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Audit mechanisms and earnings management

Mecanismos de auditoria e gerenciamento de resultados contábeis

Mecanismos de auditoria y manipulación contable

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Abstract
In this study we evaluated the influence of audit mechanisms on earnings management based on a sample of 142 non-financial firms listed in the 'Differentiated Corporate Governance' segment of the Brazilian stock market (B3) between 2011 and 2017. A descriptive analysis of the adopted metrics of earnings management (discretionary accruals, abnormal real activities, abnormal earnings) suggests that accounting information quality is most severely impacted by discretionary accruals. Multiple regressions on panel data using the quantile regression method revealed that audit mechanisms are protective of accounting information quality and that the existence of internal control and audit bodies—commonly regarded as internal mechanisms of corporate governance—was insufficient to inhibit the adoption of earnings management strategies, such as classification shifting, for the sample and period analyzed.
Keywords: Audit mechanisms; Information quality; Discretionary accruals; Real activities; Abnormal earnings

Resumo
Este estudo tem por objetivo analisar a influência dos mecanismos de auditoria no gerenciamento de resultados contábeis. A investigação reúne dados de 142 empresas não financeiras participantes da carteira do Índice de Ações com Governança Corporativa Diferenciada da B3, no período de 2011 a 2017. A estatística descritiva das métricas de gerenciamento de resultados (*accruals* discricionários, o nível anormal das atividades reais e o resultado contábil anormal) sinaliza que os *accruals* discricionários é a medida que mais contribui para a redução da qualidade das informações contábeis. A partir de regressões múltiplas com dados em painel e pelo método de regressão quantílica, verificou-se que os mecanismos de auditoria melhoram a qualidade das informações contábeis e que a existência de órgãos de auditoria interna e controle interno, tidos como mecanismos internos de governança corporativa, não são eficientes em inibir a adoção de estratégias de gerenciamento de resultados por mudança de classificação, para a amostra e período investigados.
Palavras-chave: Mecanismos de Auditoria; Qualidade da Informação; *Accruals* Discricionários, Atividades Reais; Resultado Contábil Anormal

Resumen
Este estudio analiza la influencia de los mecanismos de auditoria en la manipulación contable, reuniendo datos de 142 empresas no financieras participantes en la cartera del Índice de Acciones con Gobernanza

Corporativa Diferenciada de la B3, en el período de 2011 a 2017. La estadística descriptiva de las métricas manipulación contable (accruals discrecionales, nivel anormal de las actividades reales y resultado contable anormal) indica que los accruals discrecionales son la medida que más contribuye a la reducción de dicha calidad. A partir de regresiones múltiples con datos en panel y por el método de regresión cuantílica, se verificó que los mecanismos de auditoria mejoran la calidad de la información contable y que los órganos de auditoría y control interno, considerados mecanismos internos de gobernanza corporativa no son eficientes para inhibir la adopción de estrategias de manipulación contable por cambio de clasificación, para las empresas analizadas en el período.
Palabras clave: Mecanismos de Auditoria; Calidad de la Información; Accruals Discrecionales, Actividades Reales; Resultado Contable Anormal

1 Introduction

The adoption of good governance practices potentially improves corporate performance and market relations by generating mechanisms ensuring managers always act in the interest of the firm and its shareholders (Bushman & Smith, 2001) and by minimizing behaviors like earnings management which compromise accounting information quality (Lin & Hwang, 2010).

Among such governance practices are a number of audit mechanisms. Since the passing of the Sarbanes-Oxley Act (SOX), which regulated firms traded on the US stock market, with impacts on Brazilian firms as well, audit mechanisms have played a crucial role in risk management and in the interplay between board directors, auditors and shareholders (Silva, Vasconcelos & De Luca, 2017) in view of the emphasis laid on the implementation and maintenance of internal control structures and the creation of audit committees.

Audit mechanisms may be either internal or external. The former operate through internal control, internal audits and audit committees. The latter are related to independent audits and to the legal and regulatory environment, which combine to reduce information asymmetry and promote information transparency and earnings reliability (Bortolon, Sarlo & Santos, 2013).

Much has been published on the effect of specific audit mechanisms on earnings management. Several audit variables have been tested in separate, such as audit committee size (Zalata, Tauringana & Tingbani, 2018), audit committee independence (Poretti, Shatt & Brynseels, 2018), auditing by one of the Big Four (Khalil & Ozkan, 2016), auditor change (Demski, 2004), internal audits (Christ, Masli, Sharp & Wood, 2015) and internal controls (Brown, Pott & Wömpener, 2014).

Most of these studies used discretionary accruals to quantify the influence of specific audit mechanisms on earnings management, yielding rather inconsistent results. However, accounting figures can also be managed with strategies relying on real activities and classification shifting. Thus, to better understand how accounting information quality is affected by earnings management, a wider set of audit mechanisms should be taken into account.

Manipulation by way of discretionary accruals results in changes in net earnings without directly affecting cash flow (Dechow, Ge & Schrand, 2010). In contrast, abnormal real activities modifies net earnings and directly affects cash flow (Bilal & Komal, 2018). Finally, classification shifting alters items on the income statement for the fiscal year in order to misrepresent operating profits, but does so without affecting net earnings or cash flow (McVay, 2006).

