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# VARIABLE REMUNERATION OF EXECUTIVES AND MANAGEMENT OF RESULTS IN EMERGENT COUNTRIES: BRAZIL CASE

Allison Manoel de Sousa <sup>1</sup>  
Cassiana Bortoli <sup>2</sup>  
Rodrigo Oliveira Soares <sup>3</sup>

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## ABSTRACT

Variable remuneration is the central discussion of many studies because it can be an incentive for executives to practice opportunistic actions instead of promoting the increase of companies' performance. In face of that, the present study investigated the influence of executives' variable remuneration on the management of results by accruals and operational activities in open companies of Brazilian market. The sample was composed by 761 notes on 108 companies at yearly periods from 2012 to 2019. Notes were analyzed by means of the generalized method of moments (GMM). Results indicate there is a difference on the level of manipulation by operations when executives are partially rewarded or exclusively rewarded with plans of variable remuneration when compared to executives remunerated only with plans of fix remuneration. Increasing the proportion of variable remuneration in relation to the total amount received by managers is also a motivating factor to high-level executives to increasing themselves the level of management by operational activities. However, as executives get far from the performance target established to that period, the practices of management of results by discretionary accruals are intensified. So, the present investigation advances in the discussion when presenting empirical evidence that different features linked to variable remuneration are attributes that motivate executives to manipulate results to reach particular purposes.

**Keywords:** Variable remuneration. Management by discretionary accruals. Management of results by operational activities.

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<sup>1</sup> PhD Student in Accounting at the Federal University of Paraná (UFPR), Av. Prefeito Lothário Meissner, 668-794 - Jardim Botânico, Curitiba - PR, CEP: 82590-300, Phone: (41) 3360-4193, [allison.msousa@gmail.com](mailto:allison.msousa@gmail.com)  
<https://orcid.org/0000-0002-5959-6078>

<sup>2</sup> PhD in Accounting from the Federal University of Paraná (UFPR), Av. Prefeito Lothário Meissner, 668-794 - Jardim Botânico, Curitiba - PR, CEP: 82590-300, Phone: (41) 3360-4193, Phone: (41) 3360-4193, [cassianabortoli@gmail.com](mailto:cassianabortoli@gmail.com)  
<https://orcid.org/0000-0003-1307-2110>

<sup>3</sup> PhD in Administration from the Federal University of Rio Grande do Sul (UFRGS) and Professor of the Postgraduate Program in Accounting (PPGCONT) at the Federal University of Paraná (UFPR), Av. Prefeito Lothário Meissner, 668-794 - Jardim Botânico, Curitiba - PR, CEP: 82590-300, Phone: (41) 3360-4193, Phone: (41) 3360-4193, [rosoares@ufpr.br](mailto:rosoares@ufpr.br)  
<https://orcid.org/0000-0003-0428-8278>

# REMUNERAÇÃO VARIÁVEL DOS EXECUTIVOS E GERENCIAMENTO DE RESULTADOS EM PAÍSES EMERGENTES: O CASO DO BRASIL

## RESUMO

A remuneração variável é ponto central de discussão em diferentes trabalhos, pois pode servir de incentivo para executivos praticarem ações oportunistas ao invés de promover o aumento do desempenho das empresas. Diante disso, o presente trabalho investigou a influência da remuneração variável dos executivos no gerenciamento de resultados por accruals e por atividades operacionais nas empresas abertas do mercado brasileiro. A amostra foi composta por 761 observações de 108 empresas em períodos anuais de 2012 a 2019. As observações foram analisadas por meio do método dos momentos generalizado (GMM). Os resultados indicaram que há diferença no nível de manipulação por operações quando os executivos são recompensados parcialmente ou exclusivamente com planos de remuneração variável em relação aos executivos que são remunerados apenas com planos de remuneração fixa. Aumentar a proporção da remuneração variável em relação ao valor total recebido pelos gestores também é um fator motivador para que os próprios executivos de alto escalão aumentem o nível de gerenciamento por atividades operacionais. Contudo, à medida que os executivos se distanciam da meta de desempenho estipulada para o período, intensificam práticas de gerenciamento de resultados por accruals discricionários. Dessa forma, esta investigação avança na discussão ao apresentar evidências empíricas de que diferentes características ligadas à remuneração variável são atributos que motivam os executivos a manipularem os resultados para alcançar propósitos particulares.

**Palavras-chave:** Remuneração variável. Gerenciamento por accruals discricionários. Gerenciamento de resultados por atividades operacionais.

## 1 INTRODUÇÃO

Agency conflicts take place when principal's and agent's aims are not aligned as to the incentive to maximize their use (Jensen & Meckling, 1976; Mehran, 1995; Marques & Ramos, 2022). One cause for such misalignment consists in shareholders search for increasing economic-financial performance for maximizing their own wealth, while managers, who are risk-averse, tend to not prioritize bold projects, but choose for less-risky projects aiming at minimizing the non-systematic risk (Haugen & Senbet, 1981; Smith & Stulz, 1985; Eisenhardt, 1989; De Angelis, Grullon & Michenaud, 2017). In face of such scenario, different mechanisms were created for aligning aims between principal and agent (Jensen & Meckling, 1976; Eisenhardt, 1989; Indjejikian, 1999; Bebchuk & Fried, 2003), and one of the dispositives consists in linking variable remuneration plans to a previously established target to the period (Eisenhardt, 1989; Kyriacou & Mase, 2006; Harris, 2009).

In several contracts, the parameter used for establishing the target is company's economic-financial performance in the period (Banker & Datar, 1989; Core, Holthausen & Larker, 1999; Fernandes & Mazzioni, 2015; Lopes, Gasparetto, Schnorrenberger, & Lunkes, 2017; Li & Singal, 2019). Consequently, managers are led to choose for high-profit projects at short term even when such projects are riskier (Rengel, Sousa, Monteiro & Meurer, 2020). The increase on risk propensity by managers is taken as a benefic behavior by shareholders since it causes an increase on expected returns (Rajgopal & Shevlin, 2002).

In this sense, remuneration plans for executives based on period performance seem to be an interesting alternative for aligning managers and shareholders targets, since it maximizes shareholder wealthy when mitigating the manager risk aversion (Haugen & Senbert, 1981; Smith e Stulz, 1985; Low, 2009). However, there is a limitation on target alignment that shows as an incentive based on the variable remuneration linked to economic-financial performance because the focus tends to concentrate on short term, causing managers to feel motivated to change accounting choices for manipulating results of the period (Shuto, 2007; Ibrahim & Lloyd, 2011).

Managing results can bring a direct benefit to managers because it increases a company performance and, in turn, raises the bonus value earned in the period (Gao & Shrieves, 2002; Shuto, 2007; Almadi & Lazic, 2016; Dal Magro, Dani & Klann, 2019). Because of it, managers rewarded in a partial or total way by means of variable remuneration plans are stimulated to manipulate accounting information at a higher extent than those exclusively rewarded by means of fix remuneration plans. That reasoning leads to the understanding that rewarding managers with variable remuneration mechanisms can become a "double-edged sword". It happens because as long as managers are under higher risk (by exposing the chose for short-term return projects instead long-term ones) and search for better profit indexes (Lopes et al., 2017; Li & Singal, 2019; Rengel et al., 2020), they can also adopt strategies for reaching particular purposes (Shuto, 2007; Ibrahim & Lloyd, 2011; Li & Chii-Shyan, 2017; Harris, Karl & Lawrence, 2019).

