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Financial performance and the decisions to establish special regimes in the Brazilian supplementary health sector

Desempenho econômico-financeiro e as decisões de instauração de regimes especiais no setor de saúde suplementar brasileiro

Desempeño económico-financiero y decisiones para establecer regímenes especiales en el sector complementario de salud brasileño

Tatiele Alves Reis*
Mestre em Ciências Contábeis (UFRJ)
Professora Substituta do Departamento de Ciências Contábeis e Finanças (UFRRJ), Seropédica/RJ, Brasil
tatiele.reis@hotmail.com
https://orcid.org/0000-0003-3384-8182

Marcelo Alvaro da Silva Macedo
Doutor em Engenharia de Produção (UFRJ)
Professor do Programa de Pós-Graduação em Ciências Contábeis (UFRJ), Rio de Janeiro/RJ, Brasil
malvaro.facc.ufrj@gmail.com
http://orcid.org/0000-0003-2071-8661

José Augusto Veiga da Costa Marques
Pós-Doutor em Controladoria e Contabilidade na Universidade de São Paulo (USP)
Professor do Programa de Pós-Graduação em Ciências Contábeis (UFRJ), Rio de Janeiro/RJ, Brasil
joselaura@uol.com.br
https://orcid.org/0000-0002-8673-961X

Primary contact address for correspondence *
BR-465, Km 7 - ICSA/UFRRJ – Seropédica, CEP. 23.897-000 – Seropédica/RJ, Brasil

Abstract
This research analyzes financial ratios that explain the Brazilian National Supplementary Health Agency's (ANS) decision to intervene in private health plan operators' administration based on interventions that occurred from 2017 to 2019. Logistic regression was used with a sample of 154 operators. After factor analysis, the following independent variables were established: three factors (profitability, liquidity, expenses) and four indicators (EBITDA margin, indebtedness, medical expenses, and financial cycle). The logistic regression used a resampling process at t-1 and t-2. Variables related to the ANS intervention by introducing special regimes were: the factor liquidity and the indicators indebtedness and financial cycle (the latter presented a weak relation). The results show that the health plan operators' financial condition, particularly regarding liquidity and indebtedness, is relevant to the ANS's decision to introduce fiscal and technical special regimes. These findings can contribute to better management of private health operators, offering evidence of the importance of controlling these financial aspects.
Keywords: Financial ratios; Health plan operators; Special regimes

Resumo
Este estudo teve como objetivo analisar quais indicadores econômico-financeiros são capazes de explicar a decisão da ANS de instaurar regimes especiais nas operadoras, considerando as instaurações de regimes especiais ocorridas de 2017 a 2019. Foi utilizada a regressão logística com uma amostra de 154 operadoras. Após a análise fatorial, foi estabelecido como variáveis independentes: três fatores (rentabilidade, liquidez, despesas) e quatro indicadores (margem EBITDA, endividamento, despesa médica e ciclo financeiro). A regressão logística utilizou o processo de reamostragem em t-1 e t-2. As variáveis relacionadas com a instauração de regimes especiais foram: o fator liquidez e os indicadores endividamento e ciclo financeiro; o último relacionado de forma mais fraca. Concluiu-se que a situação econômico-financeira é relevante na determinação dos regimes especiais de direção fiscal e técnica, principalmente a liquidez e o endividamento. Espera-se que este resultado contribua para uma melhor gestão das operadoras, a partir do controle desses aspectos financeiros.
Palavras-Chave: Indicadores financeiros; Operadoras de planos de saúde; Regimes especiais

Resumen
Este estudio tuvo como objetivo analizar qué índices financieros son capaces de explicar la decisión de la ANS de establecer regímenes especiales en los operadores, considerando el establecimiento de regímenes especiales ocurridos de 2017 a 2019. Se utilizó regresión logística con una muestra de 154 operadores. Después del análisis de factores, se estableció como variables independientes: tres factores (rentabilidad, liquidez y gastos) y cuatro indicadores (margen EBITDA, endeudamiento, gastos médicos y ciclo financiero). La regresión logística utilizó el proceso de remuestreo en t-1 y t-2. Las variables relacionadas con el establecimiento de regímenes especiales fueron: el factor de liquidez y los indicadores de deuda y ciclo financiero; este último débilmente relacionado. Se concluyó que la situación financiera es pertinente en la determinación de regímenes especiales (fiscal y técnica), especialmente la liquidez y el endeudamiento. Se espera que este resultado contribuya a una mejor gestión de los operadores, desde el control de estos aspectos financieros.
Palabras clave: Indicadores financieros; Operadores de planes de salud; Regímenes especiales

1 Introduction

The supplementary health sector is proven to be relevant in Brazil, both for society and the economy. Studies released by the National Supplementary Health Federation (Fenasaúde) show that the supplementary health market employed approximately 8.1% of the Brazilian workforce in July 2018 (Fenasaúde, 2018) and generated BRL 200 billion in 2018 (approximately 3% of the national GDP) (Fenasaúde, 2019). According to the National Supplementary Health Agency (ANS) (data retrieved from the website www.ans.gov.br on March 19, 2021), in January 2021, the sector had 1,184 active private health plan operators, considering all modalities. In December 2020, it had 47.6 million beneficiaries in health care plans with or without dentistry and 27 million exclusively in dental plans.

Financial ratios are used to assess a company's ability to pay its debts, achieve commercial and managerial success, and even the statutory regulation of its performance (Barnes, 1987). Several studies use financial ratios to predict organizations' insolvency, among them the classic research works by Beaver (1966) and Altman (1968), and the recent studies by Guimarães and Alves (2009), Zhen-Jia-Liu (2014), and Scalzer, Rodrigues, and Macedo (2015).

Nogueira (2004) stresses that the continuous provision of health care services depends on the health operators' financial situation, particularly their solvency. Therefore, solvency is a *conditio sine qua non* for the adequate operation of the supplementary health sector.

The Brazilian legislation – Law 9656 (1998) and Law 9961 (2000) – has pointed out the relevance of maintaining the health plan operators' financial balance and established measures such as the ANS intervention by introducing special administration regimes. The ANS periodically analyzes operators to verify the financial balance and quality of health care services. Once an abnormality is identified (assistance, financial, or administrative), the agency may request a plan with the necessary measures to solve the problem. If the operator does not comply with the corrective measures, they may be subjected to three special regimes: technical management, fiscal management, or extrajudicial liquidation. Therefore, special regimes are interventions carried out by the ANS in the face of a severe abnormality that puts at risk the assistance provided to users and the continuity or the quality of health care – as provided by Normative Resolutions 316 (ANS, 2012a) and 417 (ANS, 2016b).