When looking at discretionary accruals and abnormal real activities, Shipper and Vincent (2003) concluded that the introduction of stricter accounting and control mechanisms can actually lead to the diversification of earnings management strategies. Thus, in the same fiscal year managers may employ more than one strategy to embellish accounting information, based on the perceived cost of each strategy (Cupertino, Martinez & Costa, 2015; Zang, 2012).

Considering the role of corporate governance in the Brazilian capital market, the purpose of audit mechanisms and their expected impact on information quality, we attempted to answer to what extent audit mechanisms affect levels of earnings management. To do so, we conducted a study on a sample of public firms listed in the 'Differentiated Corporate Governance' (IGC) segment of the Brazilian stock market (B3 S.A. Brasil, Bolsa, Balcão), covering the period 2011-2017.

The fact that firms listed in the B3 IGC segment are also listed in the 'New Market' segment and in the 'Corporate Governance levels 1 and 2' segments means they are formally adopters of corporate governance practices in general. But the control and audit mechanisms of such firms have not yet been shown to protect accounting information quality, thereby aligning the interests of managers and investors and minimizing agency conflicts.

In this study, earnings management was proxied by discretionary accruals, abnormal real activities and abnormal earnings. Each strategy affects accounting figures in a different way, and some managers employ a combination of strategies in the same fiscal year (Zang, 2012), with a significant impact on accounting information reliability (Dechow, Ge & Schrand, 2010).

The influence of audit mechanisms on each strategy of earnings management was evaluated with fixed-effects regressions on panel data and quantile regressions, covering the period 2011-2017. Our results show a negative effect of audit mechanisms on discretionary accruals, abnormal real activities and abnormal earnings in the sampled firms.

The present investigation contributes to the discussion on the effect of audit mechanisms on the level of earnings management by analyzing variations in discretionary accruals, abnormal real activities and abnormal earnings. Unlike previous studies, our results show to what extent different audit mechanisms inhibit the manipulation of accounting figures. The evidence gathered can help investors, auditors, financial analysts, creditors and regulatory bodies assess and monitor firms, to the general benefit of the Brazilian capital market.

2 Review of the literature and development of hypotheses

According to Davidson, Goodwin-Stewart and Kent (2005), the function of the audit committee is to monitor managers' financial decisions to ensure the reliability of financial reports, protect shareholders' interests and improve the quality of disclosed accounting information. The authors pointed out that the efficiency of the audit committee depends on the members' independence.

As shown by Fich and Shivdasani (2006), the monitoring capacity of the audit committee is compromised when the members serve on one or more other committees. Other authors have reported a correlation between audit committee efficiency and the number of independent members (Sultana, Singh & Van Der Zahn, 2015).

Likewise, Sun, Lan and Liu (2014) found the presence of board members on the audit committee to be positively associated with abnormal real activities. Duplicity of function among audit committee members reduced the committee's ability to monitor corporate activities.

Conversely, a study by Cunha, Hillesheim, Faveri and Rodrigues (2014) involving 415 firms listed on BM&FBovespa in 2010 and 2011 failed to show a significant influence of audit committee size and member independence on the level of discretionary accruals.

Davidson et al. (2005) concluded that external audit firms constitute a governance mechanism with impacts on accounting information quality. This is supported by DeAngelo (1981), according to whom larger audit firms tend to render higher quality services due to their greater resources and expertise at detecting strategies distorting information disclosed to external users.

By way of audit committees, firms can run internal audits to complement and support corporate governance routines (Prawitt, Smith & Wood, 2009). When analyzing data from 218 US public firms for the period 2000-2005, the authors found a positive association between internal audit quality and the level of discretionary accruals.

Brown et al. (2014) showed that the establishment of an internal control body is key to the improvement of accounting information quality as it discourages managers from mislabeling expenses. Likewise, in a comparative study of earnings quality in Canadian firms before (2002-2003) and after (2004-2005) the mandatory adoption of internal controls, Singer and You (2011) concluded that the new governance mechanism had a positive impact on disclosure.

Limiting the time external auditors are responsible for auditing the firm reduces the risk of undue intimacy between auditors and managers (Nagy, 2005). Frequent external auditor changes favor objectivity and audit quality (Lys & Watts, 1994), inhibiting earnings management and safeguarding financial information quality (Defond & Subramanyam, 1998).

As argued by Dantas and Medeiros (2015), the importance of external audits is universally acknowledged as a means to curb subjective accounting judgments on part of opportunistic managers looking to mask poor corporate results and boost the firm's image in the eyes of investors. Healy and Wahlen (1999) observed that managers reduce earnings quality through judgments by intentionally misrepresenting specific operations of interest to financial information users in search of performance data, or by influencing the signing of contracts which depend on accounting figures.

Managers may also adopt strategies of manipulation of accounting figures in order to attain specific performance goals (Schipper, 1989). Almeida and Almeida (2009) showed that the level of discretionary accruals is lower in firms audited by one of the Big Four than otherwise. Cohen, Dey and Lys (2008) observed that, following the passage of SOX, an overall improvement in accounting information quality occurred. Ten years earlier, Becker, DeFond, Jiambalvo and Subramanyam (1998) found the level of discretionary accruals to be higher in firms with low external audit quality.