Although part of companies adopts variable remuneration plans, there is no standard as to the proportion of variable values earned by managers compared to the total remuneration of the period (Shuto, 2007; Sousa & Ribeiro, 2020), because the proportion of variable remuneration depends on the internal policy of each company. Investigations (Li & Chii-Shyan, 2017; Harris et al., 2019) found that increasing such variable values in the period serves as an incentive for managers to work results more intensively. It is linked to the logic that the higher the proportion of variable remuneration comparing to total remuneration in the period, the more managers are stimulated not only to deliver better performance indexes but manipulate results in a more aggressive way, too (Gao & Shrieves, 2002).

Even with the logic that increasing variable remuneration results in incentive for managers to raise the distortion of accounting information, studies (Gao & Shrieves, 2002; Shuto, 2007; Ibrahim & Lloyd, 2011; Almadi & Lazic, 2016; Dal Magro et al., 2019) did not consider if the performance scope

was met in the period. It is important to notice that item because when managers reach the target established to the period, any increase on performance marker does not necessarily implies an increase on variable remuneration. That information can be read by the manager as discouraging to manage results with the aim of increasing performance in the period beyond the target established (Holthausen, Larcker, & Sloan, 1995).

So, when managers figure that company's performance will reach values over the target established, they tend to manipulate information down to revert accruals in future periods (Holthausen et al., 1995). It occurs because managers figure out that they will not get to increase variable values to be earned from the moment they reach performance target set for the period (Healy, 1985), causing the decrease in result in the current period and then raise it in future period to be a more interesting option to maximize their own wealth (Healy, 1985; Holthausen et al., 1995). That practice can also be a way to minimize the excessive raise on next year target from "excellent" results reached in the previous period. So, the results target set for the period can be used as a reference point by managers as to the level of result management to be practiced along the year.

To manage results, managers change accounting choices of manipulation-sensitive items which do not show in the cash during the period (Scott, 2009). Discretionary accruals show these features and are habitually used by managers to manipulate results of the period (Shuto, 2007). Manipulation by means of discretionary accruals, however, is not the only way for distorting results, since changing choices related to company's operation is also a way to reach the same purpose (Dechow, Kothari & Watts, 1998; Roychowdhury, 2006; Cohen & Zarowin, 2010).

Managing operational results is more noxious to the quality of accounting information than manipulation by means of discretionary accruals, because it is harder to be reverted (Chi, Lisic & Pevzner, 2011). Due to such feature, Almadi e Lazic (2016) signals the importance of performing studies approaching the lens that variable remuneration can also be motivating for managers to manipulate company's operation. A logic that, according to authors, is little noticed by studies approaching the issue of results management and, due to that, it can bring contributions to both literature and practice.

From that discussion one can notice that variable remuneration is a factor encouraging managers to manipulate results in favor of particular wishes. But the existence of the variable remuneration plan itself may not be the single feature serving as a motivating factor for managers to manage results. Depending on the proportion of variable remuneration proportion as to the total earned, as well as the remuneration target set for the period, can also be aspects considered as to results managing intensity. Besides that, it is highlighted that there are different ways managers can distort results in favor of particular, ulterior purposes. Because of this, when considering referred aspects of variable remuneration plans, managers can distort results by means of discretionary accruals or operations. Thus, the present study aims at **investigating the influence of variable remuneration of executives on**

### **managing results by accruals and operational activities in open companies of Brazilian market.**

The present study is justified by contributing to the discussion that remuneration can not only stimulate managers to obtain higher economic-financial performance in the period but also encourage them to manipulate results of the period. Advancing in the discussion does not resume to variable remuneration implying the results management by accruals or operations, but also considering (1) if the company uses variable remuneration or not; (2) the degree of variable remuneration compared to total remuneration; and (3) proportional distance of variable remuneration amount paid to managers compared to the targeted performance set to the period.

The last factor, although mentioned by Healy (1985) and Holthausen et al. (1995) as an aspect encouraging managers to manipulate results, it is not encompassed by researches on the issue, for example Holthausen et al. (1995), Balsam (1998), Gao e Shrieves (2002), Shuto (2007), Ibrahim e Lloyd (2011), Almadi e Lazic (2016), Harris et al. (2019) e Dal Magro et al. (2019) studies. In other words, the present study innovates when it shows the manager can use the target set for the period as a reference point to intensify or slow down the degree of management in order to adjust the result compared to that target. It is a contribution under both theoretical perspective and practical point of view as to the explanation of existing incentives for increasing or decreasing the quality of economic-financial quality presented to external users.

Another advance point for the discussion is investigating not only how variable remuneration impacts on the management of results by discretionary accruals, as seen by Holthausen et al. (1995), Balsam (1998), Gao e Shrieves (2002), Shuto (2007), Almadi e Lazic (2016), Harris et al. (2019), Dal Magro et al. (2019), and Sousa e Ribeiro (2020), but also accept Almadi e Lazic (2016) and Park (2019) suggestion when evaluating if variable remuneration may instigate the use of operations for manipulating results. That point of view deserves attention because the exclusive change of discretionary accruals may not be enough for high-level executive managers can reach targets set by the company, with potential to encourage the use of more aggressive strategies to reach particular interests. Besides, discretionary accruals are a source of surveillance for auditors and board of administration (Pathak, Hoskisson & Johnson, 2014; Chen, Cheng & Wang, 2015; Liu, Du & Bian, 2019), while operational changes are less associated to the intention of manipulating results and then, are less probable of being detected by such governance mechanisms.

Brazil has a suitable environment for studying the issue raised specially because of the smaller proportion of variable remuneration compared to the total, different from countries of the Western Europe and North America (Ferreira, 2012). Also, researches analyzing Brazilian companies, for example Hoff e Vicente (2016), Dal Magro et al. (2019) and Sousa e Ribeiro (2020), focused on investigating the impact of remuneration on discretionary accruals without checking if that impact can also occur at operational level. That type of manipulation brings more damage to information quality when

compared to management by accruals, since it is not triggered by a change in accounting policies but comes from a change in an operational activity of the company (Chi et al., 2011) reflecting on cash flows, with long-term consequences.

## 2 DEVELOPMENT AND HYPOTHESES PRESENTATION

Changing accounting choices aiming at managing results by means of discretionary accruals is the most recurrent way to manipulate the net result of the period since it does not depend on the approval of controlling organs, such as the board of administration or audit committee (Liu et al., 2019; Costa & Soares, 2022). Besides, accounting choices can be reverted on the following periods, being an aspect that can be beneficial when considering managers ulterior purposes (Healy & Wahlen, 1999; Scott, 2009).

Due to that aspect, changing accounting choices from discretionary accruals can catch the attention of the board of administration, external audit, and audit committee (Cohen & Zarowin, 2010; Pathak et al., 2014; Chen et al., 2015). Surveilling these mechanisms brings worry to managers since proving the act of manipulating results is negatively seen by market, prejudicing managers prestige and reputation with shareholders (Bagnoli & Watts, 2000; Zahra, Priem & Rasheed, 2005; Martínez-Ferrero, Banerjee & García-Sánchez, 2016). Due to this, managers search for alternatives to manipulate results without catching the attention of governance mechanisms. One alternative consists in managing results by means of operational activities (Cohen & Zarowin, 2010).