Previous studies such as Jesus, Queiroz, Macedo, Cruz, and Sauerbronn (2019) and Guzella and Rodrigues (2015) showed that financial ratios could predict operational performance. Although performance analysis involving financial and non-financial ratios is common in the literature, the study by Sancovschi, Macedo, and Silva (2014) observed that the financial ratios of health plan operators are the most influential in the ANS's decision to submit them to special regimes.

The regulation of the supplementary health market is crucial, considering its complexity and social and economic relevance. Regulation must include monitoring the health plan operators' economic and financial situation since financial vulnerability poses a risk to the provision of health services and the country's economy.

Therefore, the research question guiding this study is: What financial ratios can explain the ANS decision to introduce special regimes for health plan operators? This question is based on the relevance of financial ratios to analyze the supplementary health sector and considers the potential relationship between low financial performance and the introduction of special regimes.

This research examines financial ratios that explain the ANS decision to submit health plan operators to special regimes, considering economic and financial indicators from 2015 to 2019 and the introduction of special regimes that occurred from 2017 to 2019.

The study increases knowledge on performance analysis, particularly on health plan operators' financial management performance. Identifying financial ratios that explain the ANS's decision to submit operators to special regimes may help these organizations be aware of the indicators presenting poor performance, establish priorities, and avoid severe abnormalities.

2 Theoretic Framework

This section is divided into four subsections: organizational performance analysis, analysis of financial performance in the supplementary health sector, studies analyzing financial performance in the supplementary health sector, and research hypothesis. The studies reviewed were collected from Capes and Google Scholar databases, using the terms "*desempenho organizacional*" (organizational performance), "*indicadores financeiros*" (financial ratios), "*saúde suplementar*" (supplementary health), "*regimes especiais*" (special regimes), and "*operadoras de planos de saúde*" (health plan operators). The norms applied to the sector were collected from the ANS website (www.ans.gov.br).

2.1 Organizational performance analysis

According to Barnes (1987), financial ratios are used to assess a company's ability to pay its debts, achieve commercial and managerial success, and even the statutory regulation of its performance. The author demonstrates that financial ratios are often used in statistical models to predict corporate failures, credit rating, risk assessment, and to test economic hypotheses.

For Altman (1968), the most important financial ratios are those that measure profitability, liquidity, and solvency. Based on these ratios, financial statements are transformed into easily visualized information, allowing to make decisions on granting credit, administrative assertiveness, solvency, profitability, efficiency, and organization's continuity (Matarazzo, 2010).

However, authors such as Kaplan and Norton (1992) and Bhimani and Langfield-Smith (2007) emphasize that financial ratios must be accompanied by non-financial ratios to carry out performance evaluations that consider operational aspects. Bhimani and Langfield-Smith (2007) claim that non-financial information is necessary to capture the relevance of strategic decisions. In this sense, Kaplan and Norton (1992) developed the balanced scorecard (BSC) – a tool that assesses the company from four different perspectives: customer, internal, innovation and learning, and the financial perspective.

2.2 Analysis of financial performance in the supplementary health sector

Law 9.961 (2000) states that the Brazilian National Supplementary Health Agency (ANS) aims to promote the defense of the public interest through the regulation of health plan operators in the supplementary health sector, thus contributing to the development of health actions in the country. Among the ANS's duties, this research emphasizes monitoring financial ratios and the ANS's interventions when operators present severe managerial abnormalities.

According to Soares, Thóphilo, and Corrar (2009), among the measures adopted by the ANS's Directorate of Standards and Qualification of Operators (DIOPE) are the institution of the Standard Chart of Accounts (PCP) and the reporting of quarterly accounting information to the agency through of the Periodic Information Document (DIOPS). This instrument is the ANS tool to monitor and control the health plan operators' financial situation.

From the perspective of the performance indicators mentioned in the legislation the creation of the Operator Qualification Program in 2004 stands out, which underwent restructuring in 2015. In this program, the operators' performance is evaluated and expressed through the Supplementary Health Performance Index (IDSS) (retrieved on March 29, 2019, from www.ans.gov.br).

The calculation of the IDSS is based on indicators defined by the ANS and constantly evaluated to improve the Operator Qualification Program. The current IDSS dimensions are: health care quality, the guarantee of access, sustainability in the market, and process management and regulation (ANS, 2015). According to Oliveira and Kornis (2017), these new dimensions are the result of alignment with the ANS guidelines, the regulatory agenda, and literature on quality health.

In the IDSS, the financial ratios are included in the dimension *sustainability in the market*. The dimension concerns the operators' economic and financial balance, assessing their ability to keep up financial obligations with their providers, offering continuous quality services to their beneficiaries (ANS, 2017b).

As provided for in Normative Resolution (RN) 400/2016, the ANS carries out individual technical analysis of financial monitoring through the Technical Note on Economic-Financial Monitoring (NTAEF) in health plan operators that fail to meet the risk and relevance criteria established (ANS, 2016a). This analysis is conducted based on the DIOPS and other documents that are part of the operators' financial statements and independent audit reports.

Regarding the operators' performance analysis, the ANS conducts evaluations based on financial and non-financial indicators. The IDSS offers a mix of financial and non-financial indicators, while other assessment instruments exclusively adopt financial ratios to monitor the operators' performance.

When an operator presents an abnormality, the ANS requests an Assistance Recovery Plan (PRASS) (ANS, 2016b). In case of financial abnormalities, the operator must adopt the Economic-Financial Adequacy Procedures (PAEF) and is required to elaborate the Economic-Financial Adequacy Plan (PLAEF)

or adhere to the Term of Assumption of Economic-Financial Obligations (TAOEF), depending on the risk and relevance criteria, as noted in the NTAEF (ANS, 2012b). If the operator does not comply with the plans' corrective measures, they may be submitted to one of three types of special regimes: technical management, fiscal management, or extrajudicial liquidation, as provided by RN 316 (ANS, 2012a) and RN 417 (ANS, 2016b). The special regime of technical management is introduced when severe administrative abnormalities related to assistance are identified, putting at risk the care provided to the health plan operator's beneficiaries (ANS, 2016b). The special regime of fiscal management is introduced when one or more severe economic-financial or administrative abnormalities threatens the continuity or the quality of the health care (ANS, 2012a).

The special regime of extrajudicial liquidation is introduced in at least one of the following situations: signs of irregular dissolution; failing to overcome serious economic-financial or administrative abnormalities; failing to replace managers disqualified or dismissed following the ANS determinations, which are made when there are risks for the continuity or quality of health care provided to beneficiaries; application of administrative sanction canceling the organization's authorization to operate or its provisional registration; and when the operator's management incur in severe violation of the ANS determinations, or legal and statutory rules that govern the institution's activities (ANS, 2012a).

