the information present in financial statements, and the importance of accounting information for different users, the following hypothesis arises:

H1: Evidence of fraud is related to the loss of relevance of accounting information in Brazilian publicly-held companies.

3 Methodological Procedures

This study aimed to verify the relationship between evidence of corporate fraud and the relevance of accounting information in Brazilian publicly-held companies to provide findings that may contribute to the literature on information quality.

For this, an empirical-theoretical model was used to verify if the results allow or not the acceptance of the hypotheses raised in the development of the present research. The procedures adopted are of a descriptive, documental, and quantitative nature, using secondary data for the elaboration of the research. Thus, this section will describe how the final sample of companies was defined, the model applied in detail, and the development of analysis of the data obtained.

3.1 Data and sample collection

The study had as an initial sample publicly traded companies listed on the Bolsa, Brasil, Balcão (B3), involved or not in fraud situations — the scope of the analysis period extended from 2011 to 2020. Table 1 shows the criteria adopted to identify companies with sufficient information to meet the research objective.

Table 1 – Criteria and sample definition

Total companies consulted initially	694
(-) Companies excluded due to a lack of data regarding the variables of the relevance of accounting information	(464)
(=) Companies with complete data regarding the relevant variables	230
(-) Companies excluded due to lack of data regarding stock prices	(63)
(-) Excluded companies that had negative EVPS	(27)
(-) Excluded companies that had SP above BRL 100.00	(14)
(=) Final sample with adjusted data	126

Source: Prepared by the authors.

As can be seen in Table 1, exclusions occurred due to the absence of information on the Equity Value per Share (EVPS), Earnings per Share (EPS), and Stock Price (SP), since without these it would not be possible to relate the variable of fraud with the relevance of accounting information. Also, companies that presented data from the studied period that were repeated over the years without showing liquidity or variation and those that were too far from the majority, such as SP values above 100.00 and negative EVPS values, were excluded, as they were understood as possible outliers and data that could compromise the analysis of the study.

Next, in Table 2, the sectoral distribution of the companies that contained the necessary information to compose the final sample of the research is shown. It can be seen that the sample presented a greater number of companies operating in the activities “Finance and Insurance (13)”, “Construction (12)”, “Electric Energy (12)”, “Textile (10)” and “Others (25)”, following the classification of Sectors by Economática.

Table 2 – Economática's sectoral distribution of the studied companies.

Economática Sector	Number of Companies
Agro and Fishing	2
Food and drinks	5
Business	9
Construction	12
Electronics	2
Electricity	12
Finance and Insurance	13
Industrial machines	2
Mining	1
Non-metal minerals	1
Others	25
Paper and Cellulose	1
Oil and Gas	5
Steelworks and Metallurgical	7
Software and Data	2
Telecommunications	2
Textile	10
Transport and Services	7
Vehicles and Parts	8
Total	126

Source: Prepared by the authors.

It should be noted that the main source used to collect information regarding companies was the Economática database. Many errors and questionable values were found regarding the dates and balances of the variables analyzed in the study, thus justifying the choice of time frame to start with the year 2011, as these errors were quite forceful in the data for 2010. In addition, the absence of values on the platform within the period selected in the survey, corresponding to any of the variables studied caused companies to be comprehensively excluded from the sample.

Therefore, some complementary data regarding the companies were collected from the quotation platform on the B3 website and from the information available on the Securities and Exchange Commission of Brazil (CVM) website, considering the period of analysis of the work.

3.2 Corporate fraud measure

The variable of interest in the research is represented by the evidence of fraud incurred in Brazilian publicly traded companies. Therefore, Table 3 presents some ways of measuring fraud based on previous international studies to highlight this variable's measurement. In general, it is noted that the variable representing fraud behavior is quantified as 1 or 0, indicating the presence or absence of this practice.

Table 3 –Literature that quantified fraud.

Variables	Measurement	Authors	Database
Commitment to Financial Fraud	'1' is assigned if a company commits financial fraud in one year and is subsequently detected by the SEC, and '0' otherwise.	Shi et al. (2017)	SEC and AAERs (Compustat)
Corporate Fraud Indicator (PROB(FRAUDE))	'1' is assumed if a corporation was convicted of a fraudulent significant criminal case defined by the DOJ (Department of Justice) in a specific year or '0' otherwise.	Harjoto (2017)	DOJ and KLD (Compustat, CRSP)
Fraud (Fraud Accounting; Fraud_ Disclosure; Fraud_ Others)	The dummy variable is coded as '1' if the fraud was committed in a specific year and '0' otherwise.	Liao et al. (2019)	CSMAR

Source: Prepared by the authors.

