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Article

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Earnings management by health insurance companies in Brazil

Earnings
management

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453

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Abstract

Purpose – This study examines whether Brazilian health insurance companies (HICs) engage in earnings management through discretionary accruals or operational decisions by refraining from reporting a low indicator of sustainability in the market (IDSM).

Design/methodology/approach – The study used the Jones and Modified Jones models to identify earnings management through discretionary accruals and used the model described by Roychowdhury to estimate the abnormal behaviors of operational decisions. Data covering 2012 to 2018 were collected from the ANS website.

Findings – The results show that HICs engaged in earnings management to avoid reporting a low IDSM. The findings should help health insurance clients make decisions regarding the purchase or change of health insurance. The findings should also encourage regulators to improve their evaluation of the economic and financial risks around HICs.

Originality/value – The National Agency of Supplementary Health (ANS) established a qualification program for HICs, monitoring them based on a set of indicators. Managers may have an incentive to use earnings management to obtain indices that meet the requirements of the ANS qualification program in order to avoid showing signs of abnormality.

Keywords Health insurance company, Abnormality, Earnings management, Abnormal behavior, Operational decision

Paper type Research paper

1. Introduction

Health insurance companies (HICs) in Brazil are regulated by the Agência Nacional de Saúde Suplementar (National Agency of Supplementary Health; ANS), which operates under the umbrella of the Ministry of Health. The agency was established by [Law 9961/2000](#) and serves to regulate, standardize, control and supervise activities related to supplementary health ([Cardoso, 2005](#); [Guimarães and Alves, 2009](#)). The ANS runs a qualification program for service providers. The program includes an evaluation system based on the Índice de Desempenho de Saúde Suplementar (Supplementary Health Performance Index; IDSS). The index's indicators are aggregated into four dimensions: quality in health care, guarantee of access, sustainability in the market, and process and regulatory management. The last indicator is based on an evaluation of how quality in the sector is being enhanced according to the ANS.

The ANS has also measured performance using the Indicador da Dimensão Econômico-Financeira (Indicator of the Economic and Financial Dimension; IDEF) and the Indicador da Dimensão de Sustentabilidade no Mercado (Indicator of Sustainability in the Market; IDSM);



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the latter replaced the former after the reformulation of the qualification program in 2015. It monitors HIC sustainability, verifying the firm's economic and financial stability, as well as its ability to fulfill its obligations. The results are calculated based on a set of indicators: net assets and current liquidity, the provision for events incurred but not reported, sufficient guarantee assets, own resources, financial availability, inspection rate, and rate of resolution of preliminary intermediation notifications.

The ANS uses the qualification program to promote quality, comparability and competition in the sector. The program reports the overall performance of HICs and thus increases transparency and allows the firms' beneficiaries to make informed choices of service provider (ANS, 2017a). According to [Pinheiro et al. \(2015\)](#), the issuance of the ANS provisions related to economic and financial factors has forced HICs to improve their management.

However, [Mensah et al. \(1994\)](#) suggest that, despite the regulatory supervision, managers in this industry conduct earnings management to achieve specific goals. [Greenwood et al. \(2017\)](#) provide econometric evidence that earnings management is used to avoid regulatory intervention when firm performance is just below or well above the intervention threshold.

Managers may use earnings management due to various incentives ([Dechow et al., 2010](#)), such as to hide administrative abnormalities, satisfy the indicators used by the ANS qualification program (e.g. net assets, liquidity, provision for events incurred but not reported, sufficient guarantee assets, own resources and financial availability), and to improve their IDSS ranking, which consumers can use when choosing their health insurance company. Thus, this study seeks to determine whether Brazilian HICs use earnings management to avoid reporting a low IDSM, particularly through discretionary accruals and operational decisions.

Several important Brazil-focused studies have examined this issue. For example, [Cardoso \(2005\)](#) verified the impact of health insurance regulation on incentives to choose accounting practices using data from 2001 to 2003. [Guimarães and Alves \(2009\)](#) tested a prediction model for estimating the probability of insolvency, and [Ferreira et al. \(2011\)](#) examined whether external audit minimizes the propensity to engage in earnings management. [Sancovschi et al. \(2014\)](#) examined the relationship between HICs' IDSS ranking and their likelihood of being subject to special regimes. [Pinheiro et al. \(2015\)](#) analyzed the dynamics of financing strategies, pointing to the need for more comprehensive analyses of HICs. [Bragança et al. \(2019\)](#) argued that more studies are necessary on HICs in Brazil and other countries, especially regarding their solvency and sustainability.

None of the abovementioned studies discussed performance indicators (e.g. IDEF, IDSM) or their relationship to earnings management. To address this lacuna, this study offers original empirical evidence drawn from Brazil of the association between earnings management and the ANS sustainability indicators, providing clear evidence that companies manage earnings in order to increase them, which impedes the agency's ability to perceive risks.

This study contributes to the literature on the supplementary health market in Brazil, which, according to the ANS, was worth approximately R\$179 billion and served approximately 24% of the Brazilian population. We seek to demonstrate the existence of earnings management in this sector by discussing the incentives for manipulating accounting information. The study highlights the risks to sector regulators and calls for improvements in the tools used to monitor HICs. It also seeks to help HIC users choose health insurance firms and to encourage regulators to improve their assessment of the economic and financial risks of HICs.

