




Audit red flags and internal control weaknesses disclosure in IBRX 100 listed companies


Red flags de auditoria e divulgação das deficiências de controles internos nas empresas do IBRX 100

Las *red flags* de auditoría y la divulgación de las deficiencias de control interno en empresas del IBRX 100

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Abstract

This study analyzes the effect of Audit Red Flags (ARF) on the Internal Control Weaknesses (ICW) of IBRX 100 (Brazil100 Index) listed companies from 2010 to 2018. Data were analyzed using content analysis, average/median/proportion differences test, and logistic/Poisson regression. Results showed the types of ICW most disclosed were accounting policy; technology failures; and specific accounts. It was also observed that red flags related to revenues, receivable account, and depreciation reduce the probability of ICW disclosure, while those related with profitability and debt increase it. The findings are consistent for different specifications and increase the ARF role as flags of ICW contributing for risk assessment and decrease of informational asymmetry of investors, auditors, regulators, and accounting information users.

Keywords: Weaknesses of Internal Control; Red Flags; Auditing Risk

Resumo

Este estudo analisou o efeito das *Red Flags* de Auditoria (RFA) sobre a divulgação de Deficiências de Controles Internos (DCI) das empresas participantes do Índice Brasil 100 da B3, no período de 2010 a 2018. A pesquisa, de natureza descritiva, documental e com abordagem quantitativa, utilizou-se da análise de conteúdo, testes de diferenças entre as médias/medianas/proporções e análise de regressão, logística e de Poisson para a análise dos dados. Os resultados evidenciaram que as categorias de DCI mais divulgadas foram: Políticas Contábeis; Falhas Tecnológicas; e Contas Específicas. As RFA relacionadas às vendas, contas a receber e depreciação, reduzem a probabilidade de divulgação de uma DCI, enquanto aquelas relacionadas à lucratividade e endividamento, aumentam. Os resultados reforçam o papel das RFA como sinalizadores de problemas nos controles internos das empresas, contribuindo para a avaliação de risco e redução da assimetria informacional para investidores, auditores, reguladores e demais usuários da informação contábil.

Palavras-chave: Deficiências de Controles Internos; *Red Flags*; Risco de Auditoria

Resumen

Este estudio analizó el efecto de las *Red Flags* de Auditoría (RFA) en la divulgación de las Deficiencias de Controles Internos (DCI) de las empresas participantes del índice Brasil 100 de la B3 en el período de 2010 a 2018. Para el análisis de los datos se utilizaron análisis de contenido, pruebas de diferencias entre

medias/medianas/proporciones y regresión, análisis logístico y de Poisson. Los resultados mostraron las categorías de DCI más publicados: Políticas contables; Fallos tecnológicos; y Cuentas específicas. Las RFA relacionadas con las ventas, las cuentas por cobrar y la depreciación reducen la probabilidad de revelar un DCI, mientras que las relacionadas con la rentabilidad y el endeudamiento aumentan. Los resultados refuerzan el papel de las RFA como señal de problemas en los controles internos, contribuyendo a la evaluación de riesgos y reduciendo la asimetría de información para inversores, auditores, reguladores y otros usuarios de la información contable.

Palabras clave: Deficiencias de los controles internos; *Red Flags*; Riesgo de auditoría

1 Introduction

This study aimed to analyze the effect of Audit Red Flags on the disclosure of Weaknesses of Internal Control (ICW) of publicly traded companies that make up the Brazil 100 Index (IBRX 100), listed in Brasil, Bolsa e Balcão B3. Auditing Red Flags (ARF), or red flags, represent warning signs used by the auditor to assess the risk of auditing, mainly regarding the probability of material error or fraud in the entity's financial statements (Gullkvist & Jokipii, 2013). Its occurrence doesn't mean that the company has committed an unlawful, fraudulent act, or incurred in any material error, but alerts the auditor to heed certain factors identified as associated with the risk of material fraud and/or error (Cao, Luo & Zhang, 2019).

To identify the level of risk associated with each work, auditors use the ARF and classify the internal control structure, so to assess the risk levels of error or fraud (Donelson, Ege & Mcinnis, 2017; Baader & Krcmar, 2018). According to Rae, Sands and Subramaniam (2017), internal control can be defined as the set of processes, methods and techniques used for the proper execution of activities and use of resources, aimed at the efficiency of operations, as well as the reliability of financial statements and compliance with laws and regulations applicable to the company.

Since 2010, from the Resolution of the Federal Accounting Council CFC 1,210/2009, which approved the Brazilian Accounting Standard NBC TA 265 – Communication of Weaknesses of Internal Control, the auditor became responsible for communicating to the company's administrators the occurrence of ICW throughout the process of securing financial statements. According to the Securities and Exchange Commission (2016), the absence of ICW is an exceptional situation and, even if it does not present itself, the auditor should record such non-detection in their report. According to Ge and McVay (2005) and Ge, Koester, and McVay (2017), the disclosure of Internal Controls Weaknesses by entities enhances the assessment of accounting errors and/or fraud risks in financial statements.

Ge and McVay (2005) showed that more complex sectors tend to present greater weaknesses in internal controls. On the other hand, more profitable companies with more resources tended to report less ICW. Lenard, Petruska, Alam, and Yu (2016) highlight that there is a positive association between weaknesses of internal controls and the manipulation of the companies' real operations; therefore, such disclosure works as a mechanism for monitoring agents and assessing the risk of greater informational asymmetry.

Donelson et al. (2017) highlight that flawed internal controls increase the occurrence and extent of fraud in financial reporting by senior executives. According to the authors, deficient internal controls are related to a higher risk of undisclosed accounting fraud, so much so that insufficient internal controls may increase the risk of fraud and encourage managers to commit illegal acts. Furthermore, the NBC TA 265 – Internal Control Weakness Communication states in item A5 that significant Weaknesses of Internal Control “do not depend only on whether the distortion actually occurred, but also on the probability that such distortion could occur and the possible magnitude it”, and exemplifies in item A6, “the susceptibility to loss or fraud of the respective asset or liability”, which can be seen as a red flag, as indicative or a potential symptom of accounting fraud (CFC, 2009).

There is a broad literature that discusses Internal Control Weaknesses in the international context: Ge and McVay (2005) identified ICW after the implementation of the Sarbanes Oxley Law; Ge et al. (2017) analyzed the ways of evidencing internal controls in small companies; Lenard et al. (2016) verified whether there is a relationship between ICW and the level of manipulation of activities; Donelson et al. (2017) studied the association between ICW and the risk of fraud; and Bauer, Bucaro and Estep (2019) analyzed the association between ICW and the possibility of committing fraud. Another aspect of the literature explores audit red flags, as in the studies by Gullkvist and Jokipii (2013), which examined the perceived importance of these tools in financial reports; Baader and Krcmar (2018), who identified possible fraudulent processes from the analysis of processes associated with the signaling of red flags; and Cao et al. (2019), which have analyzed whether abnormal positive and negative changes in employment act as a potential risk for distortions linked to those decisions. These studies, however, analyzed the themes in isolation, even though there is evidence of association between them (Hammersley, Myers & Shakespeare, 2008).