In a more recent study, Miko and Kamardin (2015) evaluated the impact of several factors (existence and size of audit committees, auditing by the Big Four, time of relationship between auditor and firm, external auditor remuneration) on the level of discretionary accruals in the Nigerian capital market. The authors identified the existence of audit committees and audit quality as inhibitors of earnings management through discretionary accruals. Based on the above review, the following study hypothesis was formulated:

H_1: Audit mechanisms are negatively associated with the level of discretionary accruals (GR1).

Evaluating a sample of 6,759 US firms covering the 7-year period preceding the passage of SOX (1996-2002), Visvanathan (2008) found no significant correlation between the level of abnormal real activities and audit committee size and independence. However, in a study by Garven (2015) based on 2005-2007 data from 148 US firms, greater audit committee member independence was associated with lower levels of earnings management through abnormal real activities.

Sun et al. (2014) found a negative correlation between auditor independence and abnormal operating cash flow, production volume and discretionary expenses in US firms. The authors added that curbing earnings management in the form of abnormal real activities is one of the most important functions of audit mechanisms. Based on the above considerations, a second study hypothesis was formulated:

H_2: Audit mechanisms are negatively associated with the level of abnormal real activities (GR2).

According to Haw, Simon and Ho (2011), earnings management through classification shifting involves the deliberate mislabeling of basic expenses (e.g., the cost of products sold and general and administrative expenses) in order to report abnormally large profits. In a study on the adoption of this strategy by US firms, McVay (2006) observed that managers opportunistically relabel basic expenses as special items to satisfy the predictions of financial analysts.

While abnormal accounting figures distorted by classification shifting are difficult to detect in audits, they strongly impact analysts' interpretations and investors' perceptions of company profits (Haw, Simon & Ho, 2011). Identifying factors inhibiting this type of accounting manipulation in markets with low levels of investor protection, such as Brazil, is very important (Marques, Costa & Silva, 2016). Insufficient investor protection has been shown to favor earnings management through classification shifting (Defond, Hung & Trezevant, 2007). Thus, a third study hypothesis was formulated.

H_3: Audit mechanisms are negatively associated with the level of abnormal earnings (GR3).

3 Methods

3.1 Sampling

The study population consisted of 188 firms listed in the B3 IGC segment, which monitors the performance of adopters of differentiated levels of corporate governance (Level 1, Level 2, New Market) (B3, 2018). As shown in Table 1, some firms were excluded to compose the final sample.

Table 1:
Sample composition

Firms listed in the B3 IGC segment as of March 2018	**188**
(-) Firms in the financial sector and others, according to the B3 classification	32
(-) Duplicated firms	13
(-) Firms with incomplete data	1
(=) Final sample	**142**

Source: the authors.

Covering the period 2011-2017, information was retrieved from the databse Economatica® and from reference forms available on the website of the Brazilian Securities and Exchange Commission (CVM). Due to the incompleteness of data for some firms, years and models, and because some panels were unbalanced, regressions were based on either 494 or 632 observations.

In order to determine the effect of audit mechanisms on the level of earnings management of accounting figures in the sample, three metrics were adopted.

3.2 Metrics of earnings management

Earnings management was quantified with three metrics: discretionary accruals (GR1), abnormal real activities (GR2) and abnormal earnings (GR3). The models based on these metrics (Equations 1, 2, 4, 5, 6 and 8) were estimated according to year and industry. When necessary, the presence of autocorrelation and heteroscedasticity was adjusted for in each model. The following models were used:

3.2.1 Metric 1: Discretionary accruals (GR1)

The detection of discretionary accruals (GR1) requires the estimation of total accruals from the balance sheet. Once total accruals have been estimated, the coefficients α, β_1 and β_2 are estimated with the

Jones model (1991) (Equation 1), then fitted in the modified Jones model (Dechow et al. 1995) to determine discretionary accruals (Equation 2).

$$TA_{it} = \alpha(1/A_{it-1}) + \beta_1 (\Delta V_{it}) + \beta_2 (PPE_{it}) + \varepsilon_{it} \quad \text{(Equation 1)}$$

$$NDA_{it} = \alpha(1/A_{it-1}) + \beta_1 (\Delta V_{it} - \Delta CR_{it}) + \beta_2 (PPE_{it}) + \varepsilon_{it} \quad \text{(Equation 2)}$$

where:
TA_{it} = total accruals of firm *i* in period *t*, weighted by assets at the end of period *t-1*;
ΔV_{it} = variation in net sales revenue of firm *i* weighted by assets at the end of period *t-1*;
PPE_{it} = balance of fixed assets of firm *i* weighted by assets at the end of period *t-1*;
A_{it-1} = assets of firm *i* at the end of period *t-1*;
ε_{it} = regression error term (residuals) of firm *i* in period *t*;
NDA_{it} = non-discretionary accruals of firm *i* in period *t*;
ΔCR_{it} = variation in accounts receivable (clients) of firm *i* weighted by assets at the end of period *t-1*; and
α, β_1 and β_2 = coefficients estimated by the regression in Equation 2.