The study used data available on the ANS website based on yearly reports of registered HICs active from 2012 to 2018. The sample comprised data for all HICs that had sent complete information to the ANS during the study period. A total of 1,362 companies were included, providing 7,549 observations.

The next section presents theoretical background for the study. Then, we discuss the study's methodology. Next, we present our results. Finally, the study concludes with a critical assessment of the results.

2. Theoretical framework

The ANS regulations establish the conditions for ensuring the performance of private health agents such as HICs and meeting global criteria of economic and social sustainability in order to protect the public interest (Silva *et al.*, 2000; Pinheiro *et al.*, 2015). Cardoso (2005) claims that some markets feature only a small number of companies, and some services are monopolized. The author emphasizes that consumers lack access to complete information, creating significant information asymmetry regarding the firms' economic and financial situations. Cardoso (2005) also highlights the role of the state in minimizing market failure.

Campos and Camacho (2014) conducted market structure analyses and identified the existence of inefficiencies that generated a social cost and that called for public policies aimed at promoting efficiency and regulations aimed at preventing failures and universalizing products and services. Therefore, the Brazilian government created executive agencies in areas of social interest, such as sanitary control and supplementary health. According to Pinheiro *et al.* (2015), the supplementary health sector faces higher risk, since it is not possible to predict future expenses in the health services, even though the HIC is in a positive financial cycle due to the anticipated level of monthly fees.

The Instituto de Estudos de Saúde Suplementar (Institute for Supplementary Health Studies; IESS) monitors the functioning of supplementary health within a production chain (IESS, 2016). The process starts in the consumer industry and progresses through distributors, health care providers, and, finally, health insurance beneficiaries, who pay for their services through monthly fees. Three agencies regulate the supplementary health system in Brazil: the Agência Nacional de Vigilância Sanitária (National Agency of Sanitary Control; ANVISA), which is responsible for the sanitary and economic regulation of the hospital supplies market; the ANS, which regulates the financial and service dynamics among health insurance companies, beneficiaries, and service providers; and the Sistema Brasileiro de Defesa da Concorrência (Brazilian System for Competition Defense; SBDC), which aims to ensure competitiveness in the sector.

The ANS is a regulatory agency linked to the Ministry of Health. It has the authority to issue norms and is independent in its decision-making, administrative and financial processes. The ANS is responsible for regulating HICs (Cardoso, 2005). According to the IESS (2016), HICs are legal entities registered with the ANS that operate and commercialize private health care plans. They are classified into the medical/hospital and dental segments. Cardoso (2005) points out that some HICs may be subject to more than one regulatory body and scheme. Closed complementary pension entities, for example, have their main activity regulated by the national superintendence of complementary pensions. These entities have to meet the accounting standards established by the superintendence, along with those of the ANS.

As Salvatori and Ventura (2012) make clear, regulatory agencies perform executive, legislative and judiciary roles, since they oversee economic activities and rights, publish legal regulations (such as sectorial norms) and procedures, and impose sanctions on the players under their control. Among the legal powers granted to ANS in Law 9961/2000 are the following: proposing general policies and guidelines for regulating the sector; establishing standards, routines and procedures for recording, authorizing, maintaining and canceling the registration of the plans commercialized by HICs; issuing norms and standards for the presentation of the HICs' economic and financial information; and establishing parameters and indicators of quality for the health care coverage provided by the services rendered directly by HICs as well as services provided by third parties based on the commercial plans of HICs (ANS, 2017c).

Cardoso (2005) points out that the standardization of accounting practices allows comparability across HICs and highlights their economic and financial situations.

Accounting and financial information are necessary in order to form an understanding of a firm's economic and financial position, development, and trends (Assaf, 2010, p. 35), and other types of regulatory standardization helps consumers and other entities choose between HICs.

Brazil's qualification program for service providers began in 2004 and was redesigned in 2015 to improve services and bring them in line with the new rules and practices in the sector (ANS, 2017a). The evaluation carried out in the program is based on the IDSS, calculated using aggregated indicators in four dimensions: quality in health care, guarantee of access, sustainability in the market, and process and regulatory management. The IDSS bands range from 0 to 1, as shown in Figure 1.

The ANS claims that the qualification program evaluates improvements in HICs, stimulates competition and benefits the consumer. The ANS seeks to ensure that its dimension analysis is as close to the real-world situation as possible in order to improve the qualification program. The methodology used to evaluate the IDSS criteria thus changes as necessary. The dimension used to evaluate HICs' economic and financial stability and their capacity to fulfill their obligations has evolved, as shown in Box 1.

One issue regarding the sustainability indicator is that HICs may make discretionary accounting choices (about recognition and measurement), take operational decisions and/or select criteria for the presentation of financial statements (disclosure) within the limits of accounting standards designed to modify their reported earnings in order to influence the ANS' perceptions of the underlying economic facts.

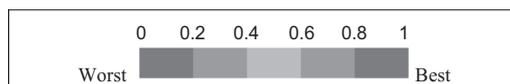
Earnings management occurs when managers use discretionary criteria to manipulate financial statements, which can mislead users about the firm's economic performance (Cardoso, 2005). Martinez and Cardoso (2009) described earnings management as accounting practices and decision-making designed to prepare and disclose accounting numbers different from those that would be prepared and disclosed if such practices were not adopted. For Healy and Wahlen (1999) "earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers" (p. 368).