The use of operational activities for managing results is a substitute or complimentary way for manipulation by means of discretionary accruals (Roychowdhury, 2006; Cohen & Zarowin, 2010). However, it is harder to be practiced because it is linked to changes in company's operations, affecting cash flows of the period directly (Sun, Lan & Liu, 2014). In some cases, managers need investors comprehension/approval to perform some operational changes. When it occurs, it triggers executives need for deceiving investors stating the operational change is good for the company, when the real goal is linked to meeting managers' particular purposes.

Based on this context, manipulation by means of operations is less recurrent and more noxious to the quality of accounting information (Chi et al., 2011; Liu et al., 2019), since its reversion does not take place by changing accounting choices but by a new change in operational activities that will result in cash disbursement out of company's target. Among the examples of operational activities management, there is the reduction of expenses with publicity, and development and/or maintenance for reaching the profit goal in the period (Cohen & Zarowin, 2010).

Although managing results can bring benefits to managers' personal interests (Scott, 2009; Dechow, Ge & Schrand, 2010), it is not a practice performed all the time or way because it is performed from incentives (Healy & Wahlen, 1999), for example, (i) earnings from modes of variable

remuneration (Bergstresser & Philippon, 2006; Shuto, 2007; Almadi & Lazic, 2016); (ii) deceive market perception as to company performance (Cheng & Warfield, 2005; Suffian, Sanusi & Mastuki, 2015), and; (iii) changes in regulation (Healy & Wahlen, 1999). Management for maximizing earnings from variable remuneration bases on the logic of increasing economic-financial indexes that will be used as a parameter for setting the remuneration amount in the period (Shuto, 2007; Almadi & Lazic, 2016).

In essence, variable remuneration aims at aligning managers and shareholders goals. The incentive via variable remuneration smooths managers' aversion to risk (Amihud & Lev, 1981; Smith e Stulz, 1985; Low, 2009), in face of the autonomy managers have to choose for projects with more chance for net cash entries, even if linked to a higher risk (Haugen & Senbert, 1981). Thus, variable remuneration stimulates managers to choose riskier projects, since they are usually linked to higher profit rates (Rengel et al., 2020), besides encouraging executives to reach the goal set for the period (Rajgopal & Shevlin, 2002).

The use of variable remuneration as a tool for aligning interests, however, is fragile when based on economic-financial performance, because there may have a displacement of the focus for short term (Shuto, 2007). Such fragility comes from asymmetric information between managers and shareholders, which instigates executives to adopt result manipulation practices, aiming at increasing performance in the period and, in turn, increases bonuses received and other modes from variable remuneration plans (Shuto, 2007; Ibrahim & Lloyd, 2011). In this sense, the use of variable remuneration modes by executives, either partial or exclusively, increases the probability of managing results by companies (Gao & Shrieves, 2002). Thus, the following research hypotheses are presented:

*H1a: Companies rewarding their managers by means of variable remuneration (in exclusive way or complimentary to a fix remuneration) present a higher level of results management by discretionary accruals than companies adopting exclusively the fix remuneration system in the period.*

*H1b: Companies rewarding their managers by means of variable remuneration (in exclusive way or complimentary to a fix remuneration) present a higher level of results management by operational activities than companies adopting exclusively the fix remuneration system in the period.*

Although companies adopting variable remuneration plans can present more manageable results than companies rewarding their managers exclusively by fix remuneration plans (Gao & Shrieves, 2002), there is no standard for the proportion of these plans comparing to the total amount of the remuneration plan. The lack of such standard provides distinct proportions from variable remuneration plans earned by managers when comparing different companies (Goh & Gupta, 2010; Ferreira, 2012).

Some companies pay their managers with a bigger share of variable than fix amounts (Gao & Shrieves, 2002). That behavior results in different incentive levels earned by executives for misrepresenting results. In face of this, companies with remuneration plans with a higher proportion of amounts split among managers via variable remuneration than fix remuneration plans tend to present demonstrations with more managed results than organizations with lower levels of such proportion (Shuto et al., 2007; Li & Chii-Shyan, 2017; Harris et al., 2019). So, instead of aligning managers to their interests (Eisenhardt, 1989; Harris, 2009; Low, 2009), investors may be encouraging them to manipulate results (Ibrahim & Lloyd, 2011; Almadi & Lazic, 2016; Dal Magro et al., 2019).

In face of such perspective, researches in different countries dedicate to investigate the impact of the proportion of variable remuneration (comparing to fix remuneration) on results management. Shuto (2007) found that managers from Japanese companies similarly to USA executives, present more managed accounting information when they get more earnings from variable remuneration plans based on period performance. An analysis considering different developed countries found similar results (Almadi & Lazic, 2016). Harris et al. (2019) found that increasing managers variable remuneration means increasing the level of manipulation of accounting information in the USA, despite the gender. Besides, remuneration also interferes with the relation between CEO mandate and results manipulation, encouraging them to distort results even more (Dal Magro et al., 2019).

Even with such evidence, most studies limited to analyzing how variable remuneration stimulates the use of ulterior practices by managers when considering the use of discretionary accruals (Gao & Shrieves, 2002; Shuto, 2007; Almadi & Lazic, 2016; Li & Chii-Shyan, 2017). However, this is not the only way to distort results. Executives, as long as exposed to more aggressive variable remuneration plans, can also use operational activities to distort results aiming at maximizing personal wealth, as suggested by Almadi e Lazic (2016), and evidenced by Harris et al. (2019) and Dal Magro et al. (2019). From these discussions the following hypotheses are presented:

*H2a: Increasing the proportion of variable remuneration comparing to fix modes impacts the management of results by discretionary accruals in a positive and significant way.*

*H2b: Increasing the proportion of variable remuneration comparing to fix modes impacts the management of results by operational activities in a positive and significant way.*

Variable remuneration as an incentive for managers to distort results in a period, even under different investigations (Gao & Shrieves, 2002; Shuto, 2007; Almadi & Lazic, 2016; Li & Chii-Shyan, 2017; Harris et al., 2019; Dal Magro



et al., 2019), was not totally studied. A missing point in these researches consists in the target remuneration set for the period.

That target sets what will be the variable amount earned by managers, in case it is fulfilled (Eisenhardt, 1989; Scott, 2009). When the remuneration target is not met, managers will earn lower amounts from variable remuneration plans. Because of it, they feel encouraged to manipulate accounting information towards the target in order to increase the amount to receive at the end of the period (Healy, 1985; Holthausen et al., 1995). However, from the moment executives overcome the target, many times, there is no increase in the amount to earn from variable remuneration plans (Murphy, 1999). In this sense, when managers reach the target, there are no additional incentives to increase the result of the period as a purpose to raise the amount of variable remuneration value to earn at the end of the period. On the other hand, from the target meeting point, practices can be put into motion to decrease results of that period, bringing it the closest to the target as possible (Holthausen et al., 1995). It turns variable remuneration into a finite resource since it is based on a performance target.

Performance target can be seen as a reference point to executives because, according to Eisenhardt (1989), it is the optimum point providing the higher variable remuneration considering performance effort. Thus, it can be a standard setting how intense the manipulation caused by executives is (Holthausen et al., 1995). When reaching the period target, the manager reduces uncertainty investors feels about their work (Ali & Zhang, 2015) and in turn, increases the chance for staying in company's administration board the next period (Gibbons & Murphy, 1992; Ryan, Wang & Wiggins, 2009). It is highlighted two shady issues may raise so the manager remains close to the target and make use of results managing for that, being: (1) avoid excessive increase of the target in the upcoming period; and (2) making it easy to revert accruals during upcoming periods.