As previously mentioned, the ANS uses financial and non-financial indicators to analyze health plan operators, which is evidenced by the dimensions that make up the IDSS. This view that performance analysis should include financial and operational aspects is supported by authors such as Bhimani and Langfield-Smith (2007) and Kaplan and Norton (1992). However, although performance analysis involving financial and non-financial perspectives is common practice, empirical studies indicate that financial ratios prevail in performance analysis.

Jesus et al. (2019) and Guzella and Rodrigues (2015) found evidence that financial ratios can predict operational performance. Also, the study by Sancovschi et al. (2014) observed that the interventions carried out by the ANS in health plan operators in 2009 were significantly related to their financial dimension and their structure and operation dimension in 2007 and only to their financial dimension in 2008. Therefore, the financial dimension was proven to have a great influence on ANS's decision to introduce special regimes, and it could predict such intervention up to two years in advance.

According to information collected on the ANS website (www.ans.gov.br, retrieved on May 28, 2019), the ANS publishes an annual report with the main accounting data for each health plan operator and their financial ratios. This report works as an incentive to managerial excellence and collaborates with the incorporation of good governance practices and greater transparency in the sector. The annual report shows 19 indicators distributed into different subgroups according to their purpose, following the guidelines elaborated by Matarazzo (2010) (Figure 1).

2.3 Studies analyzing financial performance in the supplementary health sector

Soares et al. (2009) sought to verify whether the financial ratios used by the ANS are the most relevant to classify and evaluate the financial performance of health plan operators, examining the traditional indicators pointed out in the literature. The authors applied factor analysis in a set of traditional indicators and ratios used by the ANS, obtaining the same result. They found that the indicators third party shares, net fixed assets, current liquidity, general liquidity, and return on equity were the most relevant to assess the performance of health plan operators. They concluded that the ANS uses the most relevant indicators to form its quality index.

Veloso and Malik (2010) aimed to evaluate healthcare companies' economic and financial performance, mainly hospitals, comparing their performance with health plan operators and companies in general. The authors failed to reject the hypothesis that there are no differences in profitability between hospitals, operators, and companies in general. They found that the larger the companies, the greater the difficulty in rejecting this hypothesis. Therefore, the companies' revenue is a factor influencing the profitability of the companies analyzed.

Kudlawicz (2013), on the other hand, studied the characteristics that differentiate health plan operators with higher profitability from those with lower profitability. The results of applying the panel data model showed that there are not many differences between operators with higher profitability and those with lower profitability. However, the authors concluded that those with higher profitability use their own resources to fund operations, whereas companies with lower profitability seek funds from third parties and in the short term.

Kudlawicz and Santos (2013) sought to identify the financial profile of health plan operators based on the ratios observed in the literature. Using factor analysis, the authors concluded that the profitability factor ratios are the most important for the supplementary health sector.

The study by Sancovschi et al. (2014) verified the relationship between the score obtained by the operators in the dimensions of the IDSS and the ANS's decision to intervene. At the time of this study, the IDSS was composed of the following dimensions: health care, economic and financial, structure and operation, and beneficiary satisfaction. It was found that the ANS interventions on health operators in 2009

were significantly related to the economic and financial dimension (negatively) and structure and operation dimension (positively) in 2007, and only to the economic and financial dimension (negatively) in 2008. From these results, Sancovschi et al. (2014) concluded that operators' performance in the economic and financial dimension of IDSS explains part of the interventions carried out by the ANS in 2009.

Groups	Purpose	Indicator	Acronym	Calculation
Capital structure	Identifying how the operations are funded	Total fixed assets	TOTFIX	Noncurrent assets / Total assets
		Indebtedness	INDEBT	(Current liabilities + Noncurrent liabilities) / Total assets
		Composition of indebtedness	CI	Current liabilities / (Current liabilities + Noncurrent liabilities)
Profitability	Determining the operator's ability to generate returns	Return on total assets	ROA	Net income / Total asset
		Return on net equity*	ROE	Net income / Net equity
		Gross profit margin	GPM	Gross income / Revenues from health services after taxes
		Net profit margin	NPM	Net income / Revenues from health services after taxes
		EBIT margin	EBIT	(Net income + Interest expenses + Income tax (IR) + Contribution on net profit (CSLL) – Deferred taxes) / Revenues from health services after taxes
		EBITDA margin	EBITDA	(Net income + Interest expenses + IR + CSLL – Deferred taxes + Depreciation + Amortization) / Revenues from health services after taxes
Liquidity	Determining the ability to pay off debts obligation	General liquidity	GL	(Current assets + Long-term assets) / (Current liabilities + Noncurrent liabilities)
		Current liquidity	CL	Current assets / Current liabilities
Expenses	Verifying the relationship between expenses and revenues from health plan operations	Medical expenses ratio	MEXP	Net indemnifiable events / Revenues from health services after taxes
		Selling expenses ratio	SEXP	Selling expenses / Revenues from health services after taxes
		Administrative expenses ratio	ADMEXP	Administrative expenses / Revenues from health services after taxes
		Combined ratio	COMB	(Administrative expenses + Selling expenses + Net indemnifiable events) / Revenues from health services after taxes
		Expanded combined ration	EXPCOMB	(Administrative expenses + Selling expenses + Net indemnifiable events) / (Revenues from health services after taxes + Net financial income)
Activity	Identifying the financial cycle, or how long it takes to receive from sales and how long it takes to pay for events where health plan users accessed health services	Average collection period (revenues from health services)	ACP	(Credits with health providers / Revenues from health services after taxes) x 360
		Average payment period (expenses with health services provided to health plan users)	APP	(Event to be paid / Net indemnifiable events) x 360
Sales	Analyzing revenues with health plan operations per user	Average monthly ticket	AMT	Revenues from health services after taxes / (Average health plan users x 12)

Figure 1 – Financial ratios in the ANS annual report
*This indicator cannot be interpreted if the operator presents negative net equity.
Source: Elaborated by the authors based on Matarazzo (2010) and ANS (2019a, 2018a, 2017a, 2016c)

Silva and Loebel (2017) carried out a study to identify the economic-financial performance of private health plan operators and compared their results between the years 2008 and 2012. Through descriptive statistics of the indices, the authors found that the economic-financial performance was asymmetric over the years of analysis, with differences between the means and medians of each of the calculated indices. In addition, through the median test, the authors concluded that when compared, only the return on total assets, short-term debt, and loss ratio demonstrated significant differences between the average values. This indicated that the operators had different net returns on investments made, different short-term debt rates in the fiscal year, and different rates of destination of their revenues to cover the beneficiaries' medical expenses.