Dong (2016) collected financial data from all US hospitals that had requested reimbursement from the federal government for treating Medicare patients and regressed discretionary accruals on hospital size, profitability, asset liquidity, operating efficiency, labor cost and ownership. The findings provided direct evidence of the use of discretionary accruals to manage financial earnings among US hospitals in this special public (or quasi-public) service sector.

Research on earnings management in Brazil has used methods based on statistical models, including discretionary accruals detection models such as the Jones and Modified Jones model, which Dechow *et al.* (1995) argue explain variations in accruals most accurately. Brazilian research has also adopted management decision-making models for operational decisions, income distribution, specific accruals, income smoothing and accruals of abnormal working capital.

Although regulation is generally perceived as a mechanism that limits opportunistic behavior, it can have the opposite effect. Regulations generally aim at enhancing management incentives to improve performance, but such incentives may create pressure to manage earnings (El-Diri, 2018). Firms may manage earnings in different ways under the pressure of regulation. Regulatory investigations or new regulatory projects can drive firms

Figure 1.
Bands of evaluation
grades



Source(s): Portal ANS

Box 1. Evolution of ANS measure of economic and financial dimensions of HICs

Year	Abbreviation	Indicators	Formulas
2012– 2014	IDEF	NAI – Net asset indicator	$NAI = (\text{Adjusted net asset})/(\text{Solvency margin})$
		CLI – Current liquidity indicator	$ILC = (\text{Current asset})/(\text{Current liability})$
		IPEINR – Indicator of provision for events incurred but not reported	IPEINR = (0 if the accounting of PEINR is insufficient in the 4th quarter; 1 if PEINR is sufficient in the 4th quarter)
		ISG – Indicator of sufficient guarantee assets	ISG = (0 if there is no sufficient guarantee; 1 if there are guarantee assets)
2015– 2019	IDSM	IOR – Indicator of own resources	$IOR = (\text{Adjusted net asset})/(\text{Solvency margin})$
		IFA – Indicator of financial availability	$IFA = (\text{Current assets})/(\text{Current liability})$
		IR – Inspection rate	$IR = (1.0 \times UDA^* + 0.5 \times UDN - A^{**} + 0.25 \times EVRA^{**} + 0.25 \times EVRN - A^{****}) / (2 \times \text{Average_Beneficiary}) \times 10,000$
		RR – Rate of resolution of preliminary intermediation notification	$RR = (\text{Total demand of preliminary intermediation notification (PIN), classified as: RVE, Inactive, Preliminary notification}) / (\text{Total of social classified PIN demands}) \times 100$

Note(s): * Total of the HIC's unresolved demands of preliminary intermediation notification (PIN) related to services in the period; ** Total of the HIC's unresolved demands of PIN non-related to services in the period; *** Total of the HIC's demands of PIN related to services classified as Effective Voluntary Reparation (EVR); **** Total of the HIC's demands of PIN non-related to services classified as EVR

Source(s): ANS website

to manage discretionary accruals downwards in order to demotivate regulators from issuing strict norms.

Therefore, the managers of HICs may have an incentive to avoid presenting indications of abnormality to avoid monitoring by the ANS. As it is the qualification program that evaluates the overall performance of HICs, users can refer to it when buying or changing plans; firms thus seek a high IDSS ranking. Accordingly, this study proposes the following:

Hypothesis 1. The managers of HICs use earnings management to avoid reporting a low sustainability performance indicator.

3. Methodology

This study performed hypothetical-deductive and quantitative analyses using secondary and longitudinal data. The main method used was an empirical and descriptive analysis of a sample composed of all HICs actively enrolled in the ANS. A probabilistic sample was selected covering 2012 to 2018.

The study examined HICs that, according to ANS data, conducted financial transactions totaling approximately 179 billion reals and served about 24% of the Brazilian population via private health care and dental (exclusive) plans in 2017. Since HICs send accounting and financial information to the ANS quarterly, the database was constructed using information from the fourth quarter of each year.

The study used several measures to detect earnings management: the Jones (1991) and Modified Jones model (Dechow *et al.*, 1995) was used to estimate discretionary accruals, and the model described by Roychowdhury (2006) was used to detect abnormal behavior in operational decisions. According to Dechow *et al.* (1995), standard errors tend to be lower for the Jones and Modified Jones models, in which they are more efficient in the time series. According to Magro *et al.* (2019), the Modified Jones Model has been the most widely used in both the international and national literature, though they recognized that other, more recent models may offer different perspectives.

The control variables were calculated and the performance indicators, IDSM (2015–2018) and IDEF (2012–2014), were compiled from all HICs with valid ANS registration. IDSM data for 2019 were not used because the ANS had not made them available at the time of the study. We excluded HICs that sent no lagged accounting information ($t-1$) to the ANS and those that presented negative net assets (NA). The full set of data adjustments are shown in Table 1.

Data on 1,362 health insurance companies were analyzed covering 2012 to 2018, for a total of 7,549 observations and an average of 5.54 observations per company, as seen in Panel A, Table 2. The distribution of observations per year was relatively homogeneous. Therefore, the inhomogeneous sample bias was controlled for (Ferreira *et al.*, 2012), as shown in Panel B, Table 2.