In the national literature, Teixeira and Cunha (2016; 2016a) developed two studies on ICW: in the first, they investigated the relationship between ICW, moderated by their determinants, whereas in the second they used an ICW index. Fiirst, Pamplona, Haag and Silva (2017) identified the level of evidence of risk factors and the reporting of ICW. Still in this spectrum, Lopes, Marques and Louzada (2019) identified which ICW were

being reported. One should also note that, in the national context, no studies were found that analyzed the association between ICW and red flags. Therefore, this research sought to fill this gap and answering the following question: What is the effect of Audit Red Flags on weaknesses of internal control in Brazilian companies listed on IBRX 100?

The research had a descriptive, documentary nature, and a predominantly quantitative approach; we analyzed data from 2010 to 2018 from the 96 companies that comprised the Brazil 100 Index (IBRX 100) on 12/31/2018. This sample was thus selected because, according to Ge and McVay (2005), there is a tendency for large companies to be audited by other large companies and, consequently, they are likely to be subject to a greater detection of ICW, as they are exposed to greater legal liability, litigation and reputation risks.

Thus, the development of this research is justified for several reasons: first, due to the relevance of dissemination of ICW for the reduction of informational asymmetry (Clinton, Pinello & Skaife, 2014); second, because the reduction of asymmetry improves the risk assessment and pricing of assets by external users (Hammersley et al., 2008). Third, because both red flags and ICW are additional elements used by auditors, information users, and regulators to assess the risk of fraud and material errors (Lenard et al., 2016; Donelson et al., 2017; Bauer, et al., 2019). Finally, the fourth reason is based on the scarcity of studies evaluating the association between them, especially in the Brazilian context, thus seeking to fill a gap in studies on auditing and accounting. Therefore, this study has potential to bring contributions to administrators, accountants, auditors, investors, regulators, as well as other users of accounting information, as empirical evidence of the relationships between ICW and the ARFs indicated can increase the reporting of accounting information content.

This study is divided into 5 sections, including this introduction. Section 2 discusses Agency Theory and the role of the structure of internal controls, the importance of ARF and previous studies. In section 3, methodological procedures are presented. Section 4 presents data and results analysis and, finally, section 5 presents the final considerations and suggestions for further research.

2 Theoretical Framework

2.1 Agency Theory and the Role of the Internal Controls Structure

The Agency Theory considers there is an imminent conflict of interest in the relationship between managers (agents) and shareholders (directors) because agents can prioritize their private interests to the detriment of shareholders. Brickley and Zimmerman (2010) reinforce that, despite many myths being constructed on the subject, "agency problems" have a potential effect on the occurrence of fraud and errors, since agents can report skewed information opportunistically, potentiating problems arising from informational asymmetry and the chance of adverse selection by external users.

In this context, governance structure functions as a strategy to mitigate agency problems since, from the structure of internal controls, fiscal councils, audit and other internal or external mechanisms — such as the incentive package, it seeks to align the interests of the parties, reducing the risk of expropriation (Rae, Sands & Subramaniam, 2017). In this context, Hoi, Wu and Zhang (2019) showed that incentive packages are a strategy often used to mitigate agent conflict. Liu and Liu (2017), for their part, observed that financial incentives improve managers' propensity to reduce, among other factors, Weaknesses of Internal Controls (ICW), which, at first, function as mechanisms for restricting agents' opportunistic behavior. Bolton, Liam, Rupley and Zhao (2016), highlighted, however, that the disclosure of ICW has a coercive effect on the behavior of firms and among their peers, considering the disclosure of such deficiencies can affect stock prices and, moreover, function as monitoring mechanisms for competitors.

Li, Park and Wynn (2018) noted that agents can select the ICW that will be reported, considering their potential effect on investor behavior, which would act as an incentive to select and manage disclosure. In the American context, with the validity of the Sarbanes-Oxley Act (SOX) of 2002, given expectations of transparency regarding the structure of internal controls and the accounting system, publicly traded companies began to provide their shareholders with a report on deficiencies identified in internal control, for evaluation and decision-making purposes (Hammersley et al., 2008; Clinton et al., 2014; Li et al., 2016).

Considering this, Ge and McVay (2005) raised 493 different types of deficiencies, which were identified according to the requirements of SECTION 302 of the 2002 SOX. The authors categorized these deficiencies into nine distinct groups, namely: Specific Accounting Accounts; Accounting Professional Training; Reporting/Accounting policies at the end of the period; Revenue Recognition; Segregation of Functions; Reconciliation of Accounts; Specific Subsidiary; Senior Management; and Technology Problems.

Brazil followed the same line of demand, with the creation of NBC TA 265 — Communication of Weaknesses of Internal Control. This standard requires the independent auditor to disclose the ICW in a detailed report, in accordance with his/her professional judgment. The Brazilian Securities and Exchange Commission (CVM) ratifies this requirement by means of CVM Instruction No. 308, art. 25, item II (CVM, 1999, p. 10), which determines that the independent auditor must "prepare and forward to the administration and the Fiscal Council a detailed report that contains his/her observations in relation to internal controls [...] describing any deficiencies or in-efficacies identified during the work." This detailed report was listed until 2014 in item

10.6.b of the Reference Form — "Comments of directors" — "deficiencies and recommendations on internal controls present in the independent auditor's report" (ICVM No. 480, 2009). As of 2015, these reports began to be reported in item 5.3.d — "Risk management policy and internal controls" — of the same form, dealing among other elements that refer to risk, about the ICW, which deals with deficiencies and recommendations on internal controls, also informing whether the deficiency is significant, according to the structure of Annex 24 of the ICVM No. 480 (2009) as amended by ICVM No. 552 (2014).

It is emphasized that both NBC TA 265 and the CVM's set of instructions on the evidence of ICW do not specify what are the potential weaknesses in the controls that companies may face, since each firm may be subject to particular weaknesses. Thus, the change produced by ICVM No. 552 (2014) is not a new obligation, but only incurs a new positioning of information.

2.2 The Importance of Audit Red Flags (ARF)

Gullkvist and Jokipii (2013) state that ARF are used to detect fraud risk and/or manipulate financial statements. Since the auditors (internal and external) deal with evaluation of complex processes and with ongoing judgments regarding the events under their evaluation, and that such judgments will be summarized in the audit report, the use of these ARF functions as a heuristic that simplifies and gives objectivity to the process of investigation and detection of fraud or material errors.

For Krambia-Kapardis, Christodoulou and Agathocleous (2010), ARF can increase the auditors' perception of fraud detection. Gullkvist and Jokipii (2013) complement that ARF are indicated by regulators as one of the stages for combating fraud, although they lack research evidence and present limitations on their detection and forecasting power.

Hegazy and Kassem (2010) state that ARF help auditors focus their work on critical factors already flagged, still in the planning stage. The authors observed that evidence found so far demonstrated that errors and fraud stemming from revenue manipulation (especially early recognition), and the concealment of liabilities and expenses, are the preponderant ones. Thus, ARF related to these events may show signs of anomalies in the audit process of firms.