Xavier, Souza, and Avelar (2019) studied the relationship between economic-financial performance and the characteristics of health plan operators in the period from 2010 to 2015, using the Kolmogorov-Smirnov test and the Kruskal-Wallis test. The authors concluded that the financial ratios are related to the characteristics they studied. They found that operators with better performance were small, worked in the self-management modality, had headquarters in inland regions, and were in the market for a long time. The authors also stressed that most financial ratios showed statistically significant differences depending on the operators' modality.

In a similar study, Fernandes, Cailleau, and Souza (2019) sought to assess behavior patterns of the financial ratios in health plan operators, observing modality and region of operation between 2010 and 2015, through analysis of variance - ANOVA. As a result, they found that the modality and the region in which the operator works are related to indicators of profitability, liquidity, activity, and indebtedness.

Jesus et al. (2019) sought to verify whether financial performance is a determinant of the operational performance of health plan operators. The authors used the financial indicator and the indicators of operational quality (or non-financial) present in the IDSS from 2011 to 2014. The IDSS in this study, as well as in Sancovschi et al. (2014), adopted the dimensions of health care, economic and financial, structure and operation, and beneficiary satisfaction. Jesus et al. (2019) concluded that there is a positive relationship between the economic and financial indicators and the indicators of operational quality (non-financial) of the ANS quality program.

2.4 Research Hypothesis

The literature review led to the following conclusions that support this study:

1. Maintaining the supplementary health market is relevant to society and the country's economy. As Nogueira (2004) mentioned, the ability to provide health services is directly related to the financial situation of the health plan operators. Therefore, it is necessary to regulate and strongly monitor these organizations' financial situation.
2. The financial ratios proved to be relevant for the analysis of the health plan operators' performance. These ratios are predictors of future operational performance (Jesus et al., 2019), and poor financial performance is correlated with the ANS's decision to introduce a special regime for health plan operators in subsequent periods (Sancovschi et al., 2014).
3. The group of indicators calculated by ANS considers the main indicators adopted to analyze the operators' performance. The majority of authors studying the supplementary health sector used similar ratios to evaluate health plan operators (of the 31 indicators observed in the literature, the ANS periodically calculate 20). This idea is consistent with Soares et al. (2009), who concluded that the ANS used the most relevant indicators to analyze the sector.

Therefore, this research tests the following hypothesis:

H1: Poor financial performance of health plan operators is correlated with the introduction of special regimes by the Brazilian National Supplementary Health Agency (ANS).

This research tests this hypothesis and seeks to determine the financial ratios that influence the ANS's decision to submit operators to special regimes. The findings may guide health plan operators to avoid abnormalities that lead to the ANS's intervention.

3 Methodology

This is correlational, empirical, quantitative, and ex post facto research (Kumar, 2011; Kothari, 2004; Sampieri, Collado & Lucio, 2013). It is correlational for studying the relationship between financial ratios and the introduction of special regimes for health plan operators; empirical and quantitative since it seeks to validate the hypothesis elaborated based on data analysis and by employing statistical methods; and, finally, it is an ex post facto research because the data analyzed refers to past events.

The study examines financial ratios that explain ANS's decision to submit health plan operators to special regimes. Logistic regression was used to predict and explain a categorical binary variable (Hair Júnior, Black, Babin, Anderson, & Tatham, 2009a) to find a logistic function that indicates the probability of such intervention to occur and the influence of the variables for the occurrence (Fávero, Belfiore, Silva, & Chan, 2009a).

Operators are submitted to special regimes when the ANS identifies severe abnormalities that can cease the operators' activity. Therefore, this study may present similar characteristics as those on bankruptcy prediction. Based on Altman's (1968) finding that bankruptcy can be predicted with precision up to two years before, the data on financial ratios in this study was collected for the period 2015 to 2018 to assess the introduction of special regimes for health plan operators in 2017, 2018, and 2019.

The initial sample was formed of health plan operators active in 2019 who had data on the financial ratios analyzed in this research for 2015 to 2018. Also, the organizations should be operating in the following modalities: medical cooperatives, dental cooperatives, group medicine, group dentistry, philanthropy, and specialized insurance firms. Organizations operating in the modalities of self-management and benefits administration were not considered to form the sample due to their specificities

This sample was obtained from a population of 1220 health plan operators active in 2019. When applying the sample criteria, 911 were selected since they operated in the modalities considered for this

research. Also, due to the unavailability of data for the period stipulated (2015-2018), 196 operators were disregarded. Therefore, the initial sample (sample 0) consisted of 715 health plan operators.

The logistic regression was applied on a different sample (sample 1), formed of health plan operators submitted by the ANS to a special regime in 2017, 2018, or 2019. We identified 47 operators submitted to a special regime in 2017, 40 in 2018, and 46 in 2019. Operators without appropriate registration and those classified as self-management (due to this modality's specificities) were excluded. After this procedure, 37 operators in 2017, 34 in 2018, and 38 in 2019 remained. Finally, we disregarded the operators that did not have data on financial ratios for the period analyzed in the study (2015-2018), which also eliminated from the sample for the logistic regression the operators submitted to the special regime of extrajudicial liquidation. Thus, sample 1 consisted of 25 operators in 2017, 26 in 2018, and 26 in 2019, totaling 77 occurrences of operators submitted to a special regime (fiscal management and technical management) in 2017, 2018, and 2019.

The logistic regression also requires creating a mirror sample (sample 2) to analyze the sample of operators submitted to a special regime in 2017, 2018, or 2019. Therefore, 77 health plan operators were randomly selected (using Microsoft Excel 2016 through the RANDBETWEEN function) from the initial sample of 715 operators. The selected operators forming sample 2 were not submitted to a special regime. They operated in the same modality as the organizations of sample 1 and had headquarters in the same geographic region as the headquarters of the operators in sample 1. Thus, for each operator submitted to a special regime in sample 1, an operator was working normally in sample 2. Thus, a final sample of 154 operators was submitted to logistic regression (see the sampling process in Figure 2).

In addition, the resampling method was adopted to reduce uncertainties generated by the randomness in the selection of the mirror sample. This process was conducted by repeating the random selection to form the mirror sample a further ten times, maintaining the similarity with the operators submitted to a special regime regarding modality and headquarters' geographic region (using Microsoft Excel 2016 RANDBETWEEN function). The resampling generated ten new final samples that were submitted to logistic regression.