Table 1.
Data adjustments

Year	Observations	Exclusions		Adjusted Observations for earning management	Exclusions		Adjusted Final sample for IDSM/IDEF analysis
		Adjustment ($t-1$)	NA < 0		Without IDSM/IDEF		
2012	1,283	31	113	1,139	162	977	
2013	1,263	41	111	1,111	158	953	
2014	1,240	42	96	1,102	177	925	
2015	1,203	31	83	1,089	209	880	
2016	1,173	32	90	1,051	194	857	
2017	1,129	30	64	1,035	201	834	
2018	1,112	44	46	1,022	215	807	
<i>Total</i>	<i>8,403</i>	<i>251</i>	<i>603</i>	<i>7,549</i>	<i>1,316</i>	<i>6,233</i>	

Panel A: Sample

Number of HPCs studied	1,362
Total number of observations	7,549
Number of years studied	6
Average of observations per HPCs	5.54

Panel B: Sample per year

Year	Observations	%
2012	1,139	15
2013	1,111	15
2014	1,102	15
2015	1,089	14
2016	1,051	14
2017	1,035	14
2018	1,022	14
<i>Total</i>	<i>7,549</i>	<i>100</i>

Table 2.
Descriptive statistics of sample for earning management

3.1 Model for detecting earnings management

According to [Martinez \(2013\)](#), most Brazilian empirical studies use accrual-based detection models. As noted above, the study used the Jones and Modified Jones models to detect earnings management through discretionary accruals (DA), and the model described by Roychowdhury was used to detect abnormal behaviors in operational decisions due to its popularity and wide use in academic research ([Almeida, 2006](#); [Martinez, 2013](#); [El-Diri, 2018](#)). The [Fama and MacBeth \(1973\)](#) method was used in the regressions of the models to detect earnings management.

The ANS does not make HIC cash flow statements (CFSs) available, so total accruals (TA_{it}) were estimated based on their balance sheets ([Dechow *et al.*, 1995](#); [Martinez, 2013](#); [Heese, 2018](#)) using [Equation \(1\)](#):

$$TA_{it} = [(\Delta CA_{it} - \Delta Cash_{it}) - (\Delta CL_{it} - \Delta STD_{it}) - Dep_{it}] / A_{it-1} \quad (1)$$

where ΔCA_{it} is the change in the current assets of firm I at the end of period $t-1$ to the end of period t ; $\Delta Cash_{it}$ is the change in the cash availability of firm I at the end of period $t-1$ to the end of period t ; ΔCL_{it} is the change in the current liabilities of firm I at the end of period $t-1$ to the end of period t ; ΔSTD_{it} is the change in short-term debt of firm I at the end of period $t-1$ to the end of period t ; Dep_{it} is the depreciation and amortization expense of firm I during period t , and A_{it-1} are the total assets of firm I in year $t-1$.

The coefficients α_i , β_{1i} , and β_{2i} of [Equation \(3\)](#) are estimated via the regression of [Equation \(2\)](#), and the discretionary accruals of the Jones model are predicted by ε_{it} :

$$TA_{it} / A_{it-1} = \alpha_i [1 / A_{it-1}] + \beta_{1i} [\Delta REV_{it}] + \beta_{2i} [PPE_{it}] + \varepsilon_{it} \quad (2)$$

To calculate non-discretionary accruals using the Modified Jones model, we use the coefficients and the variables of [Equation \(3\)](#):

$$NDA_{it} = \alpha_i [1 / A_{it-1}] + \beta_{1i} [\Delta REV_{it} - \Delta REC_{it}] + \beta_{2i} [PPE_{it}] \quad (3)$$

where NDA_{it} are the non-discretionary accruals of firm I in year t ; A_{it-1} are the total assets of firm I in year $t-1$; ΔREV_{it} is the change in gross revenue of firm I between years t and $t-1$, weighted by the total assets at the end of period $t-1$; ΔREC_{it} is the change in accounts receivable for firm I between years t and $t-1$, weighted by total assets at the end of period $t-1$; and PPE_{it} are the property, plant, and equipment of firm I in year $t-1$, weighted by total assets at the end of period $t-1$.

As [Dechow *et al.* \(1995\)](#) point out, discretionary accruals (DA) are estimated by subtracting nondiscretionary accruals (NDA) from total accruals (TA), as in [Equation \(4\)](#). [Paulo \(2007\)](#) points out that, with the inclusion of the variable ΔREC_{it} in the Modified Jones model, discretionary accruals are no longer found by the residuals of [Equation \(2\)](#):

$$DA = TA - NDA \quad (4)$$

Real earnings management (REM) was calculated using the model proposed by [Roychowdhury \(2006\)](#), as shown in [Equations \(5\) and \(6\)](#). According to [Paulo and Mota \(2019\)](#), this model measures the normal activity levels of a company in order to predict abnormal behaviors via the residue; the result is obtained by summing the behaviors, as in [Equation \(7\)](#). No estimation of FCS behavior was attempted because the net effect is ambiguous, as it is affected in different directions ([Zang, 2012](#); [Paulo and Mota, 2019](#)):

$$\begin{aligned} Prod_t / A_{t-1} &= \alpha_0 + \alpha_1 [1 / A_{t-1}] + \beta_1 [REV_t / A_{t-1}] + \beta_2 [\Delta REV_t / A_{t-1}] \\ &+ \beta_3 [\Delta REV_{t-1} / A_{t-1}] + \varepsilon_{it} \end{aligned} \quad (5)$$