Discretionary accruals are calculated with Equation 3, as proposed by Dechow et al. (1995).

$$AD_{it} = TA_{it} - NDA_{it} \quad \text{(Equation 3)}$$

where:
AD_{it} = discretionary accruals of firm *i* in period *t*;
TA_{it} = total accruals of firm *i* in period *t*; and
NDA_{it} = non-discretionary accruals of firm *i* in period *t*.

3.2.2 Metric 2: Abnormal real activities (GR2)

To estimate the level of abnormal real activities we initially used the Roychowdhury model (2006) (Equations 4, 5 and 6) which estimates the normal patterns of operating cash flow (OCF) of production costs (PROD) and discretionary expenses (DEX), respectively, along with the error term (ε), which indicates the level of abnormality for the variable.

$$OCF_{it}/A_{it-1} = \alpha + \beta_1 (1/A_{it-1}) + \beta_2 (V_{it}/A_{it-1}) + \beta_3 (\Delta V_{it}/A_{it-1}) + \varepsilon_{it} \quad \text{(Equation 4)}$$

$$PROD_{it}/A_{it-1} = \alpha + \beta_1 (1/A_{it-1}) + \beta_2 (V_{it}/A_{it-1}) + \beta_3 (\Delta V_{it}/A_{it-1}) + \beta_4 (\Delta V_{it-1}/A_{it-1}) + \varepsilon_{it} \quad \text{(Equation 5)}$$

$$DEX_{it}/A_{it-1} = \alpha + \beta_1 (1/A_{it-1}) + \beta_2 (V_{it-1}/A_{it-1}) + \varepsilon_{it} \quad \text{(Equation 6)}$$

where:
OCF_{it} = operating cash flow of firm *i* in period *t* (operating profits **–** accruals);
A_{it} = assets of firm *i* in period *t*;
$PROD_{it}$ = production cost of firm *i* in period *t* (cost of products sold **+** Δstock);
DEX = discretionary expenses;
V_{it} = net operating revenues of firm *i* in period *t*;
ΔV_{it} = variation in sales of firm *i* in period *t*; and
ε_{it} = regression error term of firm *i* in period *t*.

According to Gunny (2010), the total level of abnormal real activities may be calculated with Equation 7.

$$GR2_{it} = (AOCF_{it} + ADEX_{it}) + ((APROD_{it} \times (-1)) \quad \text{(Equation 7)}$$

where:
$GR2_{it}$ = level of abnormal real activities of firm *i* in period *t*;
$AOCF_{it}$ = abnormal operating cash flow of firm *i* in period *t*;
$ADEX_{it}$ = abnormal discretionary expenses of firm *i* in period *t*; and
$APROD_{it}$ = abnormal production cost of firm *i* in period *t*.

3.2.3 Metric 3: Abnormal earnings (GR3)

The McVay model (McVay, 2006) was used to estimate the level of abnormal earnings. The model initially estimates the firm's core earnings (CE). The result is then used to measure unexpected changes in core earnings. The proxy (GR3) corresponds to the difference between CE and the error term (ε) of Equation 8.

$$CE_{it} = \alpha + \beta_1 CE_{it-1} + \beta_2 ATR_{it} + \beta_3 OPA_{it-1} + \beta_4 OPA_{it} + \beta_5 \Delta REV_{it} + \beta_6 N\_\Delta REV_{it} + \varepsilon_{it} \quad \text{(Equation 8)}$$

where:
CE = core earnings of firm *i* in period *t* (operating profit before depreciation and special items, weighted by sales revenues);
CE = core earnings of firm *i* in period *t-1* (operating profit before depreciation and special items, weighted by sales revenues);
ATR = asset turnover ratio of firm *i* in period *t*;
OPA = operating accruals of firm *i* in period *t-1*;
OPA = operating accruals of firm *i* in period *t*;
ΔREV = variation in revenues of firm *i* in period *t*; and
N_ΔREV = negative variation in revenues of firm *i* in period *t*.

The selected earnings management metrics reflect managers' efforts to misrepresent corporate performance (Dechow et al., 2010). The metrics were multiplied by (-1) and assume that high GR values (values distant from 0) indicate high levels of earnings management.

3.3 Study design

In order to evaluate the effect of audit mechanisms on the level of earnings management we initially estimated i) discretionary accruals (GR1) using Equations 1, 2 and 3, ii) abnormal real activities (GR2) using Equations 4, 5, 6 and 7, and iii) abnormal earnings (GR3) using Equation 8, for our sample of firms listed in the B3 IGC segment. When testing the study hypotheses, the earnings management metrics (GR1, GR2, GR3) were expressed in absolute values since the purpose of the study was not to investigate the effect of each strategy on corporate profits.