Step 1: Identifying health plan operators active in 2019	
Active operators in 2019 (population)	1220
Step 2: Initial sample (sample 0), formed after excluding operators working in the modalities self-management and benefits administration, and excluding those that did not have data on financial ratios analyzed in the study for the period 2015 to 2018.	
(–) self-management and benefits administration	309
(–)data unavailable	196
= Sample 0 (Factor analysis)	715
Step 3: Identifying operators submitted to a special regime in 2017, 2018, and 2019.	
Operators submitted to a special regime	133
Step 4: Sample 1, formed based on the group of operators submitted to a special regime in 2017, 2018, and 2019, excluding operators in the modalities self-management and benefits administration, and those that did not have data on financial ratios analyzed in the study for the period 2015 to 2018	
(–) self-management modality	24
(–) data unavailable	32
= Sample 1 (operators submitted to special regimes)	77
Step 5: Mirror sample (sample 2) extracted from sample 0, with operators not submitted to special regimes and in the same modalities and headquarters in the same regions as operators of sample 1, forming the final sample submitted to logistic regression	
= Sample 2 (health plan operators working normally)	77
= Final sample (Logistic regression)	154 (Final sample – FS)
Step 6: Resampling process, forming 10 new final samples	
= Sample 2 (operators working normally) x 10	77
= Final sample (Logistic regression) x 10	154 (Final sample 1 to 10 – FS1 à FS10)

Figure 2 – Description of the sampling process
Source: Elaborated by the authors

Data collection was carried out through the database available on the ANS website (www.ans.gov.br/). The ANS *Anuário* (annual report) offered the operators' financial ratios, and the website lists those submitted to special regimes per year (except for 2017, which was not found on the website. The operators submitted to special regimes in 2017 were obtained through the government's Citizen Information System (e-SIC).

The variables were selected based on the financial ratios available in annual reports (Figure 1) for 2015 to 2018. The ratios ROE, SEXP, and AMT were disregarded for the purpose of this research.

ROE was excluded because it was inconsistent in the face of negative net equity. ATM was discarded because it needed additional information to allow assertive interpretation (such as the number and profile of beneficiaries). As for the SEXP, the financial ratio was disregarded for presenting many inconsistent or missing results.

According to Matarazzo (2010), evaluation combining the average collection period and the average payment period favors the analysis of the firm's operating and cash cycle. Therefore, the indicators of activity, ACP and APP, were transformed into a single variable named financial cycle (APP – ACP) that reflected the number of days between the payment of indemnifiable events and the collection of revenues from health services. If this ratio is positive, the operator has available financial resources (since the period before payment is longer than that for the collection of revenues). If negative, the company has to use other sources of funds to cover the expenses with health services provided to health plan users (events).

This study adopts 15 indicators from *Anuário da ANS* (ANS annual report). They were subdivided into the following groups: capital structure, profitability, liquidity, expenses, and financial cycle.

3.1 Factor Analysis

Due to a large number of indicators (compared to the sample size), factor analysis was applied to the groups described in Figure 1 to obtain factors that represented each dimension and thereby reduce the number of independent variables in the logit model. The factor analysis used the initial sample (sample 0), formed of 715 health plan operators with data on 15 financial ratios for the years from 2015 to 2018. The program Statistical Package for the Social Sciences 20 – SPSS 20 was used.

Based on the literature, we used the statistical values of the Kaiser-Meyer-Olkin statistic (KMO ≥ 0.5), the Bartlett sphericity test (p-value <0.05), the Measure of Sampling Adequacy index (MSA ≥ 0.5), and communalities (≥ 0.5) to verify the quality of the factor analysis. According to Fávero, Belfiore, Silva, and Chan (2009b), values below 0.5 for KMO are considered unacceptable. Hair Júnior, Black, Babin, Anderson, and Tatham (2009b) state that MSA is considered acceptable when above 0.5 and that the minimum level for communalities should be 0.5. Regarding the Bartlett test, the rejection of the null hypothesis is ideal since this result suggests the existence of significant correlations between the variables (Fávero et al., 2009b), using the 5% level of significance to determine whether the null hypothesis should be accepted or rejected.

The factor extraction method adopted was the Principal Component Analysis (PCA). As for selecting the number of factors, we considered the Kaiser criterion with eigenvalues equal to 1. In addition, the Varimax orthogonal method was chosen to avoid the problem of multicollinearity among variables and obtain a clearer separation of factors. Finally, factor loads were analyzed considering a minimum of 0.30 to be significant, based on Hair Júnior et al. (2009b).

It was not possible to create a factor in the capital structure group (TOTFIX, CI, and INDEBT). Even when seeking different combinations for the group, in most cases, the KMO and MSA values were not greater than 0.5, and the explained variance was less than 60%. Thus, considering the importance of using at least one capital structure indicator, it was decided to maintain INDEBT in the logistic regression model. This choice was made because this indicator represents the total indebtedness of the health plan operators in the short and long term.

Regarding the profitability group (ROA, GPM, NPM, EBIT, and EBITDA), factor analysis with ROA, NPM, and EBIT presented favorable results for the KMO statistic and the Bartlett test. The total variance was satisfactory, between 70.817% and 86.161%. Thus, the profitability factor was composed of these indicators. In addition, the results of the other factor analyses conducted in the profitability group show that the presence of EBITDA increases the variance explained in some of the models. Therefore, this indicator was maintained in the logistic regression model, albeit in an isolated manner.

The liquidity indicators (GL and CL) show good results for the KMO statistic, Bartlett test, MSA, and communality. In addition, the total explained variance was high for all years, varying between 96.174% and 97.208%. Thus, the liquidity factor composed of GL and CL was maintained for the logistic regression analysis.

In the expenditure group (MEXP, ADMEXP, COMB, and EXPCOMB), the combination ADMEXP, COMB, and EXPCOMB showed the best results. KMO statistic, Bartlett Test, MSA, and communalities remained within the standards, and the total variance was between 79.277% and 82.646%. Therefore, the expenses factor was composed of ADMEXP, COMB, and EXPCOMB. Much of the total variance in models with MEXP was due to this indicator, which led us to include it as an isolated indicator in the logit model.

The financial cycle group was formed only by the APP – ACP indicator, which had no high correlation with any other indicators, and it was not possible to include it in another factor. As the financial cycle indicator was the only one that considered information from average periods and provided a complementary understanding of the health plan operators' liquidity, it was decided not to disregard it and to consider it in isolation in the logistic regression model.

As observed above, the logistic regression included as independent variables the indicators INDEBT, EBITDA, MEXP, and APP – ACP, in addition to the factors profitability (ROA, NPM, and EBIT), liquidity (GL and CL), and Expenses (ADMEXP, COMB, and EXPCOMB). Therefore, there was a reduction from fifteen to seven independent variables.