The literature on fraud and error detection presents a diversity of qualitative and quantitative red flags for their identification, as in the studies by Krambia-Kapardis et al. (2010); Gullkvist and Jokipii (2013); Omar, Johari, Amirah, and Smith (2017); Baader and Krcmar (2018) and Cao et al. (2019). However, Beneish's (1999) research directs, to some extent, much of the main subsequent studies on the subject, either with the arguments or with the metrics used (Beneish, Lee & Nichols, 2013). Beneish (1999) analyzed eight indexes that can be used to detect distortions in the financial statements and that can potentially result in fraud. In their study, only five presented statistical significance. Grove and Cook (2004) analyzed Enron, WorldCom, Qwest and Global Crossing and concluded that the indices that functioned as good quantitative red flags were: Gross Margin Index (GMI) and Sales Growth Index (SGI). One can say that such metrics were also used by Beneish (1999). In addition, the authors added to the analysis: Price to Book (or Market to Book); Price to Earnings; Profit Margin; Top-Line Growth (Δ Revenue); Bottom-Line Growth (Δ Profit); Return on Assets (ROA); Returns on Equity (ROE); Current Ratio; Quality of Earnings (QoE); and Effective Tax Rate. In the meantime, Grove and Basilico (2008) confirmed that the same financial (quantitative) red flags analyzed in Beneish (1999) were effective for prior fraud signaling, and the indicators that received emphasis in their study were: Gross Margin Index (GMI); Sales Growth Index (SGI); and Days Sales in Receivables Index (DSRI). In addition to those cited, Grove and Cook (2007) and Feroz, Kwon, Pastena and Park (2000) also highlighted that qualitative red flags of corporate governance, along with quantitative ones, helped the fraud reports.

2.3 What is Known about Internal Control Weaknesses and Audit Red Flags?

The discussion on internal controls is considered an emerging theme in audit research and, in recent years, several studies published abroad have presented evidence on material deficiencies or weaknesses of internal controls and their implications on decision-making process, quality of profits, among others (Ettredge, Li & Sun, 2006; Choi, Hogan & Lee, 2013). However, the debate on the subject in Brazil is still scarce: several studies have been published in scientific events, whereas no studies have been in journals in the upper strata of Qualis CAPES (Teixeira & Cunha, 2016; Teixeira & Cunha, 2016a; Fiirst et al. 2017; Lopes, Marques & Louzada, 2019).

Teixeira and Cunha (2016) sought to analyze the relationship between ICW moderated by their determinants. The results showed that ICW have a significant moderating effect on: (i) audit; (ii) audit delay; (iii) modified opinion; and (iv) financial restatement. In a later study, Teixeira and Cunha (2016a) proposed a ICW index of Brazilian companies based on the categories proposed by Ge and McVay (2005). In it, they found that 24.3% of the companies presented ICW and those related to IT, Groups of Financial Statements, General, Litigation, Specific Accounts, Subsidiaries, and Senior Management were the predominant categories.

The study by Fiirst et al. (2017) sought to identify the level of evidence of risk factors and the reporting of ICW of Brazilian companies with American Depositary Receipts programs of the New York Stock Exchange. The risks identified in the sample were: strategic; market; credit; liquidity; operational; legal; image; and environmental issues, and their evidence wasn't considered homogeneous. The authors demonstrated that companies with disclosure of ICW have a greater evidence of risk in image.

Lopes, Marques and Louzada (2019) analyzed data from 32 companies listed on Bolsa, Brasil and Balcão B3, from 2010-2015, and found that 87% of the deficiencies were reported with sufficient information to categorize them referred to: (i) Training – 23%; (ii) Technological Failures - 20%; (iii) Failures in Subsidiaries - 17%; (iv) Specific Accounts - 15%; and (v) Segregation of Functions - 12%. They also found that 49% of the observations referred to the absence of ICW, which is contrary to the CVM's expectation.

Among the international literature on Red Flags and/or ICW, the studies synthesized in Appendix A were identified.

3 Methodological Procedures

3.1 Classification, Sampling, and Data Collection

The research was classified as descriptive, documentary, and with a quantitative approach. Sample data from 2010 to 2018 were obtained from Reference Forms available on the website of the Brazilian Securities and Exchange Commission (CVM), and in the ComDinheiro database, in relation to the 96 companies that comprised the Brazil 100 Index (IBRX 100) on December 31, 2018. They were analyzed using Stata 16 software. It is noteworthy that Bradesco, Cemig, Eletrobras, and Petrobras have two securities in the portfolio, and, for this reason, the total number of securities does not coincide with the total number of companies.

The use of this non-probabilistic sample is based on the representativeness of companies in terms of volume of trades on the Brazilian Stock Exchange B3. It is important that the probability of these companies being audited by a Big4 is higher, so they are subject to greater detection of ICW because they are exposed to greater legal liability, litigation and reputation risks (Ge & McVay, 2005). In turn, the selected period was due to the implementation of ICVM No. 480 of 2009, which now requires the details of the ICW found by the independent auditor in the Reference Form of the entities.

3.2 Data Analysis techniques

Initially, content analysis techniques were used to classify the Weaknesses of Internal Control (ICW) reported in the period, according to the categories defined by Ge and McVay (2005): Account-Specific; Training; Period-End Reporting/Accounting Policies; Revenue Recognition; Segregation of Duties; Account Reconciliation; Subsidiary-Specific; Senior Management; Technology Issues.

Since the information on ICW is qualitative and non-standardized, the reading and categorization process was double reviewed. This phase was documented by a research protocol and coding book, as recommended by Saldaña (2012). Next, descriptive statistics were used to analyze the characteristics and frequencies of ICW and other variables studied. The descriptive analysis was performed together with the average/median/proportion differences test, to obtain indications of association between the groups and variables studied. According to Fávero (2015), the objective of these tests is to verify the statistical significance of such differences between the groups, such as: companies that reported and did not report ICW, governance levels, industry, type of auditor, year; among other factors. Finally, a regression analysis was performed using a Logistic model and a Poisson model. The objective of logistic regression is to estimate the probability of occurrence of a given event, which, in the present study, is the disclosure of an ICW. The evaluation of model quality was performed through: sensitivity, specificity and the percentage of correct classification, as recommended by Wooldridge (2011).

Additionally, a Poisson model was estimated, used for counting data (Wooldridge, 2011), considering we sought to verify whether tested red flags explained the amounts of ICW reported by the companies participating in the sample. In both cases, estimation was used, through Pooled with year and sector controls. One should note that results of the Logit model are presented by ODD Ratios (OR), and, in the context of the study, one can consider the probability of the companies that presented an increase in discretionary accruals reporting an ICW divided by the probability of those that did not show an increase in accruals reporting a ICW. In addition, the marginal effect ($\frac{\partial y}{\partial x}$), which consists of the variation in $y = p$ (ICW), given a variation in, such X_{it} as the size of the company, was estimated. In this study, the use of the marginal effect allows for the identification of the potential economic effect that red flags have on the probability of reporting of an ICW, indicating how much y varies as a function of x .