Equation 9 was used to test the study hypotheses.

$$GR_{i,t} = \alpha + \beta_1 ACSIZ_{i,t} + \beta_2 AUIND_{i,t} + \beta_3 BIG4_{i,t} + \beta_4 AUCHG_{i,t} + \beta_5 INTAU_{i,t} + \beta_6 INTCL_{i,t} + \beta_7 SIZ_{i,t} + \beta_8 LEV_{i,t} + \beta_9 ROA_{i,t} + \varepsilon_{i,t} \quad \text{(Equation 9)}$$

Table 2 shows the variables used as proxies for audit mechanisms (based on item 12.7 of the reference form) and the respective references in the literature. Following the example of other studies using earnings management metrics, we adopted a set of control variables: company size (SIZ) corresponding to the natural logarithm of assets (Dechow & Dichev, 2002; Gunny, 2010; Roychowdhury, 2006), return on assets (ROA) calculated by dividing operating income by assets (Roychowdhury, 2006; Zang, 2012), and leverage (LEV) estimated by dividing short- and long-term loans and funding by total assets (Almadi & Lazic, 2016; Call et al., 2014).

To test our hypotheses and verify the robustness of our findings for the association between audit mechanisms and earnings management, we employed two methods of regression: ordinary least squares (OLS) regression for the analysis of mean levels, and quantile regression for the analysis of the effect of audit mechanisms on different levels (quantiles) of earnings management, i.e., on the adoption of more (or less) aggressive strategies of accounting manipulation.

Table 2:
Variables, proxies, descriptions and references

Variável	Proxy	Description	Reference
Audit committee size (ACSIZ)	Number of members	Number of members on the audit committee	Sun et al (2014), Zalata et al. (2018), Morás & Klann (2020)
Audit committee member independence (AUIND)	Number of independent members	Number of audit committee members serving on no other committee	Chan, Liu e Sun (2013), Porettiet et al. (2018), Morás & Klann (2020), Chiang, Kleinman & Lee (2020)
Quality of audit firm (BIG4)	Dummy for any of the Big Four	"1" indicates firm *i* was audited by one of the Big Four in period *t;* otherwise "0".	Zalata et al. (2018), Zgarni, Hlioui & Zehri (2016)
independent auditor change (AUCHG)	Dummy for independent auditor change	"1" indicates change in chief external auditor in firm *i* in period *t* in relation to period *t-1*; otherwise "0".	Demski (2004), Lys & Watts (1994), Nagy (2005), Morás & Klann (2020)
Internal audit (INTAU)	Dummy for internal audit body	"1" indicates the existence of specific internal audit body in firm *i* in period *t*; otherwise "0"	Christ et al. (2015), Prawitt et al. (2009)
Internal control (INTCL)	Dummy for internal control body	"1" indicates the existence of specific internal control body in firm *i* in period *t*; otherwise "0"	Brown et al. (2014), Zakaria, Nawawi & Salin (2016)

Source: the authors.

4 Analysis of results

Initially, we submitted the collected variables to descriptive statistics. Table 3 shows the results for the metrics of earnings management (discretionary accruals, abnormal real activities, abnormal earnings), audit mechanisms and control variables.

Table 3:
Descriptive statistics

Variable	Mean	SD	Min.	Quantile					Max.
				10	25	50	75	90	
GR1	0.035	0.041	0.000	0.005	0.010	0.022	0.047	0.056	0.065
GR2	0.033	0.034	0.000	0.004	0.010	0.021	0.046	0.051	0.060
GR3	0.014	0.018	0.000	0.002	0.004	0.009	0.016	0.027	0.032
ACSIZ	1.830	1.765	0	0	0	2	3	4	5
AUIND	0.296	0.735	0	0	0	0	0	1	1
BIG4	0.929		0	1	1	1	1	1	1
AUCHG	0.332		0	0	0	0	1	1	1
INTAU	0.199		0	0	0	0	0	1	1
INTCL	0.235		0	0	0	0	0	1	1
SIZ	15.4	1.36	11.9	13.7	14.4	15.3	16.3	17.2	19.7
ROA	0.031	0.095	-1.24	-0.047	0.001	0.033	0.071	0.117	0.362
LEV	0.317	0.179	0.00	0.072	0.182	0.310	0.431	0.551	1.080

GR1=level of discretionary accruals; GR2=level of abnormal real activities; GR3=level of abnormal earnings; ACSIZ=audit committee size; AUIND=audit committee independence; BIG4=quality of audit firm; AUCHG=external auditor change; INTAU=internal audit; INTCL=internal control; SIZ=company size; ROA=return on assets; LEV=leverage; SD=standard deviation.
Source: the authors.

The mean GR1 and GR2 values were 0.035 and 0.03, respectively, but the standard deviation was greater in the former (0.041 *vs* 0.034), indicating greater dispersion. In fact, GR1 was the earnings management metric most detrimental to accounting information quality (closest to the value 1), while GR3 caused the least negative impact.

The sampled firms displayed a mean asset value of 15.4 and a low mean leverage value (0.317 of assets; 0.551 at the 90th quantile). However, the standard deviation (data dispersion) was high for LEV due to sample heterogeneity. The mean profitability of the sample was approximately 3%, although some firms had negative profitability while others attained values above 0.36.

At least one quarter of the firms (25th quantile) had no audit committee and, in at least three quarters of the firms that did, none of the members were independent (serving exclusively on the audit committee). The vast majority of the firms (92.9%) were not audited by one of the Big Four, and only 33.2% made regular auditor changes, as required by the CVM. Internal audit bodies were present in 19.9% of the sampled firms, while 23.5% had some form of internal control body.