Groups	Variables		
	Before factor analysis		After factor analysis (independent variables of logit)
Capital structure	Total fixed assets	TOTFIX	INDEBT indicator
	Indebtedness	INDEBT	
	Composition of indebtedness	CI	
Profitability	Return on total assets	ROA	Profitability factor (ROA, NPM e EBIT) and EBITDA indicator
	Gross profit margin	GPM	
	Net profit margin	NPM	
	EBIT margin	EBIT	
	EBITDA margin	EBITDA	
Liquidity	General liquidity	GL	Liquidity factor (GL and CL)
	Current liquidity	CL	
Expenses	Medical expenses ratio	MEXP	Expenses factor (ADMEXP, COMB e EXPCOMB) and MEXP indicator
	Administrative expenses ratio	ADMEXP	
	Combined ratio	COMB	
	Expanded combined ration	EXPCOMB	
Financial Cycle	Average payment period (expenses with health services provided to health plan users) – Average collection period (revenues from health services)	APP – ACP	APP – ACP indicator

Figure 3 – Results of the selection of independent variables through factor analysis
Source: Elaborated by the authors

3.2 Logistic Regression

Logistic regression, or logit, is a statistical technique used to study the behavior between a binary dependent variable and metric or non-metric explanatory variables (Fávero et al., 2009a). What differentiates logistic regression from the others is that the predicted values can never be outside the 0 and 1 domain (Hair Júnior et al., 2009a).

This technique allows us to examine the capacity of the factors – identified based on the financial ratios obtained from factor analysis – to explain the tdecision to introduce special regimes for health plan operators in a specific period. The SPSS 20 program was used.

The dependent variable was whether the health plan operator was (1) or was not (0) submitted by the ANS to a special regime in 2017, 2018, or 2019. The explanatory variables were the financial factors and indicators one year before the introduction of the special regime and two years before the event. Therefore, the regression method was applied in two moments: t-1 and t-2.

The function of logistic regression was:

$$SR = \beta_0 + \beta_1 AF_{PROFIT} + \beta_2 AF_{EXP} + \beta_3 AF_{LIQ} + \beta_4 ZINDEBT + \beta_5 ZEBITDA + \beta_6 ZMEXP + \beta_7 ZAPPACP$$

Where:
SR – The organization was submitted to a special regime (1) or not (0) in years 2017, 2018, and 2019
β_n – Coefficients
AF_PROFIT – Factor profitability in t-1 or t-2
AF_EXP – Factor expenses in t-1 or t-2
AF_LIQ – Factor liquidity t-1 or t-2
ZINDEBT – Indicator indebtedness standardized in t-1 or t-2
ZEBITDA – Indicator EBITDA standardized in t-1 or t-2
ZMEXP – Indicator medical expenses standardized in t-1 or t-2
ZAPPACP – Indicator Average Payment Period – Average Collection Period standardized in t-1 or t-2

The main premise of logistic regression was to have acceptable multicollinearity (Fávero et al., 2009a). In this sense, Gujarati and Porter (2011) mention that a correlation greater than 0.8 may indicate a problem of multicollinearity. Therefore, the first step was to assess whether the existing correlations between the independent variables indicated multicollinearity.

The logistic regression was applied after the correlation analysis. As the study sample is balanced, the cutoff point used was 0.5. In addition, the enter method was used, as it includes all the variables selected (Fávero et al., 2009a), and, in the first moment, the objective was for all variables to remain in the model.

Next, following Fávero et al. (2009a), we analyzed the information on the model's quality and fit: Classification Table, Omnibus Test, Hosmer and Lemeshow Test, ROC Curve, and the classification and R2 correctness rate of Nagelkere. Finally, after checking the model's quality and fit, the relationship between the independent and dependent variables was observed, as well as the significance of the variables that made up the model. It was then possible to identify the influence of each of the independent variables for the ANS's decision to introduce a special regime for health plan operators.

The results were validated by employing the same process for the ten final samples (all balanced and built based on the resampling process described before – Figure 2). All samples were submitted to

robustness analysis to reinforce the findings. This procedure adopted the backward elimination (Wald) method, which starts the model with all the variables and removes them one by one based on the probability of Wald's statistic (Brooks, 2019). Therefore, only significant variables remain in the model.

Figure 4 describes the expected behavior of financial factors and indicators in relation to the probability of the introduction of special regimes, based on the interpretation of the indicators in the literature.

Variables		SR (1)
Profitability factor	AF_PROFIT	Negative
Expenses factor	AF_EXP	Positive
Liquidity factor	AF_LIQ	Negative
EBITDA indicator	ZEBITDA	Negative
Medical expenses indicator	ZMEXP	Positive
Indebtedness indicator	ZINDEBT	Positive
Financial cycle indicator	ZACPAPP	Negative

Figure 4 – Results expected in the logistic regression (positive or negative)
Source: Elaborated by the authors

3.3 Research limitations

The results obtained in this study cannot be generalized since they are directly influenced by data availability and quality and because they refer to a specific period.

The ratios adopted were calculated by the Brazilian National Supplementary Health Agency (ANS), based on the accounting information sent by the health plan operators. Thus, as the data used comes from a secondary source, it is impossible to guarantee the quality of the information.

It is worth mentioning that political factors may have influenced the ANS intervention in health plan operators. Also, economic changes and changes in consumer behavior or legislation during the studied period may have played a role in the operators' performance. Therefore, it is important to consider that these and other uncontrollable factors influence the study results.

4 Results Analysis

The logistic regression analysis was used to identify the financial ratios that explain the ANS's decision to introduce special regimes for health plan operators. Table 1 shows the results of the regression for t-1 and t-2 of the final sample of 154 operators, 77 submitted to a special regime and 77 operating normally, considering the enter method. The results for t-1 and t-2 are similar. It is observed that the correlations between the independent variables do not suggest multicollinearity and, therefore, it was not necessary to make any changes to the model. The test results show that the model is a good fit and that the explained variance was 55.8% in t-1 and 53.4% in t-2 - which indicates that the explanatory variables explained more than 50% of the variation in the operators' condition. Regarding the resulting equation, in both tests, the variables that showed significance were AF_LIQ, ZINDEBT, and ZAPPACP, which indicates that they were statistically different from zero.

Table 1:
Results of the regression for the final sample

	t-1	t-2
Correlation analysis		
Correlations above 0.80	None	None
Model with all variables		
Classification table	78.6% correctness	78.6% correctness
Omnibus test (Model)	Rejects H0 (0.000)	Rejects H0 (0.000)
Hosmer and Lemeshow test	Confirms H0 (0.974)	Confirms H0 (0.106)
Nagelkere R^2	0.558	0.534
ROC Curve: Area below the curve and significance	0.833 (0,000)	0.815 (0.000)
Equation	-2.303*** + 0.339 AF_PROFIT – 0.923 AF_EXP – 4.390*** AF_LIQ – 0.457 ZEBITDA – 0.612 ZMEXP + 2.901*** Z INDEBT – 0.445* ZAPPACP	-2.299*** - 0.032 AF_PROFIT – 1.192 AF_EXP – 4.680*** AF_LIQ – 1.112 ZEBITDA – 0.224 ZMEXP + 1.293*** ZINDEBT – 0.679** ZAPPACP

***1% level of significance; **5% level of significance; *10% level of significance
Source: Elaborated by the authors

The same procedure was repeated for the ten new samples formed in the resampling process (Table 2) (FS1 to FS10) to confirm these results. Table 2 shows the prevalent and average results for t-1 and t-2 for these samples.

