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# COSTS CONSIDERED IN THE CHOICE OF THE MODALITIES OF EARNINGS MANAGEMENT: EMPIRICAL STUDY IN COMPANIES LISTED ON B3

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## ABSTRACT

The study verifies which associated costs influence the choice (trade-off) of an earnings management (EM) practice, to the detriment of another, by companies. To this end, an empirical study was carried out with publicly traded Brazilian companies listed on B3 in the period 2008-2017, carried out in two stages. In the first one, the levels of production costs considered normal, discretionary expenses and accruals were estimated, following the methodology proposed by Roychowdhury (2006) and modified Jones (Dechow et al., 1995). In the second step, following Zang (2012), the residuals of the proposed models were part of the multiple regressions estimated in a panel, to evaluate the effect of the costs of each management modality. The data were obtained via the Economática platform, being processed in the Stata software. The results indicate that companies audited by Big4 tend to incur less EM based on accruals and that companies considered leaders in the segment in which they operate engage more in manipulation by real activities. It was not possible to confirm that, due to their uncompetitive status in the sector, non-leading companies use more EM by accruals. On the other hand, less healthy financial conditions are determinant for management by accruals. Furthermore, the results indicate a substitutive relationship between manipulation of real activities and EM by accruals. The level of the latter is negatively related to the unexpected value of the former, realized at the end of the fiscal year.

**Keywords:** Accruals. Operational Decisions. Earnings Management. Trade-off.

## CUSTOS CONSIDERADOS NA ESCOLHA DAS MODALIDADES DE GERENCIAMENTO DE RESULTADOS: ESTUDO EMPÍRICO EM EMPRESAS LISTADAS NA B3

## RESUMO

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O estudo verifica quais custos associados influenciam a escolha (*trade-off*) de uma prática de gerenciamento de resultados (GR), em detrimento de outra, pelas empresas. Para tanto, realizou-se um estudo empírico com as empresas brasileiras de capital aberto listadas na B3 no período 2008-2017, desenvolvido em duas etapas. Na primeira, foram estimados os níveis de custos de produção considerados normais, despesas discricionárias e *accruals*, seguindo a metodologia proposta por Roychowdhury (2006) e Jones modificado (Dechow et al., 1995). Na segunda etapa, seguindo Zang (2012), os resíduos dos modelos propostos fizeram parte das múltiplas regressões estimadas em painel, para avaliar o efeito dos custos de cada modalidade de gerenciamento. Os dados foram obtidos via plataforma Economática, sendo tratados no software Stata. Os resultados indicam que as empresas auditadas por Big4 tendem a incorrer menos em GR baseado em *accruals* e que empresas consideradas líderes no segmento em que atuam engajam-se mais em manipulação por atividades reais. Não foi possível confirmar que, em função de seu status pouco competitivo no setor, empresas não líderes usam mais GR por *accruals*. Por outro lado, condição financeira menos saudável é determinante para gerenciamento por *accruals*. Além disso, os resultados indicam uma relação substitutiva entre manipulação de atividades reais e GR por *accruals*. O nível desse último está negativamente relacionado com o valor inesperado do primeiro, realizado no final do exercício social.

**Palavras-Chave:** *Accruals*. Decisões Operacionais. Gerenciamento de Resultados. Trade-off.

## 1 INTRODUCTION

Studies on earnings management (EM) have their origins in the 1950s, with Samuel Hepworth, shortly after the first accounting scandals reported in the United States – USA (Rosa et al., 2011). EM consists of discretionary manipulation of accounting practices (EM by *accruals*) or operational decision-making (EM by actual activities), both aiming not to portray the economic and financial reality of the entities (Martinez, 2013; Roychowdhury, 2006).

The first studies on this practice were dedicated to the modality of EM by real activities. Among these, Roychowdhury (2006) stands out, who defined it as management actions that deviate from normal business practices, carried out to induce stakeholders to believe that earnings were achieved in the normal course of activities, which therefore leads them astray. EM by *accrual*, in turn, occurs at the end of the accounting year, through changes in the accounting policies adopted by the company, modifying the accounting earnings by recognizing a certain transaction in the financial statements (Jie et al., 2017). This was noticed in the 1990s, in the *accruals* EM model established by Jones (1991), with which the author verified if the administrators managed the earnings by promoting changes in the financial statements. This model was studied by Dechow et al. (1995), promoting changes in it, by improving the measurement of discretionary *accruals*. This second model is called Modified Jones, and is frequently considered in recent studies on the manipulation of earnings by *accruals* (Costa & Soares, 2022).

While EM by *accruals* does not directly change cash flow, it does with manipulation by real activities. Considering this and given the difference in the moment in which the two forms of manipulation occur, Zang (2012) noted that,

not being achieved the desired earnings with EM by real activities, managers use EM by accruals in a complementary way. According to the same author, the analysis of sequential decisions shows that managers choose one of the practices based on their respective costs. Therefore, this study verified which costs associated with earnings management influence the choice of practice in the accruals modality or by real activities in the context of Brazilian companies listed on B3, in this sense, in analyzing the trade-off between the two mentioned EM practices.

As they generate more reliable accounting information, in environments with stricter regulations, EM is less frequent (Rey, 2012). Therefore, as an emerging market and with fewer monitoring mechanisms, compared to the US, for example, Brazil is a vast field for studies on the subject, also because in developing countries, despite the smaller number of companies listed on the stock exchanges, EM is a very relevant issue for stakeholders.

The research is relevant because, according to Roychowdhury (2006), the adoption of EM practices can mask the company's reality, leading investors to mistakenly invest in the shares of companies that are not always financially healthy. It is therefore essential to understand the benefits and harms of each managerial decision related to earnings manipulation. By extension, it appears that, depending on how the EM is carried out, different actors can be affected. For example, development institutions will be able to invest resources in ventures whose accounting situation does not reflect real levels of stability and credibility (Medrado, 2016), which can have consequences, including for company employees, as the impact on cash can compromise, among many other activities, the payment of salaries. In the same logic, the way in which EM is adopted can also affect the State, which is called upon to intervene in the event of financial problems with companies that have a strong influence on the economy of a given region.