The influence of audit mechanisms on earnings management was tested with fixed-effects regressions on panel data (Hausman and Breusch-Pagan Lagrange multiplier test) and quantile regressions which allowed to examine how the explanatory variables correlated with the dependent variable at different levels along the distribution (Yu, Wang & Wu, 2015), providing a more comprehensive picture of the effects of interest. Table 4 shows the results of the regressions performed to test the influence of audit variables on the level of discretionary accruals (GR1).

Table 4:
Influence of audit mechanisms on the level of discretionary accruals (GR1)

$GR1_{i,t} = \alpha + \beta_1 ACSIZ_{i,t} + \beta_2 AUIND_{i,t} + \beta_3 BIG4_{i,t} + \beta_4 AUCHG_{i,t} + \beta_5 INTAU_{i,t} + \beta_6 INTCL_{i,t} + \beta_7 SIZ_{i,t} + \beta_8 LEV_{i,t} + \beta_9 ROA_{i,t} + \varepsilon_{i,t}$

Variable	Quantile					Panel with fixed effects	VIF
	10	25	50	75	90		
Intercept	0.0056	0.0033	-0.0010	0.0164	0.0337	0.0015	
ACSIZ	-0.0002	-0.0007*	-0.0007*	-0.0020***	0.0012	-0.0002*	1.20
AUIND	-0.0007	-0.0011	-0.0016*	-0.0018	-0.0091	-0.0033*	1.19
BIG4	0.0034	0.0059	-0.0006	-0.0035	0.0038	0.0048	1.06
AUCHG	0.0007	-0.0010	0.0028	-0.0010	-0.0048	0.0005	1.01
INTAU	-0.0022*	-0.0015***	-0.0009*	-0.0049	-0.0041	-0.0003***	1.13
INTCL	-0.0016	-0.0009	-0.0013	0.0071	-0.0111	0.0020	1.14
SIZ	-0.0003	-0.0001	-0.0013	-0.0020*	-0.0028	-0.0016	1.12
ROA	-0.0015	-0.0004	-0.0089	-0.0226	-0.0553	0.0207	1.17
LEV	0.0011	0.0038	0.0124	0.0142	-0.0144	0.0015	1.30
			Description				
Pseudo R^2	0.0105	0.0131	0.0109	0.0179	0.0543		
Wald's F			4.77(***)				
Prob > F						1.57***	
Within						0.0118	
Between						0.0023	
Overall						0.0115	
Observations			494				

(*) Significant at the level of 10%; (**) Significant at the level of 5%; (***) Significant at the level of 1%.
GR1=level of discretionary accruals; GR2=level of abnormal real activities; GR3=level of abnormal earnings; ACSIZ=audit committee size; AUIND=audit committee independence; BIG4=quality of audit firm; AUCHG=external auditor change; INTAU=internal audit; INTCL=internal control; SIZ=company size; ROA=return on assets; LEV=leverage; VIF=variance inflation factor.
Source: the authors.

The results of the fixed-effects regressions on panel data and the quantile regressions (Table 4) show that GR1 was negatively impacted by ACSIZ, AUIND and AUCHG. By inhibiting earnings management, these audit mechanisms likely improved accounting information quality in our sample.

Matching the observations of Yang and Krishman (2005) while disagreeing with the conclusions of Cunha et al. (2014) and Miko and Kamardin (2015) with regard to audit committee size, our results indicate that the managers of the firms with the largest audit committees were less likely to manipulate accounting figures through discretionary accruals.

Nevertheless, the quantile regressions yielded no significant and negative associations between GR1 and AUIND or AUCHG from the 75th quantile on, suggesting that the existence of an internal audit body and the presence of independent members on the audit committee did not inhibit the use of aggressive earnings management strategies. This contradicts the results of Christ et al. (2015) and Prawitt et al. (2009) for AUCHG.

Our first study hypothesis ("audit mechanisms are negatively associated with the level of discretionary accruals") should not be rejected, despite the lack of statistical significance for AUCHG and INTCL as deteminants of RG1, contradicting the conclusions of Almeida and Almeida (2009), Cohen et al. (2008), Miko and Kamardin (2015) and Silvestre, Costa and Kronbauer (2018), according to whom these variables are significantly associated with earnings management, hence with accounting information quality.

Table 5 shows the results of the regressions testing the influence of audit mechanisms on the level of abnormal real activities (GR2).

Table 5:
Influence of audit mechanisms on abnormal real activities (GR2).