3.2 Variables and Models

Equation (1) was used to estimate a regression model, logit type and a variation with Poisson model (Tab.3). In the logit model (1.3), the explained variable (ICW) was operationalized as dummy, and in the Poisson model (1.4), as a discrete count variable (QICW). The explanatory variables of interest were the red flags proposed by Beneish (1999) and Grove and Cook (2004). Appendix B presents the operationalization of the variables used in the models.

$$ICW_{it} = \beta_0 + \sum_{j=1}^9 \beta_j RedFlags_{it} + \sum_{k=1}^6 \beta_k Controls_{it} + \varepsilon_{it} \quad (1)$$

3.2.1 Dependent Variables

The model-dependent variable is Weaknesses of Internal Control (ICW_{it}), operationalized as a dummy variable, which assumed value 1 when the company reported 1 or more ICW, and zero, when they did not. In addition, the ICW was operationalized as a discrete variable, with the logarithm of the amount of ICW reported in each firm/year. This approach was used by Ge and McVay (2005), classifying them by categories. The classification analysis was also adopted in Brazilian research, such as Teixeira and Cunha (2016) and Lopes, Marques and Louzada (2019).

3.2.2 Independent Variables

One of the pioneers in studies on quantitative red flags, Beneish (1999) developed a statistical model to detect fraudulent demonstrations from the alert variables, and, with this, several authors developed their research on the subject. This is the case of Wells (2001), who sought to explain the significant red flags of Beneish (1999), and Grove and Cook (2004), who used the significant variables to analyze companies involved in fraud: Enron, WorldCom, Global Crossing and Qwest. Thus, this study used the same quantitative red flags as previous studies, i.e.: Days Sales in Receivables Index (DSRI); Gross Margin Index (GMI); Asset Quality Index (AQI); Sales Growth Index (SGI); Total Accruals for Total Assets (TATA); Depreciation Index (DEPI); Sales, General and Administrative Expenses Index (SGAI); Leverage Index (LVGI); and Quality of Earnings (QoE).

This article sought to use the same variables detailed by Beneish (1999) and Grove and Cook (2004) as red flags, as described above. The DSRI variable consists of a red flag, as its exaggerated increase may be linked to revenue manipulation, suggesting a change in credit policy to stimulate sales or revenue inflation. Therefore, increases in DSRI are expected to be positively associated with the disclosure of a ICW. The GMI signals that a reduction in gross margin is seen as something bad for the company, and, thus, there would be incentives for the manipulation of profits as a way of compensating the operating fall, signaling this variable could have a positive association. The AQI variable captures the possibility of capitalization and cost manipulation as a way to mitigate the decrease in economic performance, and, therefore, a positive signal is expected. The SGI variable deals with the increase in sales from one year to another, signaling the manipulation in the numbers when this increase is abrupt. For example, a positive association with the dissemination of an ICW is expected. The TATA variable, in turn, evaluates the level of total accruals that may undergo sudden variations due to intentional manipulations. The higher the level of accruals, the greater the probability of manipulation and, therefore, the greater the probability of reporting a WCI.

The DEPI variable measures the variations in the depreciation rate. When the rate decreases, it indicates that the company may have increased the useful life of its assets or the method used to increase profit, and therefore a negative association with the disclosure of a ICW is expected. The SGAI variable, in turn, captures the risk of manipulating results in anticipation or postponement of expenses, as well as intentional manipulation of sales. Significant changes in the relationship between SGAI signal the manipulation of results by actual operations and/or fraud, and for this reason, a positive association with the disclosure of a ICW is expected. LVGI captures incentives related to debt coverage. When this index is higher, the greater the chance of manipulation of results, therefore, higher risk of reporting of an ICW. Finally, the QoE measures the quality of earnings; therefore, the higher this rate, the less likely it is to intentionally manipulate profits, as it shows a higher volume of accruals. Concerning the risk of association with the disclosure of an ICW, increases in QoE are expected to be negatively associated with the disclosure of a ICW.

3.2.3 Control Variables

The control variables were those proposed by Beneish (1999), Doyle et al. (2007) and Marques et al. (2017), i.e.: Firm Age (AGE), Corporate Governance Level (GCL), Mandatory Republication (RESTATE), Firm Size (SIZE). The variable AGE represents the number of years of listing on the market (Doyle et al., 2007). The New Market (NM) variable refers to a dummy that assumes value 1 for Special Corporate Governance Level (NM) and zero for others while the RESTATE variable is characterized as a dummy that assumes value 1 when there is mandatory republication of the demonstration and zero when spontaneous (Doyle et al., 2007; Marques et al., 2017). The variable SIZE was obtained from the logarithm of the total asset of the company in year t (Beneish, 1999; Doyle et al., 2007; Marques et al., 2017). Regarding the signs, it is expected that the variables RESTATE, and SIZE present a positive sign, with a relationship directly proportional to the disclosure of ICW. The variable NM, in turn, presents the negative sign, inversely proportional to the probability of ICW disclosure (Doyle et al., 2007; Marques et al., 2017).

4 Data Analysis and Discussion of Results

4.1 Descriptive Statistics and Differences between Groups

Initially, the frequency distribution of reported information on Weaknesses of Internal Control (ICW) from 2010 to 2018 by IBRX 100 companies was analyzed, dividing Table 1 into three panels: Panel A - Governance Level; Panel B - Audit Company, and Panel C - Industry. In a general analysis, it was found that, out of the 864 observations, 185 presented Weaknesses of Internal Control (ICW), 502 did not present weaknesses (Non-ICW), and 104 presented Non-Significant Weaknesses (NSICW). Panel A shows that 62.5% of the observations refer to companies listed in the New Market Segment. Strictly speaking, they are the ones that adopt the best corporate governance practices.

On average, the companies listed in the Traditional Market (TRAD), Level 1 (N1), Level 2 (N2), and New Market (NM) segments reported, respectively, 1.88; 1.65, 2.36 and 1.93 ICW in the period from 2010 to 2018. It was found that the companies listed in Level 2 tended to report more ICW, followed by those of the NM. The proportion difference test showed that the proportion of ICW reported by the companies listed in segment N1 is lower (Dif: -0.0576036 | $z = -1.5095$ | $\Pr(Z > z) = 0.0656$) and statistically significant at the level of 10%. N2 companies had a higher and statistically significant mean proportion (Dif: 0.0786969 | $z = 1.6327$ | $\Pr(Z > z) = 0.0513$) in relation to the other, also at the level of 10%. One could also observe that companies listed in the N2 and NM segments tend to present higher proportions of ICW, which converges with the expectation of greater transparency of companies with higher levels of governance; thus corroborating the findings of Doyle et al. (2007) and Lopes et al. (2019). On the other hand, one must stress that, if such ICW are persistent or eventual, mainly if persistent, they may highlight the company's difficulty in migrating them, even though they are at different levels of governance.