Thus, the research results can contribute to several stakeholders. As the particularities of the capital market are better known and, mainly, the singularities of the EM practice are better known, it is possible to understand the behavior of companies, the effects of these practices on the financial statements and the performance of the firms, as well as when one method is replaced by another.

## **2 LITERATURE REVIEW**

### **2.1 Earnings management by real activities and accruals**

Earnings management consists of manipulating accounting information in a discretionary way, so as not to present the company's economic and financial reality (Martinez, 2013; Paulo et al., 2007; Roychowdhury, 2006). In adopting this practice, without infringing the legislation, managers can, for example, increase or reduce earnings to achieve goals (target earnings), decrease the variation of earnings (income smoothing) or, still, reduce the earning for the year, in order to increase it in the following period (big bath accounting) (Martinez, 2002).

The occurrence of EM is more frequent from the conflict of interest between manager and shareholders, being associated with the discretionary manipulation of managers aiming at some type of incentive – economic, financial or tax

(Alhadab & Clacher, 2018; Jie et al., 2017; Oz & Yelkenci, 2018; Zang, 2012; Zhu et al., 2015). However, Law N. 11.638 (2007), standardized this information, making its understanding more accessible to international investors, including the mandatory disclosure of some financial statements, such as cash flow and value added statement (Ferreira et al., 2012).

EM by real activities occurs in the course of operations, being an intentional action (reduced spending on research and development R&D, advertising and maintenance; overproduction to reduce unit cost or decrease in sales price to increase volume sold), in order to change the earnings reported (Alhadab & Clacher, 2018; Jie et al., 2017; Oz & Yelkenci, 2018; Zang, 2012; Zhu et al., 2015). Such measures lead stakeholders to believe that the company's objectives were met through its operations considered normal (Roychowdhury, 2006; Rodrigues et al., 2017).

Roychowdhury (2006) shows that the manipulation of earnings by real activities can involve actions as a temporary attempt by managers to increase sales by offering discounts or more lenient forms of payment and credit; reducing or cutting down expenses (such as those related to R&D, advertising, general and administrative expenses); excessive increase in the quantity produced to reduce the fixed unit cost of each product, consequently reducing the cost of production, which allows an increase in accounting earning. This type of EM is more difficult to detect in audits, as it results from the alteration of activities that are part of the daily course of companies (Cohen & Zarowin, 2010).

EM by accruals, in turn, occurs, for example, by changing the method of depreciation of assets or provision for doubtful accounts, for example), without, therefore, changing the cash flow (Jie et al., 2017). In the context of publicly traded Brazilian companies, Dani et al. (2017) noted that employee benefits and tax risks were used to trigger accruals, evidencing the practice of EM, which, however, was not associated with the provision of fiscal risks. Novaes et al. (2018) also did not notice higher EM by accruals when market analysts were wrong in the forecast. In a study with Brazilian companies, the levels of accruals were highlighted as a metric to indicate a potential need for an audit (Cupertino & Martinez, 2008).

## **2.2 Trade-off between accrual modalities and real activities**

The difference between earnings management by real activities and by accruals basically resides in the impacts caused or not on the operating cash flow, being direct and indirect, respectively (Martinez, 2013). It is for this reason, but not only, that managers prefer earnings manipulation with the first modality (Cohen & Zarowin, 2010). The moment when managers choose to manipulate accounting earnings and the method for doing so were studied by Zang (2012). Based on Roychowdhury's (2006) models, with regard to EM by operational activities, and by Jones (1991), about EM by accruals, the author found that both modalities of earnings management are expensive practices, pointing out that their choice depends on the environment in which the company is inserted and the costs associated with each one. Thus, we propose the hypothesis:

H1: The relative degree of EM by accruals in relation to handling real activities depends on the relative cost of each action.

The first cost relates to market share. It is unlikely that the deviation from activities considered normal in the company will increase its value in the long term and remain a routine practice in the organization. Thus, when working in market-leading companies, some managers may find the manipulation of real activities less expensive, because the damage to its competitive advantage (arising from accumulated experience, ability to benefit from savings through bargaining power with suppliers and customers, greater investor attention, and more influence over competitors) are small (Roychowdhury, 2006; Zang, 2012). For this reason, we propose that:

- H1a: Companies that do not have market leader status have a higher level of manipulation by accruals.

In addition, when the company goes through financial difficulties, the managers' concern is focused on surviving the market, therefore, any change in operations considered normal can be quite costly, given the direct impact on their cash. This, therefore, makes such a practice less common (Zang, 2012). Thus, we hypothesize that:

- H1b: Companies with poor financial health have a higher level of management based on accruals.

The participation of other companies in institutional ownership can also make it difficult to manipulate real activities, by monitoring investors to reduce it (Roychowdhury, 2006; Zang, 2012). They do so because, unlike accruals, the management of real activities has long-term economic consequences for the company, without the exact extent of its effects. Therefore, institutional investors with more market perspectives monitor EM more for real activities than for accruals (Roychowdhury, 2006). Finally, when companies increase sales through discounts or lower costs and expenses, they are increasing tax revenue, thus incurring an increase in taxes to be paid in the period. Therefore, as it has a direct impact on cash, the manipulation of real activities is also expensive, due to tax incentives.

Regarding earnings management based on accruals, one of its costs is related to the scrutiny of auditors. In China, where the State can participate as a shareholder in some companies listed on the stock exchange, analyzing the period 2008-2012, Jie et al. (2017) noted that EM by real activities was intensified when government interference was lower, while less supervised companies and those with more growth prospects tended to EM by accruals.