From that discussion it is found that investigating the distance of remuneration comparing to the target set for the period contributes for discussing the issue, since executives can see the target as a reference point. When staring at this point it is possible to contribute to literature, specially to studies from Gao e Shrieves (2002), Shuto (2007), Almadi e Lazic (2016), Li e Chii-Shyan (2017), Harris et al. (2019), and Dal Magro et al. (2019), that managers will not always manage results of a period in an infinite way to increase remuneration, since target is the optimum point that maximizes financial gains and, thus, those executives may distort results towards the optimum point. Based on these fundamentals the following hypotheses are presented:

*H3a: The longest proportional distance from the variable remuneration value paid to managers when comparing to the remuneration target in the period is negative, significantly related to the management of results by means of discretionary accruals.*

H3b: *The longest proportional distance from the variable remuneration value paid to managers when comparing to the remuneration target in the period is negative, significantly related to the management of results by means of operational activities.*

### **3 METHODOLOGICAL PROCEDURES**

#### **3.1 Sample definition and data collect**

Population in the present study encompasses all companies that negotiated shares, in any moment, from 2012 to 2019. The first year of the time frame was chosen due to the beginning of publishing information about remuneration and the corresponding targets of managers variable remuneration in the highest executive board. It occurred because this information was made available by most companies only from 2011 on. Since data were analyzed by means of the Generalized Method of Moments (GMM) which requires an out of phase period, 2012 was chosen as the first year for analysis. 2019 was chosen to be the last year of the time frame because it preceded the Covid-19 pandemics. With this, 2019 was considered the last year for analysis to avoid distortions in results caused by an external event that impacted Brazilian companies' operations significantly, especially in 2020 and 2021.

The sample was made out of companies that had information available for calculating the measurements of results management by accruals and by operational activities, as well as about the remuneration of executives and information needed for calculating control variables. Due to those restrictions, the search sample was composed by 108 companies from 39 sectors according to North American Industry Classification System (NAICS), ranked level 2. It is worth to highlight that the maximum notes number possible was 864 but due to the lack of needed information for composing the sample, 103 notes were excluded. It caused the sample to have 761 notes. About sample yet, discrepant information may distort the analysis and reading of the research results (Fávero & Belfiore, 2017). And, due to such feature, quantitative data were submitted to winsorizing technique at 1% and 99%.

Economic-financial information needed for calculating control variables and results management by accruals and operational activities were collected by means of the data basis Refinitiv Eikon®. Data about remuneration received by the manager in the period were extracted by means of the Form of Reference (FR), at the Values Commission (CVM) website. After collecting that information by FR, it was possible to perform the calculation of the referent variables: variable remuneration, proportion of variable remuneration, and distance from variable remuneration compared to the target established for the period.

### 3.2 Variables

Management by means of discretionary accruals consists in one of the dependent variables, measured based on Dechow, Sloan, and Sweeney model (1995). Details about procedures performed for calculating this variable are shown in Appendix A. The second dependent variable is the management of results by means of operational activities (REM), calculated based on the model proposed by Dechow et al. (1998) and widely disclosed by Roychowdhury (2006). Details about REM calculation is described in Appendix B. It is important to remember that, during the procedure for estimation of these variables, the statistic software Stata 13® was used. In Table 1, besides dependent variables, the independent variables description and operationalization (interest and control) used in the regression model are described.

**Table 1**  
Research Variables

<b>Variável Dependente</b>			
<b>Variável</b>	<b>Descrição</b>	<b>Operacionalização</b>	<b>Referências</b>
<i>Discretionary Accruals (DA)</i>	Earnings management through Discretionary Accruals	$TA_{it} = \alpha 1/A_{t-1} + \beta_1 (\Delta R_{it} - \Delta CR_{it}) + \beta_2 (PPE_{it}) + \varepsilon_{it}$	Dechow et al. (1995)
<i>Real Management Earnings Global (REM)</i>	Earnings management through operational activities	$REM_{it} = REM_{REC_{it}} + REM_{CUSTO_{it}} + REM_{DES_{it}}$	Dechow et al. (1998) e Roychowdhury (2006)
<b>Variáveis Independentes</b>			
<b>Variáveis de Interesse</b>			
<b>Variável</b>	<b>Lógica relacional</b>	<b>Operacionalização</b>	<b>Referências</b>
Variable Remuneration (RVAR)	Receiving variable remuneration encourages opportunistic actions and, consequently, the realization of earnings management by DA and REM to maximize their private desires.	Dummy variable with two categories: (0) period in which executives were rewarded exclusively by fixed compensation plans and (1) period in which executives were rewarded partially or exclusively by variable compensation plans	Gao e Shrieves, (2002)
Proportion of Variable Remuneration (PROPVAR)	Receiving a greater proportion of variable remuneration causes greater stimulation of opportunistic actions and, consequently, the realization of earnings management by DA and REM to maximize their private desires.	(Amount received with variable remuneration plans/Total amount received) * 100	Goh e Gupta (2010)

Distance to Target (DTARG)	The greater proportional distance between the value of variable remuneration and the established target causes greater encouragement for opportunistic actions to manage earnings through AD and REM, given the need to get closer to the target to maximize private objectives.	(Variable remuneration amount paid to managers/Remuneration target amount based on period performance)	Proposal by the authors
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#### Variáveis de Controle

Variável	Lógica relacional	Operacionalização	Referências
Return on Assets (ROA)	The greater the performance on the company's assets, the greater the propensity for the company to have used DA and REM earnings management.	$(\text{Net Profit}/\text{Total Assets}) * 100$	Dechow et al. (1995) e Consoni, Colauto e Lima (2017)
Degree of Operating Leverage (DOL)	The higher the operational performance considering the company's cost structure, the greater the company's propensity to have used earnings management using DA and REM.	$\text{Gross Profit}/(\text{Gross Profit} - \text{Selling and Administrative Expenses})$	Ribeiro, Carmo, Fávero e Carvalho (2016)
Revenue Growth (RGROW)	The greater the growth in net sales revenue, the greater the propensity for the company to have used earnings management using DA and REM.	$((\text{Net Sales Revenue}_t/\text{Net Sales Revenue}_{t-1}) - 1) * 100$	Hochberg (2012) e Sincerre et al. (2016)
Total Debt (DEBT)	The higher the company's debt level, the greater the need to use earnings management using DA and REM to reflect the company's good performance.	$((\text{Current Liabilities} + \text{Non-Current Liabilities})/\text{Assets}) * 100$	Marra, Mazzola e Prencipe (2011) e Rodrigues, Melo e Paulo (2019)
Audit Firm Tenure (TEN)	As the audit firm's tenure increases, there is an increase in the level of earnings management, as the audit firm's independence decreases with the increase in tenure.	Number in years of the audit firm responsible for auditing financial reports in the same company	Harris e Whisenant (2012) e Bell Causholli e Knechel (2015)
BIG4	Companies audited by the four largest international firms (PwC, KPMG, Deloitte, EY) have lower levels of earnings management.	Dummy variable with two categories: (0) company audited by a non-BIG4 audit firm and (1) company audited by a BIG4 audit firm.	Tendeloo e Vanstralen (2008) e Francis e Yu (2009)