Table 1:
Frequency Distribution by Type of Information on Internal Control Weaknesses Reported in the 2010-2018 Period by IBRX100 Companies

Panel A - By Governance Level								
	N	ICW	Non-ICW	NSICW	NDICW/NA	Total	Fri.	Fra.
Level 1 (N1)	17	28	107	16	2	153	17.71%	17.71%
Level 2 (N2)	11	26	54	6	13	99	11.46%	29.17%
New Market (NM)	60	116	292	76	56	540	62.50%	91.67%
Traditional (TRAD)	8	15	49	6	2	72	8.33%	100.00%
Total	96	185	502	104	73	864	100.00%	
Panel B - By Audit Firm								
Deloitte Touche Tohmatsu (DTT)	45	40	103	6	1	150	17.36%	17.36%
Ernst & Young (EY)	51	37	120	2	9	168	19.44%	36.81%
KPMG	65	53	146	27	10	236	27.31%	64.12%
PriceWaterhouseCoopers (PWC)	44	47	106	19	12	184	21.30%	85.42%
Others (NBig4)	12	8	27	50	41	126	14.58%	100.00%
Total		185	502	104	73	864	100.00%	
Panel C - By Economic Segment								
Industrial Goods (IG)	8	16	43	4	9	72	8.33%	8.33%
Communications (COM)	2	4	14	0	0	18	2.08%	10.42%
Cyclic Consumption (CC)	20	52	87	29	12	180	20.83%	31.25%
Non-Cyclical Consumption (NCC)	9	18	38	15	10	81	9.38%	40.63%
Financial (FIN)	17	7	118	9	19	153	17.71%	58.33%
Basic Materials (BM)	10	13	69	8	0	90	10.42%	68.75%
Oil, Gas and Bioc. (OGB)	5	7	30	2	6	45	5.21%	73.96%
Health (HEA)	6	22	12	6	14	54	6.25%	80.21%
Information Technology (IT)	3	7	12	5	3	27	3.13%	83.33%
Public Utility (PU)	16	39	79	26	0	144	16.67%	100.00%
Total	96	185	502	104	73	864	100.00%	
	Fri.	21.41%	58.10%	12.04%	8.45%	100.00%		

Note: ICW – With Weaknesses of Internal Control; Non-ICW – Non-Weaknesses of Internal Controls; NSICW – Non-Significant Weaknesses of Internal Controls; NDICW – No Details of Weaknesses of Internal Controls; NA – Not Available.

Brickley and Zimmerman (2013) point out that corporate governance literature has reinforced some myths, including that "good governance" can be captured by data. The authors observed that one must understand its effectiveness in depth, which converges to the apparent incoherence observed in the comparison of the proportion of ICW reported at the TRAD and N1 levels, which presented less ICW than the segments regarded as those with the best practices of governance, N2 and NM.

It was also verified that 33.45% of the total of 864 observations presented some type of ICW, significant or not. This percentage refers to a total of 75 of the 96 companies, which represents 78.13% of the total number of companies participating in the sample. In addition, 21 companies did not report ICW in any of the years analyzed. According to the CVM (2009), the absence of ICW should be an exceptional situation, so the proportion of: No Internal Control Weaknesses (Non-ICW) should be zero or close to that. On the other hand, as the ICW disclosure can generate adverse effects on managers, it is possible that they select and/or avoid

disclosing existing ICW (Lenard et al., 2016). It is noteworthy that the companies COGNA Educação and Hypera Pharma were the ones that most reported varied classifications of ICW in the period (20), being therefore considered as significant in total.

The analysis of frequency distribution by auditing company (Panel B) shows that Big4 companies accounted for 85.42% of observations. On average, those that were monitored by the auditing companies DTT, EY, KPMG and PWC reported, respectively, 0.89, 0.74, 0.82 and 1.07 ICW over the period. On the other hand, the companies audited by the non-Big4 reported, on average, 0.67. These results suggest that those that were audited by the non-Big4 have lower amounts of ICW, which converges with the perspective of Rice and Weber (2012) and Ge and McVay (2005), who stated that Big4 customers, because they are larger, tend to have a higher probability of detection of ICW due to the higher risk of litigation and reputation. Thus, previous evidence is reiterated in the sense that there is a better control structure in companies audited by Big4 (Ge & McVay, 2005; Doyle et al., 2007; Rice & Weber, 2012). However, Lenard et al. (2016) found evidence that being audited by a non-Big4 increases the likelihood of reporting ICW.

Finally, Panel C shows that the CC Industry (Dif: 0.0980771 | $z = 2.6749$ | $\Pr(Z > z) = 0.0037$) and HEA (Dif: 0.3346764 | $z = 4.8862$ | $\Pr(Z > z) = 0.000$) were the ones with the highest proportion of Reported ICW; on average, 2.60 and 3.67, respectively, per company. FIN (Dif: -0.2162378 | $z = -5.4076$ | $\Pr(Z > z) = 0.0000$) and BM (Dif: -0.144444 | $z = -2.0918$ | $\Pr(Z > z) = 0.0182$) industries were the ones with the lowest proportions – on average, 0.41 and 1.30 per company, over the period. The proportions difference test showed statistically significant differences at levels of 1%, 5% and 10%. These results are consistent with the sectoral differences found in Gullkvist and Jokipii (2013) and Bolton et al. (2016). It stands out that the FIN and HEA Industries are considered complex by the nature of their operations. The complexity of the industry is a determining factor in the dissemination of ICW (Ge & Mcvay, 2005; Doyle et al., 2007; Bolton et al., 2016). However, while in the financial industry the ICW proportion was lower than the others, in the health sector the proportion was comparatively higher than in the other sectors.

Figure 1 shows the frequency distribution by type of ICW reported in the period from 2010 to 2018 by IBRX 100 companies.

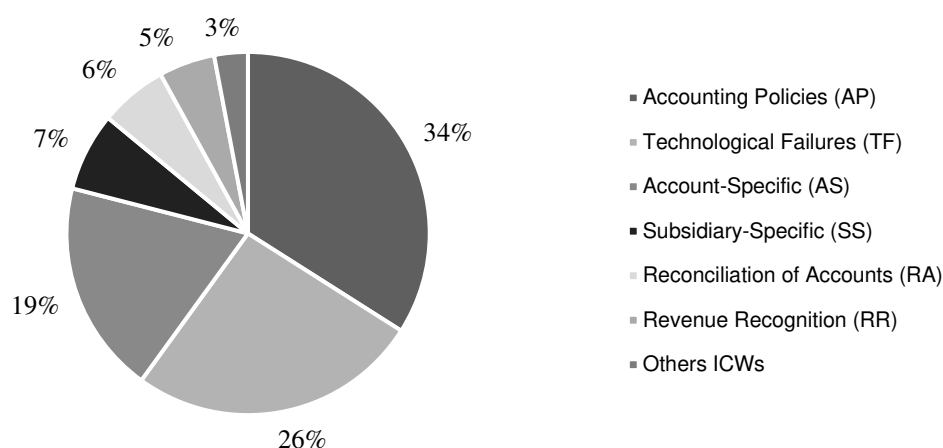


Figure 1 - Frequency Distribution by Type of Significant Internal Control Weaknesses, Reported in the Period 2010-2018 by IBRX 100 Companies

Note: The category - Other ICWs groups the Weaknesses with: Training, Senior Management, Function Segregation.