$$Desp_t / A_{t-1} = \alpha_0 + \alpha_1 [1 / A_{t-1}] + \beta_1 [REV_t / A_{t-1}] + \varepsilon_{it} \quad (6)$$

$$REM_{it} = Ab_Prod_{it} + (-1 * Ab_Desp_{it}) \tag{7}$$

where $Prod_t$ is the production costs of firm I in year t , weighted by the total assets at the end of period $t-1$; $Desp_t$ is the operating expenses of firm I in year t , weighted by the total assets at the end of period $t-1$; REV_t is the net revenues of firm I in year t , weighted by the total assets at the end of period $t-1$; ΔREV_t is the change in net revenues of firm I in year t for period $t-1$, weighted by the total assets at the end of period $t-1$; ΔREV_{t-1} is the change in net revenues of firm I in year $t-1$ for period $t-2$, weighted by the total assets at the end of period $t-1$; Ab_Prod_{it} is the abnormal behavior for production costs of firm I in year t , and Ab_Desp_{it} is the abnormal behavior for operating expenses of firm I in year t ;

3.2 Proposed model

The measurements expressed in Equations (8–9) verify whether the performance (IDSMS and IDEF) of HICs is related to the DA:

$$HIC\ performance_{it} = \alpha + \beta_1 DA_{it} + \beta_2 d_IDSMS_{it} + Controls\Gamma_{it} + \epsilon_{it} \tag{8}$$

$$HIC\ performance_{it} = \alpha + \beta_1 DACC_{it} + \beta_2 d_IDSMS_{it} + Controls\Gamma_{it} + \epsilon_{it} \tag{9}$$

$$HIC\ performance_{it} = \alpha + \beta_1 REM_{it} + \beta_2 d_IDSMS_{it} + Controls\Gamma_{it} + \epsilon_{it} \tag{10}$$

where $HIC\ performance_{it}$ represents IDSMS and IDEF); DA_{it} denotes discretionary accruals in the Jones model for firm I in year t ; $DACC_{it}$ denotes discretionary accruals in the Modified Jones model for firm I in year t ; and REM_{it} is the abnormal behaviors of operational decisions of firm I in year t . The control variables are as follows: $SIZE_{it}$ is the natural logarithm of Total Asset of firm I in year t ; LEV_{it} is the degree of financial leverage of firm I in year t ; ROA_{it} is the return on assets of firm I in year t ; $INDEBT_{it}$ is the Indebtedness of firm I in year t ; and ϵ_i is the regression residue for firm I in year t .

The control variables are firm size, degree of total leverage, asset return and indebtedness calculated as shown in Box 2.

The study used firm size (SIZE), expressed as the natural log of total assets, because HIC performance may be partly explained by its size. Dechow and Dichev (2002) also used the logarithm of total assets as a measure of firm size. Barnett and Salomon (2012) used financial leverage (LEV) as a control proxy in their performance analysis, as debt increases the volatility of future earnings. Return on assets (ROA) was used as a measure of performance because they represent future economic benefits (Joia and Nakao, 2014). Kothari et al. (2005) found that tests that used return on assets as a measure of performance were well-specified and had substantial power. Indebtedness (INDEBT) was adopted as a variable following

Box 2. Control variables			
Variable	Abbreviation	Formulas	References
Firm size	SIZE	Natural log of total assets	Dechow and Dichev (2002)
Financial leverage	LEV	Total liabilities/Total assets	Barnett and Salomon (2012)
Return on assets	ROA	Edit/Total assets	Kothari et al. (2005), Joia and Nakao (2014)
Indebtedness	INDEBT	Onerous liability/Total assets	Watts and Zimmerman (1990) Joia and Nakao (2014)

Watts and Zimmerman's (1990) finding that managers of companies with higher indebtedness tended to use methods that allowed them to show increasing results and Barnett and Salomon's (2012) finding that debt affected the behavior of managers.

4. Analysis of results

This section presents a data description and analysis of the Jones and Modified Jones models, the model described by Roychowdhury, and the proposed regression model.

4.1 Jones, Modified Jones and Roychowdhury models

Table 3 presents the descriptive statistics of the variables used in our Jones, Modified Jones and Roychowdhury models. Panel A describes the variables used for the accruals earnings management calculation, and Panel B describes the variables used for the real earnings management calculation. Total accruals (TA_{it}) had an average of -0.0291 , with a SD of -0.0276 . $Prod_{it}$ and $Desp_{it}$ had averages of 1.4796 and 1.1255, respectively, indicating that, on average, both act in favor of a positive REM signal (Paulo and Mota, 2019).

The variables shown in Table 3 did not follow a normal distribution, at a significance level of 0.01, in Jarque–Bera and Kolmogorov–Smirnov tests. Hoffmann (2016, p. 47) states that, based on the central limit theorem, a large number of independent random variables have approximately normal distributions when none of them is dominant; thus, the estimates of the ordinary least squares (OLS) method satisfy the asymptotic normality.

Paulo (2007) states that estimates of the coefficients used to calculate discretionary accruals through time series require an expanded data-gathering period. Therefore, the regression performed to estimate the coefficients of the Modified Jones model used the cross-sectional approach via the Fama and MacBeth (1973) method.