$GR2_{i,t} = \alpha + \beta_1 ACSIZ_{i,t} + \beta_2 AUIND_{i,t} + \beta_3 BIG4_{i,t} + \beta_4 AUCHG_{i,t} + \beta_5 INTAU_{i,t} + \beta_6 INTCL_{i,t} + \beta_7 SIZ_{i,t} + \beta_8 LEV_{i,t} + \beta_9 ROA_{i,t} + \varepsilon_{i,t}$

Variable	Quantile					Panel with fixed effects	VIF
	10	25	50	75	90		
Intercept	0.0113	0.0341***	0.0596***	0.1053***	0.1561***	0.0707***	
ACSIZ	0.0004	0.0001	0.0017	0.0023*	0.0046**	0.0020***	1.18
AUIND	-0.0007	0.0004	-0.0011	-0.0014	-0.0050***	-0.0030	1.18
BIG4	-0.0031	-0.0016	-0.0159**	-0.0093	-0.0012	-0.0063	1.07
AUCHG	-0.0002	0.0019	-0.0005	-0.0051	-0.0046	-0.0021	1.01
INTAU	0.0018	0.0007	0.0007	-0.0003	-0.0081	-0.0019	1.12
INTCL	-0.0017	-0.0055***	-0.0116***	-0.0185***	-0.0205***	-0.0130***	1.11
SIZ	-0.0002	-0.0014**	-0.0011	-0.0032*	-0.0059**	-0.0021*	1.12
ROA	0.0019	-0.0162**	-0.0166	0.0031	0.0356	0.0015	1.17
LEV	-0.0024	0.0007	-0.0015	0.0072	0.0199	0.0072	1.30
Description							
Pseudo R^2	0.010	0.0249	0.0341	0.0422	0.0540		
Wald's F			4.77(***)				
Prob > F						3.57***	
Within						0.0538	
Between						0.1030	
Overall						0.0487	
Observations	632						

(*) Significant at the level of 10%; (**) Significant at the level of 5%; (***) Significant at the level of 1%.
GR1=level of discretionary accruals; GR2=level of abnormal real activities; GR3=level of abnormal earnings; ACSIZ=audit committee size; AUIND=audit committee independence; BIG4=quality of audit firm; AUCHG=external auditor change; INTAU=internal audit; INTCL=internal control; SIZ=company size; ROA=return on assets; LEV=leverage; VIF=variance inflation factor.
Source: the authors.

In the regressions, INTCL had a negative effect on GR2 at the level of 1%, supporting the findings of Brown et al. (2014) and Singer and You (2011). In other words, internal control bodies appear to be very efficient at inhibiting earnings management through abnormal real activities and, thus, at safeguarding accounting information quality.

ACSIZ had a positive effect on the level of abnormal real activities (Table 5). The regressions on panel data and the quantile regressions indicated that this audit mechanism did not restrain managers in their adoption of strategies using abnormal real activities: up to the 50th quantile, no statiscally significant coefficients were observed. As shown in Table 3, the mean GR2 value was greater than the median.

It would therefore seem that larger audit committees are not necessarily reflected in a smaller propensity of managers to engage in abnormal real activities, to the detriment of accounting information quality. Similar conclusions were drawn by Yang and Krishman (2005) who found smaller committees to be more functional and better at supervising financial reports, but not by Kent, Routledge and Stewart (2010), who reported a positive association between committee size and information quality.

Moreover, in the quantile regressions, AUIND was negatively and significantly associated with GR2 at the 90th quantile at the level of 1%, suggesting that greater independence (more independent members) affects only earnings management strategies relying on abnormal real activities, a finding supported by Fich and Shivdasani (2006), Sultana et al. (2015) and Sun et al. (2014).

Thus, the second study hypothesis ("audit mechanisms are negatively associated with the level of abnormal real activities") should not be rejected. Significant coefficients were found for BIG4, AUCHG and AUIND, contrasting with Brown et al. (2014), Cunha et al. (2014), Davidson et al. (2005), DeAngelo (1981), DeFond and Subramanyam (1998) and Singer and You (2011).

Based on our results, the evaluated audit mechanisms do not seem to detect abnormal real activities very efficiently, but this is hardly surprising, considering the difficulty of identifying and defining specific levels of abnormal activity (Cupertino et al., 2015; Roychowdhury, 2006). Finally, we analyzed the influence of audit mechanisms on abnormal earnings (GR3) (Table 6).

INTAU and INTCL yielded significant coefficients at the level of 1% in the fixed-effects regressions on panel data. Likewise, positive and significant coefficients were observed for INTAU in the quantile regressions at the 10th, 25th and 90th quantile, and for INTCL at the 25th, 50th, 75th and 90th quantile. Thus, contrary to the expectations and findings of Brown et al. (2014) and Singer and You (2011), in our sample the existence of internal bodies did not inhibit opportunistic classification shifting, nor prevent loss of accounting information quality by this strategy.