It was verified that the ICW related to the Accounting Policies (AP) - 34%, Technology Issues (TI) - 26% and Account-Specific (AS) - 19% were the predominant ones. Together, represent about 80% of the significant ICW reported in the period. The difference of proportion test reinforced the predominance of these three ICW when compared with the others. In all three cases, the difference between proportions test showed that AP (Dif: 0.9120755 | $z = 22.2507$ | $\Pr(Z > z) = 0.0000$), TI (Dif: 0.8730385 | $z = 19.0018$ | $\Pr(Z > z) = 0.0000$) and AS (Dif: 0.8418157 | $z = 15.9331$ | $\Pr(Z > z) = 0.0000$) have, on average, a higher proportion - in all of them, statistically significant at the level of 1%.

The results observed in this study partially converge with the findings of Ge and McVay (2005), Lopes et al. (2016) and Teixeira and Cunha (2016). In the studies by Ge and McVay (2005), the predominant ICW were related to Account-Specific (AS) and Training (grouped in the Other ICW category). For Lopes et al. (2016), the most recurrent were Training, Technological Failures (TI) and Subsidiary-Specific (SS). In the findings of Teixeira and Cunha (2016), the most representative were Technological Issues (TI), Accounting Policy (AP), and Other ICW.

According to Ge and McVay (2005), the ICW related to Accounting Policies result from inadequate application of recognition, measurement, and disclosure policies. ICW related to Technology Issues include deficiencies related to access, maintenance, and security of data and systems. Finally, the Accounts-Specific

ICW refer to other weaknesses not categorized among the others, whose frequencies are not persistent.

Next, Table 2 — Descriptive Statistics of Red Flags by Groups, compare the average groups of companies that reported significant ICW and those that did not report ICW (NonICW). The red flags used were proposed by Beneish (1999) and Grove and Cook (2004): strictly speaking, the higher the average of red flags, the higher the potential for fraud/error (Beneish, 1999). In this way, comparing the averages, it is expected that the companies that reported ICW have higher averages of red flags.

Table 2:
Descriptive Statistics of Red Flags by Groups

Variables	No Internal Control Weaknesses					With Internal Control Weaknesses				
	NonICW (0)					With ICW (1)				
	N	M	σ	Min	Max	N	M	Σ	Min	Max
	N = 612					N = 185				
DSRI	478	1.0425	0.7662	0.0000	11.7966	143	1.0193	0.4199	0.0000	3.4243
AQI	538	1.1721ab	0.6832	0.1156	7.2065	179	1.0273ab	0.2350	0.3847	2.7234
GMI	512	1.0384A	0.3009	0.1357	5.2122	173	0.9638A	0.7032	-4.7598	4.7544
SGI	580	1.2162ab	1.6038	0.0316	38.9429	176	1.1031ab	0.2475	0.3467	2.5240
DEPI	529	1.0187ab	0.3902	0.0261	5.5146	173	0.9629ab	0.1956	0.1520	1.8447
SGAI	512	1.0119	1.5449	-2.1441	18.3363	173	1.2524	2.5014	-1.9631	33.1796
LVGI	511	1.0142A	0.1808	0.3633	2.3247	169	1.0576a	0.3318	0.4451	4.1656
TATA	589	1.1996	2.1959	-1.8888	395.0724	178	1.8717	8.7640	-11.1375	89.4263
SIZE	610	23.4806	1.6287	16.9027	28.0711	185	23.3358	1.3085	20.6097	27.5258
QE	601	1.7086	1.3136	-1.2496	229.3554	183	0.9901	24.6514	-209.8895	184.6429
AGE	579	10.1605ab	8.9981	2.5649	23.0239	174	8.7244ab	8.4941	3.0257	23.0222

Source: Search data. a statistically significant at 1%, 5% or 10% by means of the t.b statistically significant at 1%, 5% or 10% by kruskall-wallis test. DSRI – Days Sales in Receivables Index; AQI – Asset Quality Index; GMI – Gross Margin Index; SGI – Sales Growth Index; DEPI – Depreciation Index; SGAI – Sales, General and Administrative Expenses Index; LVGI – Leverage Index; TATA – Total Accruals Index (provisions) for Total Assets; QE – Quality of Earnings; SIZE – Continuous variable obtained from the natural logarithm of the company's total assets; AGE – Continuous variable obtained from the natural logarithm of the company's years of registration with CVM.

It was verified that, of the 11 variables presented, in 8 of them the averages of the group of companies that did not report ICW were higher than those that reported ICW. However, the differences between the means were only statistically significant for AQI, GMI, SGI, DEPI, LVGI and AGE. The identification of significant differences is initial evidence that companies reporting ICW tend to have higher averages for red flags when compared to those that did not report ICW, constituting initial evidence that companies with higher red flags are associated with greater disclosure of ICW.

These primary results converge with the evidence presented by Beneish (1999) and Su, Zhao and Zhou (2014), who found that companies that manipulated financial statements and those that reported ICW had higher and statistically significant red flags. In this study, among the variables that presented statistical significance, except for the variable LVGI, all the others presented higher means for the group of companies that did not report ICW. This result may signal a resistance of companies to report ICW, even showing signs of errors or manipulations, which is consistent with the perspective of Lenard et al. (2016), when they stated that managers can avoid reporting an ICW to reduce its adverse effects such as political costs (Li et al., 2018) and the reduction of stock prices (Hammersley et al., 2008).

4.2 Association between Red Flags and Internal Control Weakness

Finally, Table 3 presents the result of the logistic regression model (1.1 to 1.3) and the Poisson model (1.4). Initially, the effect of red flags (1.1 and 1.2) was estimated, differing only by the control of year and sector, performed in model 1.2. There was a general improvement in the ability to correct when the effects of year and sector are controlled. This improvement is consistent with the observance of statistically significant differences between the sectors discussed above. In model 1.3, one was estimated to logistic regression and, equally, with control of year and sector and with the inclusion of other control variables observed in Beneish (1999) and Doyle et al. (2007). Such inclusions improved the overall results of the model in the three main quality indicators, namely: sensitivity; specificity; and percentage of correct answers (Wooldridge, 2011). Therefore, model 1.3 was the basis for interpreting the phenomenon of interest. Finally, through model 1.4, a regression was estimated for counting data (Poisson).