CEO Duality (DUAL)	CEOs who are also chairman of the board of directors tend to manage earnings more.	Dummy variable with two categories: (0) CEO who is not chairman of the board of directors and (1) CEO who is chairman of the board of directors.	Kamarudin, Ismail e Samsuddin (2012) e Chi, Hung, Cheng e Lieu (2015)
Size (SIZE)	The larger the size of the company, the greater the company's propensity to use AD and REM earnings management, as the greater the flow of information and opportunities to carry out such accounting maneuvers.	Natural Logarithm of Total Assets	Roychowdhury (2006) e Doyle, Ge e McVay. (2007)

Source: From the authors (2023)

### 3.3 Econometric model and data treatment

Initially, data from all variables were analyzed by means of descriptive statistics aiming at understanding the distribution of data from the companies in the sample. Complimentarily to the descriptive analysis, some variables were analyzed under time perspective. For that, Kruskal-Wallis testing was performed in order to check for significant differences along the time lapse of quantitative variables referent remuneration, such as the proportion of variable remuneration and the distance from the target. After these analyzes, testings were applied aiming at checking for the three hypotheses of the present research. It was allowed by means of developing six econometric multivariate models.

$$DA \text{ ou } REM_{it} = \beta_0 + \beta_1 RVAR_{it} + \beta_2 ROA_{it} + \beta_3 DOL_{it} + \beta_4 RGROW_{it} + \beta_5 DEBT_{it} + \beta_6 TEN + \beta_7 BIG4 + \beta_8 DUAL + \beta_9 SIZE_{it} + \varepsilon_{it} \quad (1)$$

$$DA \text{ ou } REM_{it} = \beta_0 + \beta_1 PROPVAR_{it} + \beta_2 ROA_{it} + \beta_3 DOL_{it} + \beta_4 RGROW_{it} + \beta_5 DEBT_{it} + \beta_6 TEN + \beta_7 BIG4 + \beta_8 DUAL + \beta_9 SIZE_{it} + \varepsilon_{it} \quad (2)$$

$$DA \text{ ou } REM_{it} = \beta_0 + \beta_1 DTARG_{it} + \beta_2 ROA_{it} + \beta_3 DOL_{it} + \beta_4 RGROW_{it} + \beta_5 DEBT_{it} + \beta_6 TEN + \beta_7 BIG4 + \beta_8 DUAL + \beta_9 SIZE_{it} + \varepsilon_{it} \quad (3)$$

$DA_{it}$  = discretionary accruals of company  $i$  at period  $t$ ;  $REM_{it}$  = global real management earnings of company  $i$  at period  $t$ ;  $RVAR_{it}$  = variable remuneration of company  $i$  at period  $t$ ;  $PROPVAR_{it}$  = proportion of variable remuneration of company  $i$  at period  $t$ ;  $DTARG_{it}$  = distance from performance target of company  $i$  at period  $t$ ;  $ROA_{it}$  = return on assets of

company  $i$  at period  $t$ ;  $DOL_{it}$  = degree of operational leverage of company  $i$  at period  $t$ ;  $RGROW_{it}$  = revenue increase of company  $i$  at period  $t$ ;  $DEBT_{it}$  = total indebtedness of company  $i$  at period  $t$ ;  $TEN_{it}$  = tenure of audit company of company  $i$  at period  $t$ ;  $BIG4_{it}$  = financial statements audited by audit company BIG4 (PwC, Deloitte, KPMG or EY) of company  $i$  at period  $t$ ;  $DUAL_{it}$  = CEO duality at the board of administration of company  $i$  at period  $t$ , and;  $SIZE_{it}$  = size of company  $i$  at period  $t$ .

The multivariate regressions were analyzed by means of *Generalized Method of Moments (GMM)*. The use of this model is based on the estimation of the first difference and lightens some problems, such as the existence of variables omitted and endogeneity (Heckman, 1979). It happens because this model leads to the analysis based on the instrumentation of the variables participating in the multivariate model. GMM model, according to Roodman (2009), is a robust estimation when used in some situations, for example, when: (i) the dependent variable is a dynamic one and, due to this, it is influenced by past results as gaps, (ii) statistic model independent variables are exogenous but they can present correlation in previous periods or even with the regression residue and (iii) heterogeneity is present, even if not noticed and (iv) first-order, serial autocorrelation occurrence and inherent heteroscedasticity to each sample group, but without the presence of such aspects when comparing sample groups. Because of this, GMM was adopted for estimation of multivariate regressions.

It is valid to highlight that, for evaluating the suitable adjustments of multivariate models by GMM, it was necessary to perform first- and second-order serial autocorrelation tests in first difference, named AR(1) and AR(2), suggested by Arellano e Bond (1991), Arellano e Bover (1995) and Blundell e Bond (1998). In a complimentary way, data were also submitted to Hansen test. This test indicates if instruments used are valid. It is valid to highlight that all these tests were estimated considering significance at 5% level.

## 4 ANALYSIS AND DISCUSSION OF RESULTS

The first procedure performed for data analysis was the submission of all variables to descriptive statistics aiming at checking aspects such as average, standard deviation, maximum, and minimum. Analyzing such aspects is important for understanding data distribution. From this, Table 2 presents descriptive results of the variables used in this study:

**Table 2**  
Descriptive statistics

Variables	Mean	Standard Deviation			Minimum	Maximum	Total Obs.
		O	B	W			
DA	0.065	0.079	0.052	0.06	0.001	0.546	761
REM	0.178	0.161	0.144	0.074	0.002	0.749	761
PROPVAR	48.565	22.654	19.045	12.395	0.000	89.085	761
DTARG	42.661	44.272	25.484	37.854	0.000	269.298	761
ROA	2.516	9.21	7.007	6.474	-41.387	23.269	761
DOL	2.153	3.631	1.831	3.208	-16.295	17.696	761

RGROW	5.916	21.657	11.698	18.849	-57.142	108.014	761
TEN	2.752	1.501	0.673	1.397	1	10	761
DEBT	60.459	23.905	22.302	9.349	11.203	143.411	761
SIZE	15.522	1.501	1.502	0.277	12.231	19.592	761
<b>Variable</b>	<b>Managers partially or fully rewarded with variable remuneration modalities</b>	<b>Obs.</b>	<b>Managers rewarded exclusively with fixed remuneration modalities</b>	<b>Obs.</b>	<b>Total Obs.</b>		
RVAR	94.88%	722	5.12%	39	761		
<b>Variable</b>	<b>Companies audited by BIG4 audit firms or with CEOs who have duality</b>	<b>Obs.</b>	<b>Companies audited by non-BIG4 audit firms or CEOs who do not have duality</b>	<b>Obs.</b>	<b>Total Obs.</b>		
BIG4	85.81%	653	14.19%	108	761		
DUAL	78.84%	600	21.16%	161	761		

Note: O = Overall; B = Between; W = Within; Obs = Observations.

Source: From the authors (2020)

From the results shown in Table 2 it is seen that most notes (94.88%) are from companies that rewarded managers, in some level, with variations of variable remuneration. It is worth highlighting that from 108 companies participating in the sample, a Cambuci S/A and General Shopping & Outlets were the only ones that, in any time of the frame analyzed, rewarded their high-level executives with any amount originated from variable remuneration plans. With this, it is possible to understand that a massive part of Brazilian open companies makes use of variable remuneration as an incentive mechanism for managers to reach the targets set by shareholders.