In this research, the "fraud" variable was measured based on previous studies in Table 3. The variable was quantified as "1" when the company was mentioned in some situations considered as "evidence of fraud" and 0 otherwise, considering the number of 126 companies included in the study's final sample. Below, Table 4 lists some national studies that used the same methodology as the studies cited in Table 3, which are:

Table 4 – Base studies for companies involved in fraud situations.

Referential Basis	Measurement	Data source
Vargas et al. (2020)	Dummy variable that assumes '1' for companies denounced for fraud and reported by the media and '0' otherwise.	Data collected from news in media and press consortiums
Almeida (2021)	Dummy variable that assumes '1' for companies involved in corporate scandals and 0 otherwise.	Data collected from news media and press consortia.
Manvailer (2021)	Dummy variable that assumes '1' for companies that suffered sanctioning administrative processes in a given year and '0' otherwise.	Data collected from CVM Sanctioning Administrative Processes (PAS)
Scarinci (2021)	Dummy variable that assumes '1' for companies in which fraud behavior was present in Federal Police operations and '0' otherwise.	Data collected from news in media and press consortiums

Source: Prepared by the authors.

The methodology used to build the variable that represents evidence of fraud in this research was based on the methodologies developed in the research mentioned in Table 4. That is, the data collected refer to companies involved in a situation of fraud, obtained through news in media and press consortia, and that have Sanctioning Administrative Processes (PAS) at the CVM from 2011 to 2020. Table 5 provides the sources used in this research:

Table 5 – Media and press consortia used in this research

Information Source	Section	Website
Securities and Exchange Commission of Brazil (CVM)	News	www.gov.br/cvm
Correio do Povo	Economy	www.correiodopovo.com.br
G1 - Portal de Notícias	Economy	www.g1.globo.com
InfoMoney	Markets	www.infomoney.com.br
Jornal Estado de Minas	Policy	www.em.com.br
Jornal Folha de São Paulo	Markets	www1.folha.uol.com.br
Jornal Gazeta do Povo	Republic	www.gazetadopovo.com.br
Jornal O Globo	Economy	www.oglobo.globo.com
Ministério Público de São Paulo	News	www.mpsp.mp.br
Revista Exame	Business	www.exame.com
Revista Valor Econômico	Companies	www.valor.globo.com
Revista Veja	Policy	www.veja.abril.com.br
Suno Notícias	Markets	www.suno.com.br
Uol Notícias	Economy	www.economia.uol.com.br

Source: Prepared by the authors.

The variable referring to corporate fraud (FRAUD) is a dummy that receives '1' if any case was reported in the media or by the existence of the PAS and '0' otherwise. Notably, the FRAUD variable receives the value '1' only when the evidence of fraud was identified, and the other periods without such signs receive the value '0'.

Notably, the study proposes to analyze an association between two attributes (fraud and relevance), but it is recognized that fraud, its discovery, and the conclusion of its investigation occur at different times. Even if the dummy outlined in the study is an attempt to represent reality and is substantiated, it has limitations.

3.3 Value relevance model and model adapted by the research

To test the presented hypotheses, the econometric model proposed by Collins et al. (1997) complements the model initially developed by Ohlson (1995). The model was used in two stages: 1) original model with only earnings per share (EPS) and equity value per share (EVPS) to capture the relevance of accounting information, and 2) model adapted by including dummies that verify whether corporate fraud influences the relevance of accounting results and shareholders' equity.

The two models are detailed below:

$$PDA_{it} = \beta_0 + \beta_1 LPA_{it} + \beta_2 VPA_{it} + \varepsilon_{it} \quad (1)$$

$$PDA_{it} = \beta_0 + \beta_1 LPA_{it} + \beta_2 VPA_{it} + \beta_3 FRAUD_{it} + \beta_4 FRAUD.LPA_{it} + \beta_4 FRAUD.VPA_{it} + \varepsilon_{it} \quad (2)$$

On what:

SP_{it} is the stock price of company i, in period t. The stock price refers to the day of publication of the financial statements or the first-day quotations were available after publication. In companies with more than one type of stock traded on the market, the most liquid stock was considered;

EPS_{it} is the net earnings per share of company i, in period t;

$EVPS_{it}$ is the equity value per share of company i, in the period t;

$FRAUD_{it}$ is the dummy that takes the value '1' if the company was identified with some indication of fraud and 0 otherwise;

$FRAUD.EPS_{it}$ is the multiplicative dummy with the variable EPS, which takes the value 1 if the company was identified with some indication of fraud and 0 otherwise;

$FRAUD.EVPS_{it}$ is the multiplicative dummy with the EVPS variable that takes the value 1 if the company was identified with some indication of fraud and 0 otherwise;

ε_{it} = regression error term value;

β0 is the intercept coefficient, the parameter to be estimated; and

β_1, β_2, β_3 e β_4 are the angular coefficients, parameters to be estimated.