In analysis of Saudi companies, Habbash and Alghamdi (2017) observed that one factor that can inhibit EM is highly experienced auditors capable of detecting such practices, although the literature suggests that the quality of the audit worsens as the length of the auditor's relationship with the audited company increases, as the resulting familiarity reduces the risk of non-detection of EM by accruals (Alhadab & Clacher, 2018), which is also confirmed by Jie et al. (2017).

In this way, Zang (2012) also noticed that Big Four audit firms restrict more accrual-based earnings management, because their auditors are more experienced and because companies have more reputation at stake. Therefore, the cost associated with accruals becomes more onerous for the company when it is audited by Big Four companies. For this author, the flexibility of accounting systems also favors the EM by accruals, which, on the contrary, according to Bruni et al. (2014), encountered barriers with the adoption of the international standard

in Brazilian accounting, as of 2008, because the new model reduces information asymmetry in financial statements.

A manager may find it more difficult to convince a high-quality auditor of their aggressive accounting choices than if they are dealing with a low-quality auditor. It can also assume that earnings management based on accruals is easier to detect when agents increase the inspection of the company's accounting practices. Thus, we propose that:

- H1c: Companies that face greater scrutiny from auditors and regulators have a higher level of manipulation of real activities.

The H1 proposed in this research assumes that the two practices occur together and that the trade-off depends on the relative cost of each one. However, the manipulation of real activities changes the timing and/or structure of certain business transactions and, therefore, occurs within the company's fiscal year, at the end of which the result of such practice is determined and managers can no longer change the activities (Jie et al., 2017).

Therefore, managers observe the impact that the manipulation of activities has at the end of the fiscal year and can complement a possible unexpected earnings (high or low), using more or less accruals based management (Zang, 2012). Therefore, there is a possibility that managers sometimes choose one method over another, but at other times they use both methods, making them complementary, which is decided at the moment that precedes the disclosure of the financial statements. Thus, the hypothesis arises that:

- H2: Managers adjust the intensity of adopting earnings management based on accruals after handling real activities is performed.

### 3 METHODOLOGY

#### 3.1 Sample composition

In order to achieve the objective of this study, companies listed on B3 were selected from the Economática database, in which we collected accounting data for the period 2008-2017. The choice was restricted to publicly traded companies in the Brazilian market, because it is possible to investigate contradictions and because of the availability of the history of the financial statements, since they publish such information on a compulsory basis. Table 1 below details the sample composition process.

**Table 1**  
Sample composition

Description	Quantity	Origen
Initial remarks (financial institutions, insurance and funds have already been excluded)	10,577	Economática
(-) missing values (companies with canceled status or absence of information)	4,605	Economática
Obs. companies suspected of EM	681	Equation 5
Obs. companies not suspected of EM	1,172	Equation 5

Source: authors' own elaboration based on data from Economática.

The time frame begins in 2008, as it was when Brazil began the process of convergence to international accounting standards, a "voluntary anticipation" taking place, in the sense of promoting this adequacy until 2010, when convergence becomes mandatory. Although the adoption of the international standard may have affected the level of EM in Brazil, as it is a new accounting model, it is considered, however, that the fact that there is a transition period in the initial years of the section (2008-2010), cannot affect the result differently than if 2010 were considered the initial cut-off year.

### 3.2 Variables

Table 2 presents the dependent variables used in the regression models.

**Table 2**  
Definition of dependent variables

Dependent variables	Calculation	Description	Collection source
Normal production level	$\frac{PRODt}{TA_{t-1}}$	Sum of production costs and changes in inventories	Income statement for the year (ISY) and balance sheet (BS)
Discretionary spending	$\frac{DISXt}{TA_{t-1}}$	Total discretionary spending	ISY and BS
Accruals	$\frac{ACCRUALSt}{TA_{t-1}}$	Total abnormal accruals	Cash flow and BS

Source: Authors' own elaboration

The independent variables, in turn, are described after each equation and were defined mainly on the basis of studies by Zang (2012).

To test "H<sub>1</sub>: The relative degree of EM by accruals in relation to handling real activities depends on the relative cost of each action", we used five equations, which allowed us to verify if the company has a high level of production (Equation 1), if there are discretionary spending cuts (Equation 2), the total accumulation by accruals (Equation 3) and the existence of high levels of accruals (Equation 4) and companies suspected of EM by accruals (Equation 5).

Taking as a reference the studies by Roychowdhury (2006), Zang (2012) explains that Equations 1, 2 and 3 were estimated transversally for the companies for each year of the sample that had a minimum of 15 observations, in such a way that the estimated coefficients were able to reflect the impact on production costs over time, as defined by Fama and French (1997, as quoted in Zang, 2012). Next, the equations that supported the testing of H<sub>1</sub>.

Equation 1 was used to estimate the variable "normal production level", used to find earnings management by real activities by reducing unit production costs due to excess inventory.

$$\frac{PRODt}{AT_{t-1}} = \beta_0 + \beta_1 \left( \frac{1}{AT_{t-1}} \right) + \beta_2 \left( \frac{S_t}{AT_{t-1}} \right) + \beta_3 \left( \frac{\Delta S_t}{AT_{t-1}} \right) + \beta_4 \left( \frac{\Delta S_{t-1}}{AT_{t-1}} \right) + Et \quad (1)$$

Where:  $PROD_t$  is the sum of production costs sold by firm  $i$  in year  $t$  and the change in inventories from year  $t$  to  $t-1$ ;  $TAt-1$  is the total assets in the year  $t-1$ ;  $St$  is net revenue for the year  $t$ ;  $\Delta St$  is the change in net sales for the year  $t$  for  $t-1$ .

The abnormal level of production is measured as the residual of this equation and will be called  $Residual_{prod}$ . The greater this, the greater the amount of overproduction of inventories, which is reflected in the reduction of unit costs of the product, increasing earnings the profits reported in the financial statements.