With regards to the proportion of variable remuneration in comparison to the total paid to managers, in average, the proportion of variable remuneration modes compared to the total paid to shareholders was 48.56%. It indicates non-financial companies, in average, rewarded their managers in lower proportion with variable remuneration plans than fix remuneration plans. This result is close to that found by Goh e Gupta (2010), since authors found that, in average, 40% of the amounts received by executives from companies in the United Kingdom were based on variable remuneration plans. Yet on the proportion of variable remuneration, it is highlighted that, from 761 notes, 423 (55.58%) are executives who were rewarded with a higher proportion of amounts derived from variable remuneration than fix remuneration plans. With regards to percent distance from the target set, evidence on Table 2 suggest that, in average, managers get distant in 42.66% of the value of the target set for the period.

Descriptive results offer a general panorama about the behavior of the proportion of variable remuneration and the percent distance from the target set. However, such variables can have presented significant variations along time. Due to this, data from these two variables were submitted to Kruskal-Wallis average testing. That test indicated that the proportion of variable remuneration did not show a significant variation along time [ $X^2(7) = 10.335$ ;  $p$ -value < 0.1703]. That can be considered an interesting result since, besides Brazil faced times of economic recession and peaks of economic

political uncertainty that, according to Wasiuzzaman (2015), contribute to the fall on companies' economic-financial performance, there was no significant difference on the proportion of the variable remuneration given to executives. About the percent distance from the target set, results indicate that there was also no significant difference from this variable along time [ $X^2(7) = 10.341$ ;  $p\text{-value} < 0.1681$ ]. Thus, even with turbulent moments in Brazilian economy from 2011 to 2019, the distance compared to target did not show significant differences.

In a moment after the analyzes along time, independent variables belonging to each of the six multivariate models were analyzed by means of the *Variance Inflation Factor* (VIF) aiming at checking if multicollinearity is present. The results from this test indicated that all independent variables belonging to six multiple regressions showed VIF lower than 5. That result suggests there is no presence of multicollinearity in any of the six multivariate models, since that feature is present only when VIF values are higher than 5, as mentioned by Fávero e Belfiore (2017).

From this, variables were submitted to regression analysis by means of GMM. But, before performing GMM, there are tests set up as needed presupposed for validating the multivariate regression model. Among these tests, there is AR(1) and AR(2), which indicate all multivariate regressions have only first-order autocorrelation, that is, those controlled by GMM. In all multivariate estimations, Hansen test showed to be non-significant, to significance level of 5%, indicating the instruments used in regressions are suitable. In face of this, Table 3 presents results referent multivariate analyzes.



**Table 3**

Multivariate data analyzes

Variables	DA	REM	DA	REM	DA	REM
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Discretionary Accruals <sub>t-1</sub>	0.0445		0.0528		0.0517	
Real Management Earnings Global <sub>t-1</sub>		0.2821*		0.2952**		0.281*
Remuneration Variable	-0.0285	0.2072*				
Proportion of Variable Remuneration			0.0001	0.0005*		
Distance of Target					0.0001**	-0.0001
Return of Assets	-0.0003	0.0018**	-0.0003	0.0017*	-0.0002	0.0018**
Degree of Operating Leverage	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005
Revenue Growth	-0.0001	0.0002	-0.0001	0.0002	-0.0001	-0.0001
Total Debt	0.0005*	0.0065	0.0005**	0.0006	0.0005**	0.0006
Audit Firm Tenure	0.0010	0.0042	0.0012	0.0044	0.0013	0.041
BIG4	0.0123	-0.0039	0.0057	-0.0077	0.0072	0.0001
CEO duality	0.0132	0.0078	0.0112	0.0053	0.0107	0.0092
Size	-0.0118***	-0.0176***	-0.126***	-0.0198***	-0.0122***	-0.0172***
Constant	0.2305***	0.3281***	0.2159***	0.3592***	0.2071***	0.3414***
Wald Test	43.94***	30.09***	40.76***	37.63***	45.08***	29.24***
Observations	761	761	761	761	761	761
Regression assumptions						
VIF (minimum)	1.01	1.01	1.01	1.01	1.01	1.01
VIF (maximum)	1.42	1.46	1.41	1.45	1.44	1.47
AR(1)	-3.66***	-5.00***	-3.62***	-5.06***	-3.62***	-5.06
AR(2)	1.60	1.53	1.65	1.45	1.70	1.58
Hansen	4.06	5.38	4.30	4.67	4.44	5.63

Note: \* significance level of 5% and \*\* significance level of 1% when considering bicaudal estimation. Coef. = Coefficients; AD = Discretionary Accruals; REM = Global Real Management Earnings; AR(1): Arellano-Bond Test for first-order serial autocorrelation in first difference; AR(2): Arellano-Bond Test for second-order serial autocorrelation in first difference. Hansen: Hansen Test

Source: From the authors (2020)

Evidence from multivariate regression model 1 reveal there is no significant relation (Coef. = -0.0285; p-value < 0.216) between the way of remuneration, exclusive or complimentary to the mode of fix remuneration with the practice of results managing by discretionary *accruals*, rejecting H1a. On the other hand, a positive, significant relation is noticed, at level 10% (Coef. 0.2072; p-value < 0.094), between the use of variable remuneration and the manipulation of results by operational activities. Evidence that implies accepting H1b and indicates variable remuneration is an incentive for executives to change the result of the period.

From these results, it is understood that the single act of implementing ways of variable remuneration does not encourage managers from Brazilian companies to distort results by means of discretionary *accruals*, different from studies (Gao & Shrieves, 2002; Shuto, 2007) that found such behavior in other countries. However, the adoption of variable remuneration modes to reward high-level executives encourage the practice of results manipulation by means of operational activities of the company. It is similar to the discussion of Ibrahim e Lloyd (2011), since the authors found that when the company has variable remuneration plans it brings an increase of the management of results by means of operations of the company itself.

In this sense, it is seen that the inclusion of variable remuneration plans is a behavior that implies in encouraging executives to manage results. However, findings differ from studies (Roychowdhury, 2006; Cohen & Zarowin, 2010) mentioning the use, in first moment, of discretionary *accruals* to distort results and, complementarily, operations to manage results by high-level executives. That is because in Brazil the adoption of variable remuneration plans by companies for these executives stimulates only management practices linked to operational activities. Some motivations can explain the existence of this only relation, for example, the smaller governance mechanisms – such as external audit and board of administration – in acts linked to the management by means of operational activities in detriment of the management by discretionary *accruals* (Pathak, Hoskisson & Johnson, 2014; Chen, Cheng & Wang, 2015; Liu, Du & Bian, 2019).

Although only the feature of having variable remuneration plans as a way of compensating executives being an incentive to the use of results management practice, as seen on Table 3, there is no standard as to the proportion of variable remuneration as to the total value paid by the companies to the managers (Goh e Gupta, 2010). With this, the encouragement for manipulating results may increase as the proportion of variable remuneration increases when compared to the total paid in the period. It causes companies which reward their executives with higher proportions of remuneration to create an environment that encourages high-level executives to manage results even more when compared to executives who run organizations with low or any proportion of variable remuneration plans payments (Shuto et al., 2007; Li & Chii-Shyan, 2017; Harris et al., 2019).

Results from Model 3 and Model 4 indicate that the proportion of variable remuneration influences the increase of the level of results management only by means of operational activities at significance level 10% (Coef. 0.0005; p-value < 0.051). it is because no significant relation was detected between the proportion of variable remuneration and the management of results by discretionary *accruals*

(Coef. 0.0001; p-value < 0.741). With this, there is a confirmation of H2b with a contribution to the discussions presented by Harris et al. (2019) that managers feel motivated to increase the level of results manipulation by means of operations as remuneration has a lighter proportion of variable remuneration plans.