Table 3:
Statistics of Regression Models to Determine the Effect of Red Flags on ICW

	Signal Expected	Logit (1.1)		Logit (1.2)		Logit (1.3)		Poisson (1.4)	
		OR	dy/dx	OR	dy/dx	OR	dy/dx	Mr. Coef.	
DSRI _{it}	(+)	-0.112 (0.273)	-0.018 (0.045)	-0.686* (0.389)	-0.091* (0.052)	-0.818* (0.425)	-0.094** (0.044)	-0.768* (0.421)	
AQI _{it}	(+)	-0.566* (0.321)	-0.092* (0.051)	-0.437 (0.398)	-0.058 (0.052)	-0.345 (0.436)	-0.040 (0.050)	0.005 (0.275)	
GMI _{it}	(+)	-0.248 (0.414)	-0.041 (0.066)	0.087 (0.438)	0.012 (0.059)	0.206 (0.597)	0.024 (0.068)	0.729** (0.358)	
SGI _{it}	(+)	-1.980** (0.892)	-0.323** (0.149)	-2.375*** (0.799)	-0.316*** (0.103)	-2.639*** (0.801)	-0.303*** (0.095)	-1.147*** (0.380)	
DEPI _{it}	(-)	-1.369** (0.612)	-0.223** (0.094)	-1.978*** (0.694)	-0.263*** (0.089)	-2.233*** (0.703)	-0.256*** (0.079)	-0.677* (0.367)	
SGAI _{it}	(+)	0.055 (0.248)	0.0089 (0.040)	-0.107 (0.324)	-0.0143 (0.044)	-0.071 (0.347)	-0.008 (0.040)	-0.225 (0.214)	
LVGI _{it}	(+)	1.510* (0.900)	0.246* (0.136)	2.058** (0.923)	0.274** (0.114)	2.709*** (1.044)	0.311*** (0.106)	1.505** (0.619)	
TATA _{it}	(+)	-1.401 (1.266)	-0.229 (0.216)	-0.683 (1.600)	-0.0910 (0.212)	-1.057 (1.945)	-0.121 (0.221)	-0.966 (0.993)	
QE _{it}	(-)					-0.038 (0.037)	-0.004 (0.004)	-0.009*** (0.002)	
SIZE _{it}	(+)					0.420 (0.334)	0.048 (0.037)	0.209 (0.141)	
AGE _{it}	(+)					0.062* (0.034)	0.007** (0.003)	0.028** (0.014)	
NM _{it}	(-)					-0.831 (0.661)	-0.095 (0.074)	-1.106*** (0.356)	
RESTATE _{it-1}	(+)					0.419** (0.198)	0.048** (0.021)	0.124 (0.120)	
Intercept	(+/-)	1.578 (1.711)		2.762* (1.667)		-9.839 (8.559)		-6.073 (3.869)	
Wald (x ²)		13.78***		184.71***		200.17***		5.780,80***	
Pseudo R ²		0,0458		0,2475		0,3476		0,3588	
Specificity		67,74%		72,54%		77,47%			
Sensitivity		60,66%		73,77%		81,36%			
Classif. Correct		66,19%		72,85%		78,42%			
Note/Empr.		278/49		254/44		241/41		263/268	
Year/Sector Control		No/No		Yes/Yes		Yes/Yes		Yes/Yes	

Note: ***, **, * Statistically significant at 1%, 5% and 10% respectively. Robust patterns clustered errors in enterprises in parentheses. S.E- Expected signal; OR - ODD Ratios; dy/dx - Marginal effect of the ith variable.

Considering the logistic model 1.3 as the basis for the analysis of the phenomenon of interest, given the quality indicators proposed by the literature and observing Wooldridge's indications (2011), the effect of red flags on the ICW reporting was analyzed by means of the odds ratio and the marginal effect. In the meantime, it was found that the variables DSRI (-0.818* | -0.0938**), SGI (-2.639*** | -0.3027***) and DEPI (-2.233*** | -0.2561***) had a negative and statistically significant effect. The variable LVGI (2.709*** | 0.3108***) showed a positive and statistically significant effect.

In addition, it was observed that the control variables AGE_t (0.0619* | 0.0071**) and $RESTATE_{t-1}$ (0.419** | 0.0480**) had a positive effect on the reporting of ICW. From the economic point of view, it is observed that increases of 1% in the red flags DSRI, SGI and DEPI reduce by approximately 9.38%, 30.27% and 25.61%, respectively, the probability of occurrence of an ICW. In turn, an 1% increase in the red flag LVGI increases the probability of reporting a ICW by around 31.08%. In addition, increases of 1% in the age of the firm and the fact that the company has republished the statements in the previous year increases by around 0.71% and 4.8% the probability of reporting of a ICW, respectively.

In model 1.4 (Poisson), there was convergence of the results observed in model 1.3. The red flags DSRI (-0.768*), SGI (-1.147***) and DEPI (-0.677*) had a negative and statistically significant effect on the probability of disclosure of an ICW. The GMI (0.729**) and LVGI (1.505**) red flags showed a positive effect on the reporting of an ICW. It was also observed that the control variables QE_{it} (-0.009***) and NM (-1.106***) had a negative effect and AGE_t (0.0282**) had a positive effect. In general terms, the results of model 1.4 (Poisson) reinforce the evidence observed in model 1.3 (Logit), adding evidence that the quality of profits is associated with lower reporting of ICW and that companies listed at governance levels tend to report a smaller amount of ICW.

The results obtained in this research differ, in part, from the literature (Beneish, 1999) in that they show that, in the Brazilian context, red flags are associated with lesser reports of ICW. On the one hand, this lower disclosure of ICW may result from the greater attention given by the auditor due to the signaling of the risk of error or manipulation of information from red flags. This would require auditors to require corrective actions in a timely manner to mitigate deficiencies and their implications in the financial statements. Ge and McVay (2005) reinforce that large companies, despite being exposed to a higher risk of a ICW, have the resources needed to mitigate it.

On the other hand, it may stem from the characteristics of the sample, composed of the main companies of the Brazilian capital market. Therefore, the frequency of significant weaknesses is lower due to their size and governance structure. In addition, the incentive system of large companies seeks to stimulate the permanent evolution of their internal control systems (Liu & Liu, 2017). Moreover, this negative marginal effect of red flags may result from omission or lack of transparency in the disclosure of deficiencies in internal controls. Given the existence of a potential adverse effect on the part of the market, managers, auditors, and other agents have incentives for the non-disclosure of ICW (Hammersley et al., 2008; Li et al., 2018).

5 Conclusion

The aim of this study was to analyze the effect of Audit Red Flags (ARF) on the disclosure of Weaknesses of Internal Control (ICW) of Brazilian listed companies that make up the IBRX 100. The results showed that around 78.13% of the companies listed in the IBRX 100 reported ICW, suggesting relative quality in the transparency of internal controls of companies, since the Weaknesses are being detected and evidenced by most companies in the index. The ICW related to Accounting Policies, Technological Failures and Specific Accounts represent around 80% of the total, partially corroborating the results of Ge and McVay (2005). In this context, the Basic and Financial Materials sectors are the ones that reported the least, while those of Health and Cyclic Consumption were the ones that reported the most ICW.

It was observed that the red flags proposed by Beneish (1999) presented, for the most part, a negative association effect with the disclosure of ICW, as shown in Table 3. This result contradicts, in part, the literature on manipulation and quality of profits, however, characteristics of the sample or institutional environment not explored by this study may have influenced this result.

On one hand, Brazilian managers can resist disclosing an ICW due to adverse effects on risk assessment and stock pricing. On the other hand, companies that make up the IBRX 100, besides being the ones with the highest volume of negotiations between those listed, are mostly positioned at the differentiated levels of governance (NM, N2 and N1), so their internal control structures do not, in fact, have significant weaknesses. However, according to the CVM, such a situation should be an exceptional case.