4 Results Analysis

4.1 Descriptive data analysis

As previously explained and aimed to achieve the objective of this research, this study used data referring to 126 publicly traded companies listed on B3. The general descriptive statistics information of the analyzed variables can be seen in Table 5.

First, note that the average stock price for the companies analyzed in the survey is 14.81, with a standard deviation 12.20. In addition, the data range referring to quotations is configured from a minimum value of 0.08 to a maximum of 81.39. To maintain the sample's normality, values that differed considerably from the majority (values above 100.00) were excluded, as they were considered possible outliers.

Table 6 – General descriptive analysis of the studied variables.

Variable	Average	Median	Minimum	Maximum	Standard Deviation	Coefficient of Variation
SP	14,813	11,635	0,080	81,390	12,200	0,823
EVPS	14,766	10,041	0,019	661,130	22,831	1,546
EPS	1,129	0,815	-51,916	30,009	3,4653	3,067
FRAUD	0,061	0,000	0,000	1,000	0,239	3,921
FRAUD.EVPS	1,054	0,000	0,000	82,781	5,423	5,145
FRAUD.EPS	0,049	0,000	-31,358	18,377	1,312	26,570

Source: Search results.

Regarding the variables that define the relevance of accounting information, it can also be observed that an average of book value per share and earnings per share, respectively, of 14.77 and 1.13, was found. It is noted that, unlike the EPS variable (minimum = -51.92), the EVPS does not have a negative value (minimum = 0.02), as it was understood that this could compromise the analysis of the study. Thus, companies were also excluded who had negative EVPS values.

Another highlight in Table 6 is the data referring to the variables that consider the practice of fraud in the sample companies (FRAUD.EVPS and FRAUD.EPS). It is noticed that the average of both EVPS and EPS decreases compared to unidentified companies in fraud situations, respectively, to 1.05 and 0.05.

In addition, when considering the fraud variable, the EVPS has a much lower maximum value when compared to the maximum value of the normal EVPS in the sample, changing from 661.13 to 82.78; this may already demonstrate the potential negative influence of fraudulent behavior on the relevance of accounting information, mainly on the equity value of publicly traded companies.

When specifically analyzing the dummy variable FRAUD, an average of 0.061 is observed. That is, of the total number of observations in the study, approximately 6.1% show some evidence of fraud. Dispersion measures are low, indicating that this variable has a low deviation and variation behavior. Table 7 provides a more detailed description of the FRAUD variable:

Table 7 – Descriptive analysis of the dummy variable - FRAUD.

Operation Type	Dummy 1	Dummy 0
Operação Lava Jato (Operation Car Wash)	16	0
Operação Zelotes	15	0
Sonegação Impostos (Tax Evasion)	11	0
Propina na Máfia do ISS (Bribery in the ISS Mafia)	8	0
Contratos Fraudulentos (Fraudulent Contracts)	4	0
Manipulação de Informações (Information Manipulation)	4	0
Operação Acrônimo (Operation Acronym)	4	0
Informação Privilegiada (Insider Information)	3	0
Lavagem de Dinheiro (Money Laundering)	3	0
Operação Carne Fraca (Operation Weak Meat)	2	0
Operação Cui Bono (Operation Who Benefits)	2	0
Desvios De Recursos (Diversion of Resources)	1	0
Eventual Responsabilidade de Diretor (Eventual Responsibility of Director)	1	0
Operação "Tira-Teima" (Operation Tie-Breaker)	1	0
Operação Bullish (Operation Bullish)	1	0
Suspeita de Cartel em Licitações (Suspicion of Cartel in Bids)	1	0
Nenhuma Operação (No Operation)	0	1183
Total	77	1183

Source: Search results.