Equation 2, in turn, estimates the variable "discretionary spending", which includes the investigation of manipulation by cutting discretionary expenses – selling, administrative, financial and other operating expenses, considering that the research and development variable used by Roychowdhury (2006) and Zang (2012), was not available in the database used in this study.

$$\frac{DISX_t}{TAt-1} = \beta_0 + \beta_1 \left( \frac{1}{TAt-1} \right) + \beta_2 \left( \frac{St-1}{TAt-1} \right) + Et \quad (2)$$

Where:  $DISX_t$  is the sum of discretionary spending – in year  $t$ ;  $TAt-1$  is the total assets in the year  $t-1$ ;  $St$  is net revenue for the year  $t$ .

The residual of Equation 2 measures the abnormal level of discretionary spending. It was multiplied by -1 and will be called  $Residual_{disx}$ , assuming that higher values indicate greater amounts of discretionary expenses cut by the company to increase reported earnings in the financial statements.

Finally, the variables  $Residual_{disx}$  and  $Residual_{prod}$  (from Equation 1) will be added, generating a variable called  $RM_t$ , which will be applied in Equation 6.

Then, *accruals* were calculated using Equation 3, so that it was possible to detect EM by *accruals* (through the difference between the company's actual *accruals* and the normal level of *accruals*). Different from Zang (2012), we made use of the modified Jones model (Dechow *et al.*, 1995), which has been adopted in more recent studies as it includes the variable accounts receivable, and EM is estimated through Equation 4. Equations 3 and 4 are described below.

$$TACit = LLit - RESNOPit - FCOit \quad (3)$$

Where:  $TACit$  is the total accrual in time  $t$ ;  $NIit$  is the net income for the period  $t$ ;  $RESNOPit$  is the non-operating earnings in the period  $t$ ;  $OCFit$  is the operating cash flow in the period  $t$ .

$$\frac{ACCRUALSt}{TAt-1} = \beta_0 + \beta_1 \left( \frac{1}{TAt-1} \right) + \beta_2 \left( \frac{\Delta St - \Delta REC_t}{TAt-1} \right) + \beta_3 \left( \frac{PPEt}{TAt-1} \right) + \varepsilon t \quad (4)$$

Where:  $AccrualSt$  is the total accrual in the period  $t$ ;  $TAt-1$  is the total assets in the year  $t-1$ ;  $\Delta St$  is the change in net revenues in the year  $t-1$ ;  $\Delta REC_t$  is the change in accounts receivable in the year  $t$ ;  $PPEt$  is the total gross permanent assets in the period  $t$ .



Total accrual are calculated based on the company's operating cash flow (Martinez, 2002). The residual of the abnormal level of discretionary accruals from this Equation 4 will be used as a proxy for the EM based on accruals, being called  $AM_t$  in Equation 7.

Equations 1 to 4 are necessary background to the analysis of companies suspected of adopting the EM, regardless of the modality chosen by them, what is done with Equation 5 (probit), described below. The suspicion of earnings manipulation reflects the assumptions by Graham *et al.* (2005, as quoted in Zang, 2012), which defines such companies as those that repeat the previous year's earnings or have earnings per share by BRL 0 to BRL 0.02, obtained by dividing earnings for the period by the number of shares outstanding.

$$PROB[SUSPECT_t = 1] = \beta_0 + \beta_1 HabitualBeater_t + \beta_2 ADR_t + \beta_3 MTB_{t+1} + \beta_4 Shares_t + \beta_5 ROA_t + \sum \beta_6 YearIndicator + \varepsilon_t \quad (5)$$

Where: *Suspect* is a dependent variable, being equal to 1, whether the company achieved the previous year's earnings or had an earning equal to BRL 0, being assigned 0, otherwise; *HabitualBeater* is the number of times the company reached certain levels of earnings during the analyzed period; *ADR* is defined as dummy, being equal to 1, if the company issues ADR, and 0, otherwise; *MTB* is a rate at the beginning of the period to capture growth opportunities for companies, measured through the share price multiplied by the number of shares and divided by the equity; *Shares* is a control variable measured by the number of shares outstanding; *ROA* measures profitability by period and is calculated by dividing net income for the period by the company's total assets.

With Equation 5, we obtained a sample of companies suspected of practicing EM. As mentioned, the EM for real activities must occur during the normal course in which they are carried out, therefore, within the fiscal year, after which, depending on the observed impact on the result, managers can still manipulate by accruals (Zang, 2012). Therefore, the extent of EM by real activities is stipulated by the cost of both management practices and by certain characteristics of the companies (Cohen & Zarowin, 2010; Zang, 2012). The extent of EM based on accruals, in turn, is defined not only by its cost, but also by the intensity with which EM was adopted by real activities (Cohen & Zarowin, 2010; Martinez, 2013; Zang, 2012).

Taking this into account, after Equation 5, the costs that managers consider to choose one practice over another or to complement EM by real activities with EM by accruals were investigated. The costs associated with handling by real activities can be divided into three types. The first concerns the market leader status of a company in a given segment at the beginning of the year ( $MarketShare_{t-1}$ ), used to test  $H_{1a}$ , and that captures the inverse of costs associated with EM by actual activities. It is obtained by dividing the sales of a company by the total sales of the segment. The second type of cost, in turn, is associated with the financial health of the company (which tests  $H_{1b}$ ). To detect it, we used the modified version of the Z-score, by Altman (2002, as quoted in Zang, 2012), represented by Equation 6.

$$Z - score = 0.3 \frac{Ebtida}{Asset_t} + 1.0 \frac{Sales_t}{Asset_t} + 1.4 \frac{Retained\ results_t}{Asset_t} + 1.2 \frac{Working\ Capital_t}{Asset_t} + 0.6 \frac{MarketValue_t}{TotalLiabilities_t}$$

Equation 6 captures information regarding the company's financial health at the beginning of the year. Higher Z-score values indicate more stable financial health and a lower cost associated with handling real activities (Altman, 2002, as quoted in Zang, 2012). The last type of cost related to manipulation by real activities is associated with the companies' marginal tax rate ( $MTR_t$ ), used in Equations 7 and 8. Higher values indicate greater cost to handle real activities (Zang, 2012). This variable was estimated by dividing total expenses with taxes on income and income before taxes.