Table 6:
Influence of audit mechanisms on abnormal earnings (GR3)

$GR3_{i,t} = \alpha + \beta_1 ACSIZ_{i,t} + \beta_2 AUIND_{i,t} + \beta_3 BIG4_{i,t} + \beta_4 AUCHG_{i,t} + \beta_5 INTAU_{i,t} + \beta_6 INTAU_{i,t} + \beta_7 SIZ_{i,t} + \beta_8 LEV_{i,t} + \beta_9 ROA_{i,t} + \varepsilon_{i,t}$

Variable	Quantile					Panel with fixed effects	VIF
	10	25	50	75	90		
Intercept	-0.012**	-0.0123***	-0.0290***	-0.0254	-0.0417**	-0.0186***	
ACSIZ	-0.0003	-0.0002	-0.0007***	-0.0009	-0.0009	-0.0022***	1.21
AUIND	0.0008	0.0013	0.0004	-0.0007	-0.0021	0.0009	1.20
BIG4	-0.0006	0.0007	-0.0039**	0.0053	0.0047	0.0015	1.06
AUCHG	0.0003	0.0002	-0.0002	-0.0002	-0.0002	-0.0004	1.01
INTAU	0.0022**	0.0011**	0.0003	0.0022	0.0057*	0.0067***	1.13
INTCL	0.0006	0.0071***	0.0064***	0.0144**	0.0428***	0.0175***	1.12
SIZ	0.0009***	0.0009***	0.0022***	0.0023**	0.0038***	0.0018***	1.13
ROA	0.0030	0.0014	0.0010	0.0015	-0.0037	0.0073	1.18
LEV	0.0017	0.0031**	-0.0004	-0.0049	-0.0026	0.0029	1.33
Description							
Pseudo R^2	0.0607	0.1177	0.1145	0.1253	0.2726		
Wald's F			4.77(***)				
Prob > F						15.55***	
Within						0.2040	
Between						0.5872	
Overall						0.2071	
Observações	625						

(*) Significant at the level of 10%; (**) Significant at the level of 5%; (***) Significant at the level of 1%.
GR1=level of discretionary accruals; GR2=level of abnormal real activities; GR3=level of abnormal earnings; ACSIZ=audit committee size; AUIND=audit committee independence; BIG4=quality of audit firm; AUCHG=external auditor change; INTAU=internal audit; INTCL=internal control; SIZ=company size; ROA=return on assets; LEV=leverage; VIF=variance inflation factor.
Source: the authors.

While DeFond and Subramanyam (1998), Lys and Watts (1994) and Nagy (2005) found external auditor change to reduce levels of earnings management, the coefficients calculated for AUCHG in this study were non-significant, making it impossible to characterize this audit mechanism as preventive of earnings management through classification shifting and protective of accounting information quality.

Unlike the other strategies of earnings management, classification shifting was significantly and negatively associated with BIG4 at the 50th quantile at the level of 5%, suggesting that managers take into account the risk of earnings management detection by external audit firms and so adopt a more prudent stance. This result is compatible with the conclusions of DeFond and Subramanyam (1998), Lys and Watts (1994) and Nagy (2005).

Similar to our findings for GR1, and contrary to our findings for GR2, the results in Table 6 show that larger audit committees are more efficient at inhibiting earnings management through classification shifting. In contrast, Cunha et al. (2014) and Miko and Kamardin (2015) found the number of members on the audit committee to have no influence on earnings management.

In view of the above, the third study hypothesis ("audit mechanisms are negatively associated with the level of abnormal earnings") cannot be rejected.

5 Conclusion

In this study we evaluated the influence of audit mechanisms on the level of earnings management in Brazilian firms listed in the IGC segment of the Brazilian stock market (B3) from 2011 to 2017. Audit mechanisms were represented by the variables ACSIZ (audit committee size), AUIND (audit committee independence), BIG4 (being audited by one of the Big Four), AUCHG (external auditor change), INTCL (existence of an internal control body), and INTAU (existence of an internal audit body).

Three metrics of eanings management were employed: GR1 - discretionary accruals estimated with the modified Jones model (Dechow et al., 1995), GR2 - abnormal real activities, determined with the models of Gunny (2010) and Roychowdhury (2006), and GR3 - abnormal earnings calculated as proposed by McVay (2006).

We found ACSIZ, AUIND and INTCL to be associated with lower GR1 values. Consequently, these mechanisms were protective of accounting information quality in the sample. GR1 and GR2 (misrepresentation of production volume, operating cash flow and discretionary expenses) were negatively associated with INTCL. Moreover, AUIND significantly inhibited these forms of earnings management, safeguarding financial information quality, while BIG4 was associated with lower GR2 values.

ACSIZ and BIG4 were correlated with lower GR3 values. Therefore, none of the three study hypotheses (negative effect of audit mechanisms on GR1, GR2 and GR3, respectively, in firms listed in the

B3 IGC segment) could be rejected. In other words, to some extent audit mechanisms contributed to preserving the quality of accounting information.

Our study enriches the discussion on the effectiveness of corporate governance practices, with emphasis on audit mechanisms, adopted by firms to monitor managerial decisions and curb opportunisitc interference in financial disclosure. Among our results is important evidence that audit committee size and internal control bodies may not be as effective at inhibiting earnings management as previously assumed, and that mandatory change of external auditors may not prevent managers from manipulating reports, to the detriment of information users and other stakeholders. These observations are relevant to both regulatory bodies looking standardize corporate governance practices and to investors facing complex decisions.

Our results are limited to the period sampled. Future investigations might evaluate the effect of other governance variables on accounting information quality, such as type of shareholding control and composition of executive remuneration. The sample could also be expanded to include all firms traded on B3 and the years following the adoption of restrictive Covid-19 measures. The management of the pandemic involved considerable financial restrictions for many firms and created new demands for audit mechanisms and corporate governance.

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