4.2 Results of proposed model in terms of performance

Table 4 presents the descriptive statistics of the variables in the regression model used to capture the effect of earnings management in HIC performance. The variables did not follow a normal distribution at the 0.01 significance level in Jarque–Bera and Kolmogorov–Smirnov tests.

Variables	Mean	Median	SD	Minimum	Maximum
Panel A: Variables for accruals earnings management calculation					
TA_{it}	-0.0291	-0.0276	1.3473	-26.8898	97.6802
$1/A_{it-1}$	2.32E-06	1.19E-07	7.00E-06	9.39E-10	5.13E-05
ΔREV_{it}	0.6785	0.1839	6.9852	-9.1695	408.2076
ΔREC_{it}	0.0590	0.0006	1.3224	-0.9531	98.4902
PPE_{it}	0.1928	0.1148	0.2068	0.0000	0.9998
Panel B: Variables for real earnings management calculation					
Ab_Prod _{it}	1.4796	1.1817	5.3153	0.0000	352.1589
Ab_Desp _{it}	1.1255	0.7083	2.0622	-0.0016	62.4721
$1/A_{it-1}$	2.32E-06	1.19E-07	7.00E-06	9.39E-10	5.13E-05
REV_{it}/A_{it-1}	2.7188	2.1323	7.0366	-0.0060	408.2076
REV_{it-1}/A_{it-2}	2.0403	1.8888	1.3737	-0.0027	20.5024
$\Delta REV_{it}/A_{it-1}$	0.6785	0.1839	6.9852	-9.1695	408.2076
$\Delta REV_{it-1}/A_{it-1}$	0.2293	0.1822	0.9121	-20.3082	13.7827

Note(s): The variables do not follow the normal distribution in the Jarque-Bera and Kolmogorov–Smirnov tests

Table 3.
Descriptive statistics

Table 4.

Descriptive statistics – Proposed regression model

Variables	Mean	Median	SD	Minimum	Maximum
IDS _{M_{it}}	0.8323	0.8907	0.1887	0.0000	1.0000
IDEF _{it}	0.7172	0.8296	0.2895	0.0000	1.0000
DA _{it}	-0.0291	-0.0574	0.2572	-0.3399	14.6767
DACC _{it}	-0.0587	-0.0348	1.3570	-27.0438	95.2814
REM _{it}	0.3412	0.3079	4.6350	-8.5985	295.4753
LEV _{it}	0.5244	0.5671	0.2971	-5.1109	0.9995
ROA _{it}	0.0273	0.0193	0.4760	-10.8802	10.0939
SIZE _{it}	15.7553	16.1261	2.3881	9.8784	20.7863
INDEB _{it}	0.0453	0.0000	0.0998	0.0000	1.3226

Note(s): ¹The variables do not follow the normal distribution in the Jarque-Bera and Kolmogorov–Smirnov tests. ²HIC performance is presented via IDS_M (2015–2018) and IDEF (2012–2014) indices. ³IDS_M data for the 2019 base year were not included because the ANS did not make them available during the study period

The graphical representation in Figure 2 shows that, on average, the smaller the band of the HIC performance (i.e. the worse the indicator), the greater the discretionary accruals (DA), indicating that discretionary accruals are managed to avoid reporting poor indicators (Greenwood *et al.*, 2017). The data used to calculate the mean of the DA values were in module form.

We conducted Student’s *t*-test, a parametric test, and a non-parametric Kruskal–Wallis test to verify if the means of the discretionary accruals by band were significantly different. The parametric test was performed with the 1st and 5th bands, and the non-parametric test was performed with all the ranges. Both tests showed evidence of significant mean differences in the discretionary accruals.

The greatest level of earnings management appeared in the 1st band (worst indicator); the level reduced gradually in the 2nd, 3rd, 4th and 5th bands (with the least earnings management seen in the 5th, the best indicator). These results are consistent with the hypothesis that HICs with the worst performance indicators tend to use earnings management more aggressively and frequently.

Table 5 presents the results of the proposed regression model used to capture the effect of earnings management in HIC performance.

The parameters generated by the regression of Equations (8–9) are shown in Table 5. In both models, statistical significance at the 0.01 level was found in DA_{it}, REM_{it}, IDS_{M_{it}}, LEV_{it},