For the accrual-based manipulation, in turn, two costs were taken into account. The first refers to audit quality characteristics ( $H_{1c}$ ). As it is not possible to measure other types of proxies for it, in this research, only the proxy  $BIG_4$ , defined as a dummy variable equal to 1 for companies audited by the Big Four and 0 otherwise. This measure was adopted as a proxy based on Zang (2012), whose results indicated that companies audited by Big Eight restricted manipulation based on accruals. This is because such companies are more experienced, invest more resources in training and have a greater reputation to uphold than companies that undergo minor audits, which, therefore, tend to be restricted to management by discretionary accruals.

It is noteworthy that, in the costs for the EM by accruals, the model was adapted in relation to the one proposed by Zang (2012). In addition to the Big Eight variable, the author included the professional's auditing time in the company, which was not possible, since in Brazil, there is a rotation of audit firms. In her work, the author also linked these costs to observations from the period after the SOX Act came into force. Thus, in this model, the second cost associated with earnings manipulation by accruals is related to the fact that the company operates on the North American stock exchange and, therefore, is an American Depositary Receipt (ADR) issuer, represented by  $ADR_t$ . The USA, due to its strict regulation and strong institutional presence, has a lower rate of EM by accruals (Rey, 2012).

The results obtained for the costs of real activities and accruals were used in equations 7 and 8, as described:

$$RM_t = \beta_0 + \sum \beta_1 CostOfRM_t + \sum \beta_2 CostOfAM_t + \sum \beta_3 Control_t + E_t \quad (7)$$

$$AM_t = \beta_0 + \sum \beta_1 CostOfAM_t + \sum \beta_2 CostOfRM_t + \beta_3 UnexpectedRM_t + \sum \beta_4 Control_t + E_t. \quad (8)$$

$RM_t$  is the sum of the residuals of Equations 1 and 2, which captured EM by real activities in the year  $t$ . In its turn,  $AM_t$  is the residual of Equation 3, which captures EM by accruals in year  $t$ . In both equations,  $CostOfRM$  are the variables

that make up the costs of the EM by operational decisions, while CostOfAM are the variables that make up the costs of EM by accruals; Control are the control variables: ROA, Assets and MTB and *UnexpectedRM* is the residue of Equation 7. In equations 7 and 8, the inverse Mills ratio was included (IMR) of the first step of the procedure by Heckman (1979, cited by Zang, 2012), to correct possible bias in the sample.

The process described so far provided the basis for testing  $H_{1a}$ ,  $H_{1b}$  and  $H_{1c}$  and, consequently,  $H_1$ . Since, as this hypothesis suggests, when an MS modality has high costs, managers use the other more, it is expected, in Equations 7 and 8, that  $\beta_2$  is positive and that, because each type of management is constrained by relative costs,  $\beta_1$  is negative.

H2 suggests that “managers adjust the intensity of EM adoption by accruals after the manipulation of real activities is performed”, that is, that increase or decrease the extent of the first modality when the second is unexpectedly low or high. Thus, H2 would be confirmed with a negative and significant sign in  $\beta_3$  of Equation 8.

## 4 ANALYSIS AND DISCUSSION OF RESULTS

In this section, we initially present the estimate of EM for the initial sample, using Equations 1 to 4. Then, the results of Equation 5 are highlighted, which identifies companies suspected of EM. Finally, the results related to the variables and cost equations associated with EM practices in Brazilian companies listed on B3 for the period 2008-2017 are presented.

### 4.1 Earnings management estimate

Table 3 shows the results found in the EM regressions based on accruals and real activities, as well as the descriptive statistics of the residuals of these regressions. The regression models were estimated in an unbalanced panel with fixed effect and the number of observations of each model varied, so that there were no significant losses of observations, aiming at more robust analyzes.

**Table 3**  
EM measurement by real activities and accruals

<b>Panel A: Estimation of the normal level of production costs, discretionary expenses and accruals</b>					
<b>Level of production (Equation 1)</b>		<b>Discretionary spending (Equation 2)</b>		<b>Accruals (Equation 4)</b>	
1	-1.425***	1	132.930***	1	-2.647***
$\frac{TA_{t-1}}{S_t}$	0.622***	$\frac{TA_{t-1}}{S_{t-1}}$	-0.002	$\frac{TA_{t-1}}{\Delta S_t}$	-0.078***
$\frac{TA_{t-1}}{\Delta S_t}$	0.108***	$TA_{t-1}$	0.017***	$\frac{TA_{t-1}}{PPE_t}$	-0.066***
$\frac{TA_{t-1}}{\Delta S_{t-1}}$	0.347***	Constant		$\frac{TA_{t-1}}{TA_{t-1}}$	-0.068***
$TA_{t-1}$	0.548***			Constant	
Adjusted					
R <sup>2</sup> constant	94.90%		84.86%		43.72%
Obs.	4,436		4,605		4,078

**Panel B: Descriptive statistics of EM by real activities and accruals**

Variable	N. of obs.	Mean	Sdf. deviation	Minimum	Maximum
$RM_{prod}$	4,436	-2.500	0.200	-2.564	1.371
$RM_{DISX}$	4,605	1.080	0.740	-13.870	9.073
$RM$	4,436	0.016	0.672	-13.347	9.148
$AM$	4,078	1.180	0.211	-1.529	0.580

**Panel C: Pearson (lower triangle) and Sperman (upper triangle) correlation)**

	Residual_prod	AM	Residual_disx	RM
Residual_prod	-	0.5186***	0.0983***	0.6932***
AM	0.0396	-	0.1760***	-0.0975***
Residual_disx	0.0204	0.2148***	-	-00.13
RM	0.3169***	0.2034***	0.9547***	-

Note: \*, \*\* and \*\*\* indicate statistical significance at 10%, 5% and 1%, respectively.

SOURCE: AUTHORS' OWN ELABORATION.