Results from models 1, 2, 3, and 4 indicate that the existence of variable remuneration plans, as well as the increase of the importance of that plan compared to total value, is a motivation for managers to manipulate results, but only at operational level. It can be a safer practice for executive directors, since it is a way of managing results without changing the accounting choices in a way that can be discovered by an external audit or internal governance mechanisms. Besides that, it is important to remember that the discovery of management practices can have a negative effect on the reputation of high-level managers since it not well seen by shareholders.

Although the proportion of variable remuneration is a factor motivating executives to practice acts aiming to supply particular purposes, remuneration target can be an attribute implying the level of manipulation. As these managers move far from the performance target set by shareholders to the period, they can increase their manipulation behavior to get closer to that target. That perspective was not considered in previous studies, so that observing it leads to new level of investigation about the practice of managing results as a possible consequence of the opportunism raised by variable remuneration.

Results from models 5 and 6 provide evidence that the distance from the target is statistically related in a positive way to the management of results by discretionary *accruals* (Coef. = 0.0001; p-value < 0.037). However, it presents a significant relation to the management by operational activities (Coef. = -0.0001; p-value < 0.629). This evidence caused H3a and H3b to be rejected. Although these findings are different from the hypotheses proposed, there is a contribution for literature since it advances in the discussions of the studies (Almadi & Lazic, 2016; Li & Chii-Shyan, 2017; Harris et al., 2019; Dal Magro et al., 2019) who centered efforts on the issue. The contribution for these studies is that the distance from the variable remuneration target is a component considered by managers to adopt results management practices by *accruals*.

The use of discretionary *accruals* for changing the remuneration target may be linked to a higher easiness to manage results when compared to measures based on the change of operational activities of the company. Especially because high-level managers have a finer prediction whether they will or not reach the target of the period in the last months of the year. The use of discretionary *accruals* then becomes more attractive and effective to reach or try to get closer to the target of the period for executives who are more distant from the target set in the beginning of the period. Also, it is necessary to highlight that for performing the operational management it is necessary to plan and have time so the effect can be as expected and, thus, it can be less efficient in a situation demanding more urgency.

## 5 CONCLUSION

The present study aimed at investigating the influence of the variable remuneration of executives on the management of results by *accruals* and operational activities in open companies of Brazilian market. Research results send to three reflections. The first is the fact that the company adopts partial or totally the variable remuneration mode is not a factor contributing for managing results by means of discretionary *accruals*. However, it is a factor contributing to the increase of manipulation by means of operational activities, indicating that the act of compensating executives with variable remuneration plans implies in lower quality demonstrations.

It shows a different side that occurs specifically in Brazil and contributes directly to studies of Gao e Shrieves (2002), Shuto (2007), and Ibrahim e Lloyd (2011), since that only the adoption of these plans is seen as a motivating factor for managers to use operations aiming at distorting the result of the period. Such contributions do not limit to the academy but also help external users of the accounting information, mainly investors. It happens because only including variable remuneration plans by Brazilian companies induces the decrease in result quality and, in turn, the decrease in informational capability of these users.

In this sense, the proportion of remuneration comparing to the total is a feature linked to the increase in manipulating results by operational activities. It brought a second reflection because managers feel motivated to adopt opportunistic behaviors while the proportion of amounts referent the variable remuneration increase when compared to the total paid. Thus, it is elucidated as seen by Harris et al. (2019), why the increase in the proportion of remuneration encourages managers to perform practices meeting particular desires, but only with regards to operational manipulation.

That evidence can generate contributions to external users, especially investors. These contributions occur because managers with a higher proportion of variable remuneration in comparison to the total received may not use the discretionary *accruals* since the change in accounting choices for managing results can be more easily detectable by governance mechanisms, for example, external audit. In theoretical terms, it also generates contributions to the debate established, in special, by Almadi e Lazic (2016) and Li e Chii-Shyan (2017), because in Brazil the increase in proportion can also act in opposition to the alignment of goals between managers and shareholders.

The third and last reflection comes from the result about the relation between distance from the variable remuneration target and the management by discretionary *accruals*. That is a positive relation, and it shows that managers who are more distant from the remuneration target tend to manage results. It can contribute for Holthausen et al. (1995) and Ali e Zhang (2015) studies since, depending on the distance from the remuneration target in which the manager is in, it can take to the intensification of the results management practices. So, it is a way managers more distant from the target have to reduce damages to their reputation and stability to CEO occupation when performance is lower than expected.

In this sense, the findings in the present study light up the discussion that managers manage results from the variable remuneration plan of the company. Somehow it shows that governance mechanisms must have heavier worries with practices for distorting results while there is an increase of the distance from the result reached by management as to the target set in the beginning of the period by the board of administration. Such mechanisms must also reinforce monitoring behaviors for in face of the proportion of variable remuneration in relation to the total remuneration because that proportion is used by executives themselves for intensifying the practices of results management. Thus, investors and creditors can have access to good quality accounting information, and, in turn, it will potentiate their capability to take decisions due to the reduction in information asymmetry.

The present research is not free from limitations. The analysis as to segmenting different variable remuneration plans was not deepened. Because of this, it is interesting to analyze the effect of several ways of incentive for variable remuneration in the economic-financial performance of Brazilian companies. It can be a way to analyze which are the most effective plans as to the increase in performance of Brazilian companies. Another limitation regards to the non-control of macroeconomic environment, which interferes in executives' opportunistic acts (Paulo & Mota, 2019). Because of this, future studies can focus on analyzing which are the implications of the macroeconomic context in the relation between proportion and the distance from the variable remuneration and the management of results by discretionary *accruals* and operational activities.

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## APPENDIX A – MANAGEMENT OF RESULTS BY DISCRETIONARY ACCRUALS

Discretionary *accruals* were calculated based on Dechow et al. (1995) model. For their calculation, the first step consisted in measuring total accruals over the period by means of the balance technique, as suggested by Dechow et al. (1995).

$$TA_{it} = (\Delta CA_{it} - \Delta Cash_{it}) - (\Delta CL_{it} - \Delta Fin_{it}) - Depreciation_{it} / A_{it-1} \quad (4)$$

In which:  $TA_{it}$  = total *accruals* of company  $i$  at period  $t$ ;  $\Delta CA_{it}$  = variation of the current asset of company  $i$  at the end of period  $t$  comparing to period  $t-1$ ;  $\Delta Cash_{it}$  = cash variation of company  $i$  at the end of period  $t$  comparing to period  $t-1$ ;  $\Delta CL_{it}$  = current liability of company  $i$  at the end of period  $t$  comparing to period  $t-1$ ;  $\Delta Fin_{it}$  = variation of loans and financing of company  $i$  at the end of period  $t$  comparing to period  $t-1$ ;  $Depreciation_{it}$  = depreciation of company  $i$  at period  $t$ , and;  $A_{it-1}$  = total assets of company  $i$  at period  $t-1$ .