It is possible to observe that, in general, the results do not indicate a multicollinearity problem between the independent variables. However, in the model for t-2, the samples FS2 and FS10 showed a slightly higher correlation than 0.80 between AF_PROFIT and ZEBITDA (respectively 0.816 and 0.829).

Regarding the model fit, results are all favorable, with an average of 54.6% (t-1) and 54.7% (t-2) of explained variance – it was observed again that the independent variables explained more than 50% of the variation in the condition of the operators. It is noteworthy that for the sample FS8 of t-2, the Hosmer and Lemeshow test can only be accepted considering the 1% level of significance.

Considering the significant variables and their relationship with the dependent variable, the results for FS1 to FS10 confirm the findings obtained from the final sample. The variables AF_LIQ, ZINDEBT, and ZAPPACP were significant in most cases, with emphasis on AF_LIQ in t-1 and AF_LIQ and ZINDEBT in t-2, which obtained 100% occurrence. In addition, the coefficients' status of positive or negative was maintained.

In some models, the ZMEXP variable is significant. However, this variable presented low occurrence (20% in t-1 and 10% in t-2), and the results (positive or negative) were inconsistent, diverging between t-1 and t-2.

Table 2:
Prevalent/average results of the regression analysis for FS1 to FS10

	t-1	t-2
Correlation analysis		
Correlations above 0.80	None	None
Model with all variables		
Classification table	78.51% correctness	77.60% correctness
Omnibus test (Model)	Rejects H0	Rejects H0
Hosmer and Lemeshow test	Confirms H0	Confirms H0
Nagelkere R^2	0.546	0.547
ROC Curve: Area below the curve and significance	0.826 (0.000)	0.820 (0.000)
Significant variables until 10% (% occurrence and relation)		
AF_LIQ	100% (negative)	100% (negative)
ZMEXP	20% (positive)	10% (negative)
ZINDEBT	80% (positive)	100% (positive)
ZAPPACP	60% (negative)	60% (negative)

Source: Elaborated by the authors

The results show the significance of the variables AF_LIQ, ZINDEBT, and ZAPPACP. The analysis of these variables average odds ratio shows ("event" means the introduction of a special regime for health plan operators):

- The increase of one unit of AF_LIQ reduces the probability of the event's occurrence by approximately 98%.
- The increase of one unit of ZINDEBT increases the probability of the event's occurrence by approximately 710%.
- The increase of one unit of ZAPPACP reduces the probability of the event's occurrence by approximately 24%.

In addition, based on whether the coefficients were positive or negative, it is possible to make the following inferences:

- The lower the liquidity, the greater the probability of being on a special regime.
- The higher the debt, the greater the probability of being on a special regime.
- The lower the availability of financial resources, the greater the probability of being on a special regime.

All samples were subjected to robustness analysis to reinforce the results obtained. The analysis consisted of applying regression with the backward elimination (Wald) method to all samples.

For a better understanding, the results for the final sample are presented first (Table 3), followed by the results for the samples FS1 to FS10 (Table 4). The correlation results are not reported because they are the same as in Table 2. The results were favorable regarding the model's quality and fit. In one of the samples (FS7), the robustness analysis through the Hosmer and Lemeshow test conducted for FS1 to FS10 could only be accepted considering the 1% level of significance.

Table 3 shows that the results are reinforced in t-1 and t-2 for the final sample, where the same variables remain significant and the respective signs – positive and negative – are repeated. Table 4 shows that the signs of the significant variables are the same as those of the previous tests. The variables AF_LIQ and ZINDEBT remain significant in most cases in both models, while the variable ZAPPACP is reduced to

50% in t-1 and 40% in t-2. In addition, the variables AF_PROFIT, ZEBITDA, and ZMEXP appear significant, even though this is not recurrent among the samples FS1 to FS10.

Table 3:
Results of robustness analysis for the final sample

	t-1	t-2
Model with all variables		
Classification table	77.9% correctness	76.0% correctness
Omnibus test (Model)	Rejects H0 (0.000)	Rejects H0 (0.000)
Hosmer and Lemeshow test	Confirms H0 (0.342)	Confirms H0 (0.177)
Nagelkere R^2	0.529	0.508
ROC Curve: Area below the curve and significance	0.822 (0.000)	0.802 (0.000)
Equation	-1.960* - 3.538* AF_LIQ + 2.845* ZINDEBT - 0.485** ZAPPACP	-1.994* - 4.279* AF_LIQ + 1.238* ZINDEBT - 0.654** ZAPPACP

*1% level of significance; **5% level of significance
Source: Elaborated by the authors

Table 4:
Results of robustness analysis for FS1 to FS10

	t-1	t-2
Model with all variables		
Classification table	78.2% correctness	76.4% correctness
Omnibus test (Model)	Rejects H0	Rejects H0
Hosmer and Lemeshow test	Confirms H0	Confirms H0
Nagelkere R^2	0.530	0.531
ROC Curve: Area below the curve and significance	0.818	0.812
Significant variables until 10% (% occurrence and relation)		
AF_PROFIT	10% (negative)	10% (negative)
AF_LIQ	100% (negative)	100% (negative)
ZEBITDA	0% (-)	30% (negative)
ZMEXP	20% (positive)	0% (-)
ZINDEBT	80% (positive)	100% (positive)
ZAPPACP	50% (negative)	40% (negative)

Source: Elaborated by the authors

In addition, when analyzing the average odds ratio of the variables AF_LIQ, ZINDEBT, and ZAPPACP, it is possible to observe:

- The increase of one unit of AF_LIQ reduces the probability of the event's occurrence by approximately 98%.
- The increase of one unit of ZINDEBT increases the probability of the event's occurrence by approximately 654%.
- The increase of one unit of ZAPPACP reduces the probability of the event's occurrence by approximately 45%.

It is also worth mentioning that the regressions obtained an average Nagelkere R^2 of 53.7% and average correctness of 77.3% for the classification of cases of a special regime of technical and fiscal management. Thus, it is possible to say that the model has a good explanation and that 77.3% of the occurrence of special regimes could be predicted only with information from financial ratios observed in previous years.