Panel A presents the estimated results of normal levels of production costs, discretionary expenses and total accruals. All production cost level regression coefficients were expected to be positive, because the more sales, the more they increase (Martinez, 2013). However, the residual of the regression ( $RM_{prod_t}$ ) represents the considered abnormal level of production costs. Therefore, we observe that the coefficient of  $(\frac{1}{TA_{t-1}})$  is negative, and it can be inferred that there was a drop or inconsistency in the sales of the companies. All results from this regression were statistically significant at 1%.

Still on Panel A, in the regression that captures the level considered normal for discretionary expenses (sales, administrative, financial and other operating expenses), the expectation was that all coefficients would be positive, inferring that expenses normally follow the behavior of sales. However, in  $(\frac{S_{t-1}}{TA_{t-1}})$  the result found was negative and not significant (-0.002), indicating that sales fell in the analyzed period.

In the regression that captures the normal level of accrual (accounting method), the results are statistically significant for all independent variables, in line with the findings by Zang (2012) and Crespo (2014), which also indicated appropriation of expenses with depreciation and amortization. The adjusted means  $R^2$  for the models of all independent variables indicate that they have reasonable explanatory power, as in the model by Zang (2012).

Regarding panel B, it is observed that in 25% of the companies there was a drop or inconsistency in the residues that capture the abnormal results of production costs, discretionary expenses and accruals. Thus, the behavior of Brazilian companies is similar to what was observed by Zang (2012), which may suggest that they adopt both earnings management through real activities and accruals.

In Panel C, the degree of association of the residuals estimated by regressions 1, 2 and 5 is specified. It is noted that the Pearson correlation or product-moment correlation does not capture the causal relationship of the variables, however, it identifies the degree of correlation between them. The correlation is strong, positive and significant between residual\_rm (sum of residual\_prod and residual\_disx) and residual\_prod (the abnormal level of production), that is, if the first increases, the second increases in the same proportion, in a linear way, which was repeated in the Sperman correlation. The

variable *residual\_disx* shows a moderate and positive correlation with *residual\_rm*, indicating that its increase implies a moderate increase in the latter, while the correlation between the other variables proved to be negligible. These results are similar to those obtained by Zang (2012), whose correlation analyzes and the tests of Equations 1, 2 and 3 suggest that companies use the manipulation of real activities and by accruals.

## 4.2 Identification of companies suspected of EM

The application of the probability test (probit model, Equation 5), whose results are shown in Table 4, aimed to measure the interference of each explanatory variable in the probability of the company managing earnings. The dependent variable (dummy) tested took value 1 when the company had positive earnings between BRL 0.00 and 0.02, which indicates suspicion of the practice to achieve some goal of the manager, and 0 for contrary cases. Applying the Heckman procedure, initially, Equation 5 was estimated to obtain the IMR, which was included as a control variable in the estimation of Equations 7 and 8, correcting possible selection bias in the sample.

**Table 4**  
Correction procedure for possible sample selection bias

<b>Panel A: Descriptive Statistics</b>					
	<b>Suspicious companies (n = 681)</b>		<b>Other companies (n = 1,172)</b>		<b>Difference</b>
	<b>Mean</b>	<b>Sdt. deviation</b>	<b>Mean</b>	<b>Sdt. deviation</b>	<b>Mean</b>
<i>HABITUAL BEATER<sub>t</sub></i>	10.280	4.575	9.230	5.375	1.050***
<i>ADR<sub>t</sub></i>	0.133	0.340	0.088	0.284	0.044
<i>MToB<sub>t-1</sub></i>	932.213	6701.033	414.555	4366.596	517.658
<i>SHARES<sub>t</sub></i>	12.410	1.890	12.008	1.729	0.402***
<i>ROA<sub>t</sub></i>	2.937	2.899	1.632	17.709	1.304
<b>Panel B: Estimated results for the probit model (Equation 5)</b>					
<b>VARIABLE</b>	<b>EXPECTED SIGN</b>		<b>COEFFICIENT</b>		
<i>HabitualBeater<sub>t</sub></i>	+		0.023***		
<i>ADR<sub>t</sub></i>	+		0.126		
<i>MtoB<sub>t-1</sub></i>	+		5.470		
<i>Shares<sub>t</sub></i>			0.058***		
<i>ROA<sub>t</sub></i>			0.001		
<i>Constante</i>			-1.394		
YEAR DUMMY	YES				
OBS.	1,847				
PSEUDO R <sup>2</sup>	0.0198				

Note: \*, \*\* and \*\*\* indicate statistical significance at 10%, 5% and 1%, respectively.

SOURCE: AUTHORS' OWN ELABORATION

In Table 4, Panel A presents the descriptive statistics of the independent variables included in Equation 5, comparing suspicious and non-suspicious companies, as well as the difference in means between these two groups. It is noted that, on average, suspicious companies tend to achieve expected earnings more often than unsuspecting companies (*HabitualBeater*). In addition, they still have a higher market value (*MToB*), more shares outstanding (*Shares*) and profitability (*ROA*) higher than unsuspecting companies. The results presented are consistent and corroborate with those presented by Zang (2012), which

concluded that companies considered suspicious use at least one type of EM. Another important observation found by the author and corroborated in this research is that companies that were not considered suspicious may be managing their results, but not reaching the point considered suspicious. Some companies may be managing their earnings below or above that point, and even doing so only for internal, unobservable goals.

In the estimation results of the probit model (Panel B), the number of times the company made earnings (*HabitualBeater*) – between BRL 0.00 and BRL 0.02 – is a variable with a positive and significant coefficient at 1%. In other words, the number of years the company has made earnings increases the probability that its earnings in the next fiscal year will be greater than 0 by 0.04%. On the other hand, the probability of earnings in the following year is reduced when the number of shares circulating increases, as observed in the estimation result for the Shares variable, which presented a positive and significant coefficient at 1%.