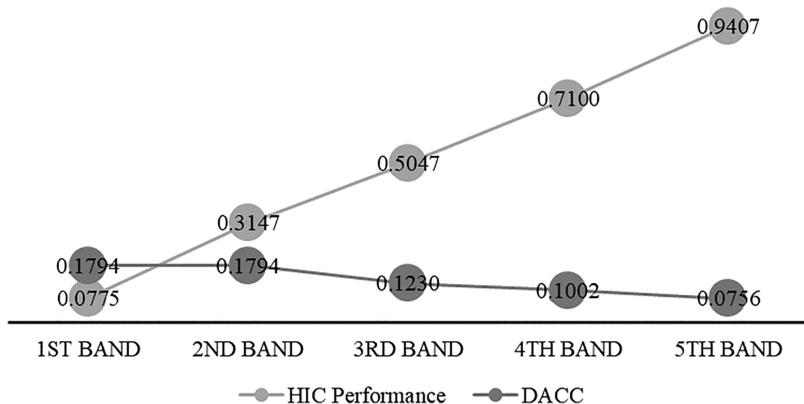


Figure 2. Comparison of HIC performance and DACC per qualification band

Table 5.
Coefficients – Proposed regression model for HIC performance

Variables	Jones model	Modified Jones model	Roychowdhury model ²
DA _{it}	-0.0615*** (0.0203)		
DACC _{it}		0.0126* (0.0072)	
REM _{it}			-0.0037*** (0.0008)
d_IDS _{Mit}	0.0447*** (0.0085)	0.0452*** (0.0085)	0.0425*** (0.0086)
LEV _{it}	-0.2283*** (0.0340)	-0.2266*** (0.0344)	-0.2308*** (0.0350)
ROA _{it}	0.0570** (0.0224)	0.0552** (0.0223)	0.0545** (0.0226)
SIZE _{it}	0.0877*** (0.0140)	0.0873*** (0.0140)	0.0925*** (0.0142)
INDEBT _{it}	-0.3188*** (0.0667)	-0.3200*** (0.0669)	-0.3212*** (0.0677)
Constant	-0.5220** (0.2249)	-0.5136** (0.2244)	-0.5933** (0.2292)
Observations	6,233	6,233	6,170
R ²	0.123	0.122	0.124
AIC	-4987.7003	-4977.0206	-4969.7878

Note(s): ¹* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. ²Proposed by Paulo and Mota (2019)

SIZE_{it} and INDEBT_{it}; statistical significance at the 0.05 level was found in ROA_{it}; and statistical significance at the 0.10 level was found in DACC_{it}.

As the Chow, Breusch–Pagan and Hausman tests were used to define the model, the fixed effects for the regression model of Equations (8–9) were thus most appropriate. The Wooldridge test detected the existence of serial autocorrelation, and the Wald test detected the existence of heteroscedasticity. The variables of the proposed regression model did not follow a normal distribution, at a significance level of 0.01, in the Jarque–Bera and Kolmogorov–Smirnov tests.

The study corrected for serial autocorrelation and heteroscedasticity using the robust estimation method in the adjusted fixed effects model, as shown in Table 6. Normality assumptions were relaxed in the inferences of the model parameters, since the coefficients were asymptotically consistent and not biased, even in the presence of serial autocorrelation and heteroscedasticity (Formigoni *et al.*, 2009; Ferreira *et al.*, 2012).

The results indicate, with strong statistical support, that an increase in discretionary accruals leads to an increase in HIC performance. These findings corroborate the hypothesis that earnings management is used to increase these indicators and thus improve perceptions of the economic and financial vitality of HICs among regulators and users. The positive and significant coefficient provides evidence that increased earnings management leads to increased HIC performance. Thus, earnings management is used to increase the key indicators, reducing the possibility of more rigorous ANS supervision.

Table 6.
Proposed coefficients regression model for HIC performance – adjusted fixed effects per DA module

Variables	Jones model	Modified Jones model	Roychowdhury model ²
DA _{it}	-0.0599*** (0.0211)		
DACC _{it}		-0.0156** (0.0077)	
REM _{it}			-0.0035*** (0.0007)
d_IDS _{Mit}	0.0448*** (0.0085)	0.0447*** (0.0086)	0.0429*** (0.0086)
LEV _{it}	-0.2291*** (0.0341)	-0.2277*** (0.0342)	-0.2301*** (0.0352)
ROA _{it}	0.0560** (0.0223)	0.0552** (0.0223)	0.0532** (0.0224)
SIZE _{it}	0.0880*** (0.0140)	0.0881*** (0.0140)	0.0915*** (0.0142)
INDEBT _{it}	-0.3191*** (0.0667)	-0.3173*** (0.0667)	-0.3209*** (0.0679)
Constant	-0.5201** (0.2248)	-0.5246** (0.2249)	-0.5768** (0.2286)
Observations	6,233	6,233	6,170
R ²	0.123	0.122	0.124
AIC	-4985.8862	-4979.5060	-4968.2537

Note(s): ¹* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. ²Proposed by Paulo and Mota (2019)

We verified the robustness of our conclusions using the proposed regression model, which included DA_{it} in the module (see Table 6). This test examined two earnings management scenarios: income-increasing and income-decreasing. A higher DA_{it} in the module represents more intense earnings management, while a lower (i.e. near zero) DA_{it} reflects less intense earnings management.

The coefficients of DA_{it} , $DACC_{it}$ and REM_{it} estimated in the regression were negative and significant. This result corroborates the finding that more intense earning management is associated with lower HIC performance. Thus, earnings management is more pronounced in HICs with lower HIC performance scores. These statistical findings offer sufficient evidence that HIC managers engage in earnings management through discretionary accruals and operational decisions to avoid reporting low sustainability indicators, with the practice more pronounced in companies showing lower HIC performance.

Table 7 presents the results for the performance indicators in the IDEF (2012–2014) and IDSM (2015–2018) periods. Evidence of earnings management is seen in both periods, via both accruals and operational decisions in order to improve HICs' scores.

5. Final considerations

This study aimed to empirically determine whether there is statistical evidence that HICs use earnings management to avoid reporting a low IDSM. The proposed regression model sought to capture whether HIC performance was significantly impacted by the use of earnings management through discretionary accruals and operational decisions. To ensure robustness, we used control variables employed in previous studies and static models.