Thus, the variables that are strongly related to the introduction of special regimes for health plan operators are AF_LIQ and ZINDEBT, as they are significant in almost all tests and have a greater influence on the event's occurrence. The variable ZAPPACP presented a weak relation, significant only for few samples (approximately half). It also had less impact on the event's occurrence. Also, the INDEBT variable, representing the total operator indebtedness, was the indicator with the most impact on ANS's decision to submit operators to special regimes when considering the odds ratio.

Therefore, hypothesis H1 "poor financial performance of health plan operators is correlated with the introduction of special regimes by the Brazilian National Supplementary Health Agency (ANS)," was confirmed. The results show that the lower the liquidity, the greater the debt, and the lower the availability of financial resources, the greater the probability of the introduction of special regimes of fiscal and technical management (an intervention that can be predicted up to 2 years before its occurrence).

This result corroborates the findings by Sancovschi et al. (2014), who observed that the interventions carried out by the ANS were negatively related to the economic and financial dimension of the

Supplementary Health Performance Index (IDSS) for both one year and two years before its occurrence. However, Sancovschi et al. (2014) did not indicate which financial ratios were the most relevant for the ANS's decision to introduce special regimes for operators.

In this sense, this work contributes by offering evidence that liquidity, indebtedness, and the financial cycle are related to the ANS's decision to introduce special regimes for health plan operators. In addition, the results showed that the indicators of general liquidity, current liquidity, and indebtedness are the most influential to the ANS's decision – since the variables AF_LIQ and ZINDEBT were considered significant in practically all the tests carried out and with the different samples tested.

The results help health plan operators to improve financial management, emphasizing liquidity and indebtedness to avoid the occurrence of severe abnormalities and the introduction of special regimes by the ANS. In this sense, the study contributes to expand the knowledge on health plan operator's performance analysis, identifying the financial ratios that influence the ANS's decision to introduce special regimes.

5 Final Considerations

This research aimed to analyze the financial ratios that explain the ANS's decision to submit health plan operators to special regimes, examining data from 2015 to 2019 and the introduction of special regimes from 2017 to 2019. Factor analysis was performed to reduce the indicators, preparing them to be used in the logistic regression. The independent variables of the logistic regression were: profitability factor, liquidity factor, expenses factor, EBITDA margin indicator, indebtedness indicator, medical expenses indicator, and financial cycle indicator. The dependent variable was whether the health plan operator was (1) or was not (0) submitted to a special regime in the period from 2017 to 2019.

The logit counted on a sample of 77 operators submitted to a special regime and 77 operators that were working normally. Given the unavailability of data for the analyzed period, the health plan operators that entered into extrajudicial liquidation were excluded from the sample.

We conducted logistic regression for t-1 and t-2, as well as resampling and robustness analysis. Two methods were used – enter and backward elimination (Wald) – applied to a total of eleven different random samples with replacement (FS and FS1 to FS10). The results were similar for all samples in the two methods used:

1. The variables strongly related to the introduction of special regimes (fiscal and technical management) were the liquidity factor (GL and CL) and the indebtedness indicator (INDEBT). They were significant in almost all samples and tests, demonstrating an influence on the ANS's decision to intervene in the operators' management.
2. The financial cycle indicator (APP – ACP) presented a weak relation with the decision to introduce special regimes. The relationship was significant in just over half of the samples and tests, in addition to demonstrating little influence on the probability of the ANS's intervention by introducing a special regime).
3. The lower the liquidity, the greater the indebtedness, the lower the availability of financial resources, the greater the likelihood of the introduction of a special regime (fiscal and technical management). These ratios can predict the intervention up to 2 years before the occurrence.
4. Confirmation of H1 that poor financial performance of health plan operators is correlated with the introduction of special regimes by the Brazilian National Supplementary Health Agency (ANS).

These results point to the importance of financial ratios to assess the health plan operators' performance, given their ability to predict the introduction of special regimes (fiscal and technical management) for these organizations.

The relationship between poor financial performance and the introduction of special regimes and the financial ratios' ability to predict this event up to 2 years in advance are findings in line with Sancovschi et al. (2014). In their study, the authors observed that the interventions performed by the ANS in health plan operators in 2009 were significantly related to the financial dimension in 2007 and 2008 (negatively). In addition, our findings contribute by highlighting which economic and financial aspects are the most relevant for the ANS's decision to introduce special regimes for operators.

It was possible to conclude that the operators' financial situation is a relevant factor in the decision to intervene by submitting them to special regimes (fiscal and technical management), especially the aspects related to liquidity and indebtedness. This finding corroborates the study by Soares et al. (2009), who found that the indicators current liquidity and general liquidity are among the most relevant to assess operators' performance. The results also confirm Kudlawicz's (2013) findings that companies with less profitability seek their resources from third parties and looking at the short term, i.e., they increase their debts.

Thus, operators with high debts have compromised profitability and are more likely to be submitted to special regimes. Considering that the liquidity indicators demonstrate the company's ability to pay debts (Matarazzo, 2010), it is also possible to infer that operators with higher levels of indebtedness may find it more challenging to maintain good liquidity.

Based on the results of this study, it is worth questioning the use of non-financial indicators by the ANS to evaluate operators, as is the case with the IDSS, which relies on mostly non-financial indicators. Considering that the IDSS aims to offer information that helps consumers choose a health plan, one could ask whether the operators' financial performance is essential information to help the population make a purchase decision, aware of the risks involved in working with health plan operators subjected to special regimes.

The results demonstrated which indicators or financial aspects should be monitored more carefully to reduce the chances of intervention. The findings reinforce the importance of operators having good working capital management to maintain favorable liquidity and use more spontaneous funding sources. Operators must seek a good payment capacity with less dependence on third-party resources, reducing the chances of having financial problems and going through special regimes.

Therefore, the good functioning of the supplementary health sector is related to the ability of companies to remain solvent (Nogueira, 2004). Ineffective financial management poses a risk to the provision of health services to beneficiaries and to the health system as a whole.

Despite evidence that the economic and financial situation is a relevant factor in the ANS's decision to introduce special regimes for operators, one must consider the existence of other variables not controlled by this research, such as political and economic factors. Thus, there are other aspects involved in ANS decisions that deserve attention.

Future research could verify if the determining factors to the decision of introducing a special regime for health plan operators are the same in the case of technical management special regime and fiscal management special regime. In addition, an interesting study could be a detailed analysis of the financial situation – in previous years – of health plan operators that went through extrajudicial liquidation, following the transition of these organizations from working normally to being under intervention, until the end of the liquidation process.

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Data collection: T. A. Reis
Data analysis: T. A. Reis, M. A. S. Macedo
Discussion of results: T. A. Reis
Review and approval: T. A. Reis, M. A. S. Macedo, J. A. V.C Marques.

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