The ROA and MToB variables had a positive sign and non-significant coefficients, indicating that companies with higher profitability and higher market value are more likely to manage earnings by any of the modalities. The result is partially similar to the one verified in the sample used by Zang (2012), that, when finding positive and significant coefficients at 1% for these variables, showed that companies that had achieved consistent earnings in the past, that had greater growth opportunities and financial market incentives signaled a great possibility of EM.

### 4.3 Trade-off between EM practices

To investigate whether managers replace or complement EM practices, the Unexpected variable was used, in order to verify the relationship between replacement of one modality by another and/or complementarity. Table 5 presents the descriptive statistics of the variables used in the trade-off models of management practices. The sample consisted of 681 companies considered suspicious in the 2008-2017 period (as shown in Table 4). All variables were winsorized at 1% at both extremes.

**Table 5**  
Descriptive statistics for companies suspected of EM

Variable	Obs.	Mean	Sdt. deviation	Min.	Max.
<i>Residual<sub>prod</sub></i>	675	0,010	0,120	-0,558	0,965
<i>Residual<sub>disx</sub></i>	681	0,051	0,157	-0,614	0,173
<i>RM</i>	675	0,061	0,201	-1,143	0,928
<i>Residual<sub>accruals</sub></i>	681	0,156	0,065	-0,498	0,245
<i>MKT Share<sub>t-1</sub></i>	681	0,089	0,151	0	0,968
<i>Z – Score<sub>t-1</sub></i>	681	401,332	2767,688	-3,118	21202,04
<i>MTR</i>	681	0,305	0,584	-2,052	4,184
<i>BIG4</i>	681	0,691	0,462	0	1
<i>ADR</i>	681	0,133	0,340	0	1
<i>ROA</i>	681	2,937	2,899	-9,3	30
<i>Assets</i>	681	1,650	4,500	51505	2,920
<i>MtB</i>	681	140,214	918,295	-50,509	6583,806

Source: Authors' own elaboration

The results show that companies suspected of EM have, on average, 8.9% of market share, with an average Z-score above that defined by Zang (2012) for financial difficulty, which indicates that most companies in the sample of this study are financially healthy. The marginal tax rate is 30.54%, i.e., most companies are profitable. The average value of Big4 suggests that 69.16% of the companies in the group are audited by a Big4 at some point in the analyzed period. It is also noted that 13.36% of the companies considered suspicious issue ADRs and, therefore, operate on the North American stock exchange. On average, they present an ROA of 2.93% and average value of each share (MToB) of BRL 140.21. Most of the companies in the sample have positive assets greater than 0, suggesting that they are larger than the average of the companies considered not suspicious.

Table 6 presents the result of Equations 7 and 8, which estimated the trade-off between EM practices, using the residuals of Equations 1, 2 and 3 as dependent variables.

**Table 6**  
Trade-off between EM practices

	RM regression		AM regression	
	Expected sign	Coefficient	Expected sign	Coefficient
Constant		.3698845*		0.062
Unexpected			-	-0.057***
<b>Costs associated with EM by real activities</b>				
<i>MKT_Share</i>	+	0.166***	-	0.048
<i>Z-score</i>	+	-8.410	-	-5.230
<i>MTR</i>	-	-0.015	+	0.004
<b>Costs associated with EM by accruals</b>				
<i>Big4</i>	+	-0.008	-	-0.010*
<i>ADR</i>	+	-0.060***	-	-0.024
<b>Control variables</b>				
<i>ROA</i>		-0.011***		-0.000
<i>Assets</i>		-4.830***		-6.890
<i>MTB</i>		8.540		8.810*
<i>OBS</i>	1,847			
<i>Year dummy</i>		Yes		Yes
<i>R<sup>2</sup> Adjusted</i>		60.26%		16.73%

Note: \*, \*\* and \*\*\* indicate statistical significance at 10%, 5% and 1%, respectively.

Source: Authors' own elaboration

We expected RM and AM to be negatively related to the costs associated with them, expectations that were not fully confirmed. In the RM regression, the Market Share variable was positive and statistically significant at 1%, as expected, thus indicating that companies with market leader status in their segments engage more with EM through real activities than EM through accruals, consistent with what we find from Zang and Roychowdhury (2006). In AM regression, in turn, the result contradicts the expected sign and also does not show statistical significance. Thus, we found no evidence that non-leading companies engage more in EM by accruals, with which  $H_{1a}$  was not confirmed. The results suggest that market dominance seems to be determinant for EM by real activities, but the condition of non-leader does not seem to play this role in EM by accruals.

The coefficient for Z-score was negative, but not significant, indicating that companies with good financial health find the practice of management by real activities less costly (Zang, 2012) and, therefore, engage less in management by accruals, confirming the hypothesis that companies with financial instability have a lower level of management based on accruals than on real activities ( $H_{1b}$ ), due to direct impacts on cash flow (Ferreira *et al.*, 2012; Jie *et al.*, 2017; Martinez, 2013). The MTR coefficient presented the expected signs, but not significant, both in the AM and RM regressions, suggesting that firms with higher marginal tax rates find manipulation by real activities more costly – as the company increases sales, it collects more taxes – and therefore avoid engaging in this practice.

The Big4 coefficient showed the opposite sign to what was expected for the RM regression, unlike what happened in the AM regression. In this, the significance was at 10%, not being noticed in RM. These earnings indicate that the fact that the company is submitted to a Big4 audit does not prevent it from earnings management through real activities, but restricts practice based on accruals. Thus, hypothesis  $H_{1c}$  is confirmed, that companies that face greater inspection by auditors and regulators have a higher level of manipulation of real activities.

Regardless of the modality, highly experienced auditors were able to detect EM practices in Saudi companies (Habbash & Alghamdi, 2017), but, in the case of the option for accruals, less supervised Chinese companies adopted this modality more. As they expect audits to be conducted by more experienced professionals and, therefore, more prepared to identify EM, including accruals, companies tend to take into account the cost of reputation, which leads them to prefer to manipulate earnings through real activities (Alhadab & Clacher, 2018; Zang, 2012).