According to the identification of constant data both in media and press news, and according to descriptions identified in the PAS at the CVM, it is noted that of the total survey sample (1260 observations), only 77 represent some indication of fraud, which justifies the percentage of 6.1% in the average of the variable. It is observed that the most recurrent operations are Operation Car Wash, Operation Zelotes, Tax Evasion, and Bribery in the ISS Mafia, with 16, 15, 11, and 8 occurrences, respectively. If the same information was observed in more than one source (media or administrative process), only one was considered without overlapping information.

4.2 Analysis of regression tests with panel data

The panel data validation and diagnosis statistics were analyzed to verify the research data's behavior. Thus, the following tests were carried out: (1) heteroscedasticity of the residues using the White test; (2) normality test; and (3) multicollinearity test using Variance Inflation Factors (VIF) to validate the two models, as well as the Chow, Breusch-Pagan, and Hausman tests for panel data diagnosis.

As described at the end of Table 8, the test results indicated that the Random Effects model is the most adequate to be estimated in this work. Additionally, according to test statistics, the data showed heteroscedasticity (being necessary to correct the residues for robust standard errors by the HAC matrix) and absence of normality (due to the number of observations in the sample, N = 1260, one can adopt the premise of normality), but without multicollinearity (all VIF below 2.705).

Table 8 also presents the results from the regression with panel data for the variables attributed to the relevance of accounting information and the interactions between fraud and relevance.

Table 8 – Results of regressions with panel data - (HAC).

Variables/Models	Model 1	Model 2
EVPS	0,1165	0,1184
	(0,0001)***	(0,0001)***
EPS	0,5072	0,5790
	(0,0010)**	(0,0001)***
FRAUD	-	1,7958
	-	(0,3613)
FRAUD*EVPS	-	–0,2357
	-	(0,0311)**
FRAUD*EPS	-	–0,0547
	-	(0,8637)
Constant	12,5192	12,5515
	(0,0001)***	(0,0001)***
Heteroscedasticity Test	0,0001***	0,0001***
Normality Test	0,0001***	0,0001***
Variance Inflation Factors (VIF)	VIF < 1,009	VIF < 2,705
Panel Effect	Random	Random
Comments	1260	1260
R-squared	0,0911	0,0845

Source: Search results. Note: *** and ** correspond to statistical significance at 1% and 5%, respectively. The values outside the parentheses represent the regression coefficients, and those inside the parentheses represent the p-values.

According to the first model, it is observed that both variables, EVPS and EPS, have a positive and significant relationship with the stock price, which denotes that these variables are reflected in the quotations of publicly traded companies. Thus, it is assumed that the market reacts following the disclosures made by the companies on the date they are published or on the next date with a quotation available after the disclosure.

Thus, the findings indicated that the period's book value and profit variables have a significant positive relationship, respectively, equal to 0.11 and 0.50, with the independent variable SP. These results are close to the findings of Badu and Appiah (2018), who found a relationship between the stock price and the book values and profits of companies, which reinforces the scenario of influence that shares prices can suffer from the disclosed financial statements.

According to the second model, which presents variables on evidence of fraud, it is also noticed that both the EVPS and the EPS have a statistically positive relationship with the relevance of accounting information, expressed in coefficients, respectively, of 0.11 and 0, 57. It is noted that the FRAUD variable alone does not present a significant relationship with the SP. However, when the accounting variables interact with the fraud measure, the coefficients become negative in both variables.

Additionally, it is noted that the interaction with the EPS loses its significance, representing the loss of relevance of this accounting information in companies with signs of fraud. A "negative relevance" for the EVPS variable denotes that the market penalizes companies with high book value through lower pricing of their shares in these periods.

Therefore, these results may mean that companies with evidence of fraud lose the relevance of their profit concerning other companies that do not and that even if equity is relevant, this information negatively affects the pricing of their assets.

Additionally, when analyzing the explanatory power of both models, it is observed that when measures of fraud are inserted in the model, there is a drop in explanatory power since the first model presented an R^2 of 9.11%, while the second model presented an R^2 of 8.45%, that is, there was a reduction in the relevance of the models.

Thus, acceptance of H1 was partially validated, in which evidence of fraud is related to the loss of relevance of accounting information in Brazilian publicly traded companies. However, it is understood that even if the equity value has not lost significance, the inversion of the sign indicates that the market reacts negatively to this information, making it irrelevant for its agents.

The findings of this study corroborate the understanding of Albrecht et al. (2015) and Eckert et al. (2014), who claim that fraud behaviors negatively affect organizations. They corroborate the study by Ines (2017), which proved the “signal theory,” in which wrong information is quickly transferred to the market. Furthermore, the results may complement Brazel et al. (2015) regarding the importance that the information reported by the financial statements reflects in decision-making.