After calculating total *accruals*, it was possible to proceed to the separation of discretionary from non-discretionary *accruals*. That separation is important for identifying which *accruals* are susceptible to manipulation from executives. Discretionary *accruals* were discriminated by means of Dechow et al. (1995) metrics when considering *Ordinary Least Squares* (OLS) regression method, expressed in Equation 5:

$$\frac{TA_{it}}{A_{it-1}} = \alpha_i \left( \frac{1}{A_{it-1}} \right) + \beta_{1i} \left( \frac{\Delta R_{it} - \Delta AR_{it}}{A_{it-1}} \right) + \beta_{2i} \left( \frac{PPE_{it}}{A_{it-1}} \right) + \varepsilon_{it} \quad (5)$$

In which:  $TA_{it}$  = total *accruals* of the company,  $A_{it-1}$  = total assets of the company  $i$  at the end of period  $t-1$ ,  $\Delta R_{it}$  = variation revenue of company  $i$  at period  $t$ ;  $\Delta AR_{it}$  = variation on accounts

receivable of company  $i$  at period  $t$ ;  $PPE_{it}$  = fixed asset of the company  $i$  at the end of period  $t-1$ , and;  $\varepsilon_{it}$  = regression error term (residue) of company  $i$  at period  $t$ .

Table 4 presents results from the multivariate regression estimation according to Equation 5:

**Table 4**

Estimation of discretionary accruals

Variables	Coefficients	Standard Error	T-statistic	p-value
$1/A_{t-1}$	-16.214.77	4.816.52	-3.37	0.001
$(\Delta R - \Delta AR)/A_{t-1}$	0.0763	0.0323	2.36	0.019
$PPE/A_{t-1}$	0.0759	0.0221	3.44	0.001
Constant	0.0785	0.0082	9.61	0.000
$R^2$		0.0346		
F Test		11.67**		
Observations		893		

Note: \*significance level at 5% and \*\*significance level at 1% when considering bicaudal estimation. Coef. = Coefficients; Estat. T = Statistics T.

Source: From the authors (2020)

Discretionary *accruals* correspond to the error term in Equation 5. With this, the more distant the error term from the regression arrow, the higher the level of results management by *accruals* performed by managers. Due to such feature, error terms were submitted to the module so that the number suitably reflected the level of manipulation by means of the discretionary *accruals* practiced by the manager. So, the more distant the arrow is from the error term, the higher the level of management performed in the period.

## APPENDIX B – MANAGEMENT OF RESULTS BY REAL OPERATIONAL ACTIVITIES

The calculation of the management of results by operational activities was performed by means of the metrics offered by Dechow, Kothari e Watts (1998) and performed by Roychowdhury (2006). These authors describe that the management of results by operational activities has, as a parameter, the company's operation encompassing income, cost, and expense. So, in order to access the level of manipulation managers performed by means of operational points of the company it is necessary to measure the level of management in each type of activity, that is, by income, cost, and expense.

To capture these nuances, three multivariate models were estimated (equations 6, 7, 8) aiming at estimating the management of results via income, cost, and expense, respectively. These nuances of the results management by operations regard error terms in these equations which indicate the portion that can be manipulated to fulfill managers 'ulterior goals (Dechow et al., 1998; Roychowdhury, 2006; Chi et al., 2011). Equations used for capturing the management of results by means of income, cost, and expense are presented:

$$\frac{CFO_{it}}{A_{it-1}} = \alpha_{1i} \left( \frac{1}{A_{it-1}} \right) + \beta_{1i} \left( \frac{S_{it}}{A_{it-1}} \right) + \beta_{2i} \left( \frac{\Delta S_{it}}{A_{it-1}} \right) + \varepsilon_{it} \quad (6)$$

$$\frac{PROD_{it}}{A_{it-1}} = \alpha_{1i} \left( \frac{1}{A_{it-1}} \right) + \beta_{1i} \left( \frac{S_{it}}{A_{it-1}} \right) + \beta_{2i} \left( \frac{\Delta S_{it}}{A_{it-1}} \right) + \beta_{3i} \left( \frac{\Delta S_{it-1}}{A_{it-1}} \right) + \varepsilon_{it} \quad (7)$$

$$\frac{DISEXP_{it}}{A_{it-1}} = \alpha_{1i} \left( \frac{1}{A_{it-1}} \right) + \beta_{1i} \left( \frac{S_{it-1}}{A_{it-1}} \right) + \varepsilon_{it} \quad (8)$$

$CFO_{it}$  = operational cash flow of company  $i$  at period  $t$ ;  $PROD_{it}$  = production costs from the end of period of company  $i$  at period  $t$ ;  $DISEXP_{it}$  = sales and administrative expenses of company  $i$  at period  $t$ ;  $A_{it-1}$  = total asset from the end of period of company  $i$  at period  $t$ ;  $S_{it}$  = net income of the period of company  $i$  at period  $t$ ;  $\Delta S_{it}$  = variation of the total income compared to total income from past period of company  $i$  at period  $t$ ,  $\varepsilon_{it}$  = regression error term (residue) of company  $i$  at period  $t$ .

Results referent estimation of multivariate regressions from equations 6, 7, and 8, aiming at calculating the three sides of results manipulation by means of operational activities, are shown in Table 5.

**Table 5**  
Estimation of Real Earnings Management models

Variáveis	REMREC		REM COST		REMEXPENSE	
	Model 1		Model 2		Model 3	
	Coef.	T Stat	Coef.	T Stat.	Coef.	T Stat.
1/A <sub>t-1</sub>	-11,1136.37	-4.65**	-16,904.42	-3.85**	26,569.78	8.84**
S/A <sub>t-1</sub>	0.0177	3.35**	0.8453	90,82**		
Δ S/A <sub>t-1</sub>	0.0854	4.91**	-0.0963	-3,16**		
Δ S <sub>t-1</sub> /A <sub>t-1</sub>			-0.0445	-2,62**	0,1310	19,80**
Constant	0.0650	14.05**	-0.0814	-10,15**	0,0198	3,39**
R <sup>2</sup>	0.0909		0.9186		0.3487	
F Test	29.62**		2.503.83**		238.27**	
Observations	893		893		893	

Legend: \*significance level at 5% and \*\*significance level at 1% when considering bicaudal estimation. Coef. = Coefficients; T Stat. = Statistics T.

Source: From the authors (2020)

As mentioned above, error terms in equations 6, 7, and 8 correspond to the management by means of income, cost, and expense. Such residues were called Revenue Real Earnings Management ( $REM_{REC}$ ), Cost Real Earnings Management ( $REM_{COST}$ ), and Expense Real Earnings Management ( $REM_{EXPENSE}$ ), respectively. From the obtention of the three nuances of results management by means of operational activities, it was necessary to perform the combination of these

nuances to estimate the global results management by means of operational activities (Dechow *et al.*, 1998; Roychowdhury, 2006; Zang, 2012).

For such combination Dechow *et al.* (1998) Roychowdhury (2006) explain that it is necessary to multiply  $REM_{REC}$  and  $REM_{EXPENSE}$  times -1. The authors state that multiplication is necessary so that the values of these variables refer to the highest levels of results management.  $REM_{COST}$  does not require the multiplication times -1 because the higher its value, the higher the level of results management by means of costs used by managers (Cohen & Zarowin, 2010, Zhang, 2012; Cupertino, Martinez & Costa Jr. 2016; Paulo & Mota, 2019; Sousa *et al.*, 2022).

Since REM corresponds to the sum of three variables estimated from the error term, the more distant from zero, the higher the management of results by real operational activities. Because of this, REM was submitted to the module aiming at checking the level of management by operational activities adopted in the period. With this, the higher the distance of the regression arrow, the higher the level of management of results by operations.