Zakaria, Nawawi and Salin (2016) note that ICW may indicate possible occurrences of fraud or error. Thus, the research results also contribute to the debate about the role of red flags as risk flags, in particular, a risk of omitting relevant information on weaknesses of internal controls or, even, a better quality of auditing to the extent that auditors, from red flags, may require the elimination or mitigation of weaknesses under penalty of issuing a modified opinion. As well as the studies by Hegazy and Kassem (2010), which concluded that red flags can be useful to external auditors, the research also contributes to managers, auditors and regulators by presenting evidence that differs, to some extent, from foreign literature, but reinforces the role of red flags in risk assessment as to the quality of accounting information.

Nevertheless, the study presents limitations related to the sample due to the exclusion of the other listed companies and regarding the non-use of the logistic panel, which was impaired due to the sample size. In addition, it could reconcile variable reduction techniques for the analysis of the marginal effect of ARF on ICW. As suggestions for future research, we indicate to: (i) analyze the effect of ARF on specific types of ICW; (ii) analyze the effect of incentives on the publication of ICW; and (iii) verify the type of association between ICW and earnings management proxies by accruals or operations.

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Appendix A - International Empirical Studies on Red Flags and Internal Control Weaknesses

Author (Year)	Title	Goal	Methodological Procedures/Sample	Main results
Feroz, Kwon, Pastena and Park (2000)	The Efficacy of Red Flags in Predicting the SEC's Targets: An Artificial Neural Networks Approach.	Provide regulators with information on how good models predict violations.	Least squares and logistic regressions, descriptive statistics. 42 companies.	There is predictive value in the use of financial indices present in the balance sheet, combined with non-financial red flags (e.g., rotation of Chief Executive Officer, Chief Financial Officer and auditors).
Hegazy and Kassem (2010)	Financial reporting fraud: Do red flags really help?	Determine whether red flags are useful to help external auditors detect fraud in financial reporting.	Questionnaire, descriptive statistics. 93 respondents.	The combination of specific red flags and red flags in statement on auditing standards SAS 99 can increase the ability of external auditors to detect fraud.
Rice and Weber (2012)	How Effective Is Internal Control Reporting under SOX 404? Determinants of the (Non-) Disclosure of Existing Material Weaknesses.	Examine, through the identification of ICW, the effectiveness of internal control reports based on the Sarbanes Oxley SOX Act 404.	Descriptive statistics and regression. 488 companies.	There is a negative association between the probability of reporting of ICW, size of the company and the presence of the Big4. In addition, there is a positive association between ICW reformulations and recent auditor and administration changes.
Su; Zhao and Zhou (2014)	Do customers respond to the disclosure of internal control weakness?	Investigate the reaction of customers to the disclosure of ICW by companies.	Descriptive statistics and regression. 2,697 observations.	Identified a decrease in sales growth in the industry after the disclosure of ICW, a decline which is more pronounced in the durable goods industries, with high intensity of research and development, or without subsequent correction of these ICW.
Lenard et al. (2016)	Internal control weaknesses and evidence of real activities manipulation	Examine whether there is a relationship between the ICW reports filed with the SEC and the level of actual activity handling.	Descriptive statistics and regression. 904 companies.	They found a positive relationship between companies reporting ICW and the actual manipulation of activities, the results suggest that companies with ICW are prone to use manipulation as a means of managing results.
Zakaria, Nawawi and Salin (2016)	Internal Controls and Fraud — Empirical Evidence from Oil & Gas Company.	Identify ICW and fraud committed as a result of them.	Case study, document analysis and interview. 1 company.	ICW (e.g. lack of supervision in overtime staff and lack of monitoring of purchase orders) were identified; as well as fraud committed (e.g. kickbacks on overtime pay and creating a fictitious invoice).

Appendix B - Operationalization of the Variables Used Model

Acronym	Description	Formula
Dependent Variables (Internal Control Weaknesses)		
ICW	Weaknesses of Internal Controls	Dummy variable that assumes value 1 when you reported 1 or more ICW and 0 when not.
NICW	Number of Weaknesses of Internal Control reported	Natural logarithm of total ICW reported per company/year.
Independent Variables (Red Flags)		
DSRI	Days Sales in Receivables Index	$\frac{(\text{Receivables}_t \div \text{Sales}_t)}{(\text{Receivables}_{t-1} \div \text{Sales}_{t-1})}$
GMI	Gross Margin Index	$\frac{(\text{Gross Profit}_{t-1} \div \text{Sales}_{t-1})}{(\text{Gross Profit}_t \div \text{Sales}_t)}$
AQI	Asset Quality Index	$\left\{ \frac{1 - [(\text{Current Assets}_t + \text{PP\&E}_t) \div \text{Total Assets}_t]}{1 - [(\text{Current Assents}_{t-1} + \text{PP\&E}_{t-1}) \div \text{Total Assets}_{t-1}]} \right\}$
SGI	Sales Growth Index	$\left(\frac{\text{Sales}_t}{\text{Sales}_{t-1}} \right)$
DEPI	Depreciation Index	$\left\{ \frac{[\text{Depreciation}_{t-1} \div (\text{Depreciation}_{t-1} + \text{PP\&E}_{t-1})]}{[\text{Depreciation}_t \div (\text{Depreciation}_t + \text{PP\&E}_t)]} \right\}$
SGAI	Sales, General and Adm. Expenses Index.	$\frac{(\text{Sales, General and Administrative Expenses}_t \div \text{Sales}_t)}{(\text{Sales, General and Administrative Expenses}_{t-1} \div \text{Sales}_{t-1})}$
LVGI	Leverage Index	$\left\{ \frac{[(\text{Long Term Debt}_t + \text{Currents Liabilities}_t) \div \text{Total Assets}_t]}{[(\text{Long Term Debt}_{t-1} + \text{Currents Liabilities}_{t-1}) \div \text{Total Assets}_{t-1}]} \right\}$
TATA	Total Accruals to Total Assets	$\left\{ \frac{(\Delta \text{CA}_t - \Delta \text{Cash}_t - \Delta \text{CL}_t - \Delta \text{LTD}_t - \Delta \text{ITP}_t - \Delta \text{Depreciation and Amortization}_t)}{\text{Total Assets}_t} \right\}$
QE	Quality of Earnings	$\left(\frac{\text{Operating Cash Flows}_t}{\text{Net Income}_t} \right)$
Control Variables		
SIZE	Size	Natural log of total assets.
AGE	Age	Natural logarithm of the firm's total years of registration.
NM	New Market	Dummy variable that assumes value 1 when the company is listed at the Governance NM level, 0 for the other.
RESTATE	Mandatory republication	Variable dummy that assumes value 1 when the company republished, 0 for the other.
INDUSTRY	Economic Segment	Dummy variable that assumes value 1 for year i, 0 for the other.
YEAR	Year	Dummy variable that assumes value 1 for year t, zero for the other.

Note: CA – Current Assets; CL – Current Liabilities; ITP – Income Tax Payable; LTD – Long-Term Debts; PP&E – Immobilized; t corresponds to the current year and t-1 to the previous; Δ the variation.

NOTES

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Does not apply.

APPROVAL OF THE RESEARCH ETHICS COMMITTEE

Does not apply.

CONFLICT OF INTERESTS

Does not apply.

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