ADR presented a coefficient contrary to what was expected in RM, being, however, significant at 1% and negative, as expected in AM, indicating that companies that trade ADRs on the North American stock exchange do not manage their earnings by accruals, however, they tend to engage in practice based on real activities. This is due to the monitoring that the US exercises over the accounting practices adopted by companies operating in its market. However, changes in the stringency of accounting legislation do not inhibit companies from practicing EM, but instead lead to changes in the strategy used (Rey, 2012; Zang, 2012).

The derived hypothesis  $H_{1c}$  predicted that companies that undergo greater scrutiny from auditors and regulators would engage more in EM for actual activities. The result of Equation 8 was negative and significant at 1% for ADR and negative and not significant for Big4, contrary to what was expected and signaling that the quality audit does not restrict the EM by real activities, but limits the practice based on accruals. It was thus indicated that companies listed on the North American stock exchange do not engage in EM by accruals, making manipulation by real activities. This is due to the monitoring that the US exercises over the accounting practices adopted by companies operating in its market. However, changes in the stringency of accounting legislation do not inhibit companies from practicing EM, but instead lead to changes in the strategy used (Rey, 2012; Zang, 2012). Taken together, the findings obtained in the hypotheses derived  $H_{1a}$ ,  $H_{1b}$  and  $H_{1c}$  confirm, therefore, that the costs of manipulations by real activities explain the level of EM by accruals, also confirming  $H_1$ , such as the result obtained by Zang (2012).



Hypothesis H<sub>2</sub>, in turn, suggests that managers increase or decrease the extent of the EM by accruals when the EM by real activities is unexpectedly low or high during the fiscal year. Consistent with this hypothesis, in the regression residual *accruals*, the *Unexpected* coefficient is negative and significant at 1%, in line with the results by Zang (2012). We thus confirm hypothesis H<sub>2</sub>, as did Rey (2012), in the US context, and Jie *et al.* (2017), under study with Chinese companies.

Combined with the confirmation of hypothesis H<sub>1</sub>, the result for H<sub>2</sub> suggests that managers' decisions about the EM practice that will be adopted are taken in sequence. That is, managers decide to manage earnings by real activities based on the costs that this has; if, at the end of the fiscal year, they do not achieve what was expected, they adjust the management level based on accruals until they reach it. Therefore, the findings of this study corroborate those by Zang (2012), indicating that managers use two strategies to achieve the expected results. In this dynamic, first, they substitute one for the other, depending on the cost that each represents to the company. When the company's operation takes place in a more financially constrained situation, manipulation by real activities becomes more costly, as it directly impacts cash flow (Crespo, 2014; Jie *et al.*, 2017), which, of course, also occurs when the company is not in a healthy financial condition (Roychowdhury, 2006; Zang, 2012) or marginal tax rates are higher (Ferreira *et al.*, 2012). Faced with this, fatefully, these companies tend to adopt management based on accruals rather than practice based on real activities.

The study confirms what the literature has indicated about market dominance as a determinant for greater engagement in manipulation by real activities (Roychowdhury, 2006; Zang, 2012), which may be related to the attention of stakeholders and auditors (Alhadab & Clacher, 2018), including because EM by accruals was suggested as an indication for the need for an audit (Cupertino & Martinez, 2008), whereas EM from real activities is more difficult to detect (Cohen & Zarowin, 2010).

If the company operates in an environment with more monitoring (Jie *et al.*, 2017; Rey, 2012) or is audited by quality auditors (Alhadab & Clacher, 2018), tends to opt for EM for real activities, to the detriment of practice by accruals. In addition, managers adopt the two strategies in a complementary way, where the amount of management based on accruals decreases as the EM by real activities increases and vice versa.

## 5 CONCLUSION

To achieve the objective of the study, this research was divided into two stages. In the first one, the levels considered normal of production cost, discretionary expenses and accruals were estimated. In the second stage, the residuals of the proposed models were part of the multiple regressions estimated in panel, in which we evaluated the effect of the costs of each type of EM (actual activities and accruals).

To assess the effect of costs on managers' decisions, we followed the methodology proposed in the study by Zang (2012), in order to investigate which costs influence the choice of management practices. The results showed that while leading companies in the segment in which they operate, they engage more in manipulation through real activities than through accruals, there is no

evidence that non-leaders adopt a higher level of accruals, so hypothesis H<sub>1a</sub> is not confirmed.

The findings obtained confirmed the H<sub>1b</sub> hypothesis, that is, companies with low financial health have a higher level of earnings management based on accruals than on real activities, given its impact on cash flow, which would further increase its level of indebtedness. The results also showed that companies audited by one of the four largest auditing companies (Big4) incur less management based on accruals, corroborating findings in the literature and confirming the H<sub>1c</sub> hypothesis.

In view of the above, it is confirmed that the adoption of one or the other modality, or even both, in a complementary way, is associated with the costs of each one. The results also indicate that companies use more EM based on accruals and less manipulation of real activities when these are more expensive, due to an uncompetitive status in the sector, being in a less healthy financial condition and incurring higher tax expenses in the current period. The study also indicates a direct substitutive relationship between manipulation of real activities and EM by accruals; the level of the latter is negatively related to the unexpected value of the former, realized at the end of the fiscal year.

Hypothesis H<sub>2</sub> was also confirmed and, therefore, it became evident that managers use the two management practices in a complementary way, that is, after the end of the fiscal year, the accrual accounts are adjusted based on the earnings management of actual activities, consistent with the sequential nature of the two activities.

The results presented may change if the analyzed period or the management model is different from what was proposed here. The limitation of this research was in relation to the methodology of cross-sectional regression by company, used in the study by Zang (2012), in which this work resembles.

The results presented may change if the analyzed period or the management model is different from what was proposed here. The research scenario addressing EM in Brazil is quite broad. For future research, we suggest making comparisons with emerging countries, as well as Brazil, in order to verify if the situation found is repeated.

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