Earnings management has negative consequences for financial reporting because it masks the consequences of management decisions. Earnings management manipulates accounting to meet a certain target. This may be motivated by a need to maintain certain economic and financial indicator levels due to the pressure to show an increasing trend or financial vitality, or to achieve goals set by regulators.

This study's data suggest that Brazilian HICs use earnings management through discretionary accruals and operational decisions to avoid reporting a low performance. The performance measured by IDSM is part of the calculation of the IDSS, an evaluation method adopted in the HIC qualification program of the ANS.

The ANS has established a recovery plan for HICs with very low IDSM and IDEF values. Such values may create serious administrative abnormalities, such as practices that lead to service denial or interruption on collective, recurrent and non-point-in-time levels, thus causing serious assistive, actuarial, structural or operational failures that carry a risk to the quality and continuity of health care, as pointed out by RN 256/2011 of the ANS (ANS, 2017d). According to the ANS, the *risco assistencial* (service risk) consists of administrative and service abnormalities (ANS, 2017b).

The ANS performance indicators (IDEF and IDSM) are not effective at limiting opportunistic behavior. To the contrary, HICs with low indicators have an incentive to manipulate earnings. Regulations, in their quest to monitor performance, create management incentives to manage earnings (El-Diri, 2018). Firms may manage earnings in different ways under the pressure of regulation, such as by misrepresenting income increases or decreases.

The effective monitoring of the economic and financial dimensions of HICs is crucial for the maintenance of contracts signed in accordance with legislation. The fact that HICs may use earnings management introduces additional risk to the system, which must be diagnosed and treated to avoid negative repercussions for users.

As Macadar *et al.* (2015) point out, Brazil, as an evolving democracy, has followed global trends and allowed the expansion of mechanisms of social control and the exercise of citizenship through transparency. Platt *et al.* (2007) argue that three elements are

Variables	IDEF (2012–2014)		Roychowdhury model ²		Jones model		IDSM (2015–2018)		Roychowdhury model ²	
	Jones model	Modified Jones model	Roychowdhury model ²	Jones model	Modified Jones model	Roychowdhury model ²	Jones model	Modified Jones model	Roychowdhury model ²	
DA _{<i>it</i>}	-0.0886*** (0.0237)	-0.0483*** (0.0090)		-0.0718** (0.0330)						
DACC _{<i>it</i>}			-0.0066*** (0.0014)							
REM _{<i>it</i>}			-0.2848*** (0.0205)							
LEV _{<i>it</i>}	-0.2755*** (0.0203)	-0.2737*** (0.0202)	0.1461*** (0.0149)	-0.2693*** (0.0149)	-0.2630*** (0.0149)					-0.0269*** (0.0025)
ROA _{<i>it</i>}	0.1459*** (0.0144)	0.1447*** (0.0143)	0.0198*** (0.0024)	0.0385*** (0.0081)	0.0377*** (0.0081)					-0.2603*** (0.0148)
SIZE _{<i>it</i>}	0.0203*** (0.0024)	0.0194*** (0.0024)	0.0198*** (0.0024)	0.0124*** (0.0014)	0.0115*** (0.0014)					0.0358*** (0.0081)
INDEBT _{<i>it</i>}	-0.3967*** (0.0491)	-0.3926*** (0.0490)	-0.3910*** (0.0492)	-0.0799** (0.0388)	-0.0822** (0.0386)					0.0094*** (0.0014)
Constant	0.5722*** (0.0361)	0.5855*** (0.0362)	0.5845*** (0.0363)	0.7762*** (0.0227)	0.7883*** (0.0226)					-0.0904** (0.0384)
Observations	2,855	2,855	2,821	3,378	3,378					0.8322*** (0.0229)
R ²	0.135	0.140	0.140	0.114	0.120					3,349
AIC	614.5280	599.6681	579.0325	-2081.1838	-2103.2181					0.143

Note(s): ¹ $p < 0.1$, ^{**} $p < 0.05$, ^{***} $p < 0.01$. ² Proposed by Paulo and Mota (2019)

Table 7. Coefficients – proposed regression model for HIC performance – adjusted fixed effects per DA module by period

required to ensure this transparency: (1) publicity and the wide public dissemination of information; (2) comprehensibility, via the visual presentation of information; and (3) usefulness for decision-making (i.e. relevance). Thus, transparent and reliable financial and economic information about HICs is crucial to ensure the efficient operation of the system.

Future research should conduct a more detailed analysis of the service risk faced by the ANS by investigating other evaluation dimensions of HICs and examining how these correlate to the companies' economic and financial characteristics. Such studies should determine whether HICs are using earnings management to avoid the revelation of serious administrative abnormalities and mask serious problems with the operation and sustainability of the plans they are offering.

This study may be limited due to its use of the Modified Jones Model. Though it is very common in the literature, it can create serious measurement errors in the computation of discretionary accruals, and it is not ideal for companies with profiles similar to those of HICs.

Healthcare is a serious issue, and it has no room for pretenses, falsehoods, or commercial interests. It is thus crucial that regulators improve the mechanisms that monitor the financial health of HICs in order to combat the use of earnings management to artificially increase indicators and hide risks from regulators and users. Proactive regulatory and monitoring instruments are required to preserve the interests of the millions of people who depend on the support of HIC plans when they are at their most vulnerable.

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