Finally, the scenario described by Brazel et al. (2015), in which such information can encourage investors to identify fraud, can materialize when society is involved in a fraudulent action, as used in the methodologies of the studies that supported this research; this, in turn, raises questions about society's credibility and may result in investors losing confidence since fraudulent financial acts are harmful to investors (Shi et al., 2017), and may have adverse effects on the relevance of society's equity value (Almujamed & Alfraih, 2019).

5 Final Considerations

The objective of this study was to verify how evidence of fraud is related to the relevance of accounting information. The main stimulus for meeting this objective is the attempt to provide insights into how these indications affect the relevance of accounting information of companies that operate in the Brazilian capital market and how these acts can affect the decision-making process of various users of accounting information.

The final sample had 126 publicly traded companies listed on B3 to reach the proposed objective; the collection of data referring to the fraud variable was based on information contained in the media, press, or in sanctioning administrative processes of the CVM, which represent companies involved in situations within the context of the study analysis.

In order to obtain the results from the hypothesis test, the econometric model proposed by Collins et al. (1997), which complemented the model initially developed by Ohlson (1995), is divided into two models, the first being an original model, with only earnings per share (EPS) and equity per share (EVPS) to capture the relevance of the accounting information, and the second including the multiplicative dummies that verify whether corporate fraud influences the relevance of the accounting result and equity.

The findings of the first model indicated that the book value and profit for the current period have a significant positive relationship with the stock price, which allows assuming the prerogative that the market reacts according to the disclosures made by the companies on the date they are published or on the following date with quotation available after publication. Such results are close to the findings of Badu and Appiah (2018).

The results of the second model showed that when interacting with fraud, both EVPS and EPS have a negative relationship with the relevance of accounting information. However, only earnings per share lost significance. Thus, it is interpreted that companies identified as “fraudulent” tend to lose the relevance of their accounting information, emphasizing the relevance of their net income in the capital market. At the same time, equity has become a tool that negatively affects the pricing of assets in the market.

In this way, the study contributed by providing data that aligns with the understanding of Albrecht et al. (2015) and Eckert et al. (2014) regarding which fraud behaviors negatively affect organizations. Furthermore, it complements Brazel et al.'s (2015) reasoning about the influence of information reported through financial statements on investor decision-making. Finally, the findings corroborate the study by Ines (2017), who observed that fraud negatively affects the relevance of accounting information for the stock market, thus proving the theory that the market quickly absorbs negative information.

A marginal contribution of the study refers to the expansion of findings concerning the research by Ines (2017), as it analyzes the direct ways that fraud can affect the relevance of information, such as profit and equity, in the market. Another marginal contribution refers to the extent of the data, which uses several companies over a long period, covering several cases of fraud in the Brazilian environment.

Finally, it contributes by analyzing the Brazilian environment, which has several particularities compared to other environments, such as: aspects of governance and transparency particular to emerging environments; proprietary regulations that can provide enabling environments; economic, cultural, regulatory, and political issues that may influence the occurrence and detection of fraud; between others. Thus, analyzing the consequences of fraud by Brazilian companies in the financial market can help other developing countries strengthen their practices and regulations, reducing future fraud risk.

In addition, these results may arouse the interest of investors regarding the scenario that occurs in companies identified as "fraudulent." It may also be relevant for the general users who wish to enter the capital market where these companies are present. Therefore, it can be observed that when companies present evidence of fraud, there is a reduction in the relevance of the book value and the absence of relevance of the earnings; this signals to the market that the accounting information is affected by fraud mechanisms and that they have significant importance to their users.

This research has some limitations that should be highlighted. The first is the lack of liquidity and availability of long-term data on publicly traded companies between 2011 and 2020; this prevented more companies from being analyzed concerning the variable of interest. In addition, the lack of a consistent measure of fraud and inconsistent data were obstacles to the further development of the work.

Additionally, it is essential to point out that although the stock price (SP) was collected on the day of publication, the market may have already absorbed this information from other sources in some cases. Therefore, this data collection form can be considered another research limitation. Finally, it is emphasized that the occurrence of fraud, its discovery, and the conclusion of its investigation occur at different times, which constitutes a limiting factor. As a suggestion for future research, it is suggested to analyze the effects of the various fraud segments on the relevance of accounting information in a disaggregated way, considering the types of fraudulent behavior presented in the various studies on the subject.

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