BUSINESS COMBINATION IN THE BRAZILIAN SUPPLEMENTARY HEALTH SECTOR: AN ANALYSIS OF MARKET CONCENTRATION AND PROFITABILITY

Wander Chagas Carnetti [1]
Rodrigo Simonassi Scalzer [2]

ABSTRACT

This research analyzes whether market concentration and profitability are determinants of business combinations in the Brazilian supplementary healthcare sector. This segment, besides being essential for the population, is highly concentrated due to economies of scale and shows an intense movement of mergers and acquisitions. The study used data from Self-Management, Medical Cooperatives, Philanthropy, Group Medicine, and Specialized Health Insurance Companies registered with the ANS in April 2024, with active beneficiaries until December 2022, and also from market concentration cases submitted to CADE. In total, information was extracted from 707 companies and 232 processes submitted to CADE between 2011 and 2022, generating 6,618 observations analyzed through a logit model to estimate the probability of business combinations. Company characteristics allowed testing hypotheses using ROIC as a proxy for profitability and the Herfindahl index for market concentration, both in relation to beneficiaries. Results indicated that profitability and market concentration are determining factors for the occurrence of mergers and acquisitions. Inefficient companies tend to be absorbed by more profitable and solvent firms, while those with higher concentration levels pursue business combinations to reduce costs and expand goods and services through scale economies. These findings contribute to understanding the dynamics of a market strongly influenced by mergers and acquisitions and help identify the factors that make firms potential targets for such operations.

Keywords: Supplementary Health. Market Concentration. Profitability. Business Combination.

COMBINAÇÃO DE NEGÓCIOS NO SETOR DE SAÚDE SUPLEMENTAR NO BRASIL: UMA ANÁLISE DE CONCENTRAÇÃO DE MERCADO E RENTABILIDADE

[1] Master's degree in Accounting from the Federal University of Espírito Santo (UFES), Avenida Fernando Ferrari, 514, EDVI Building – Room 618, Goiabeiras University Campus, Vitória – ES, CEP 29.075-910, (27) 4009-2794. carnettiw@gmail.com
https://orcid.org/0009-0005-7550-7337

[2] PhD in Finance from COPPEAD. Professor in the Graduate Program in Accounting Sciences at the Federal University of Espírito Santo (PPGCON/UFES), Avenida Fernando Ferrari, 514, EDVI Building – Room 618, Goiabeiras University Campus, Vitória – ES, CEP 29.075-910, (27) 4009- 2794. rodrigo.scalzer@ufes.br.
https://orcid.org/0000-0003-4639-6613

RESUMO

Esta pesquisa analisa se a concentração de mercado e a rentabilidade são fatores determinantes para a probabilidade de ocorrência de combinações de negócios na saúde suplementar brasileira. Para a pesquisa foram utilizados dados de Autogestão, Cooperativas Médicas, Filantropia, Medicina em Grupo e Seguradoras Especializadas em Saúde que possuíam registros em abril de 2024 perante a ANS – Agência Nacional de Saúde e, que possuíam beneficiários ativos até dezembro de 2022, além dos processos de análise de concentração de mercado de saúde suplementar submetidos ao CADE – Conselho Administrativo de Defesa Econômica. Foram extraídos dados de 707 empresas e 232 processos submetidos a aprovação do CADE no período compreendido entre 2011 a 2022, perfazendo um total de 6.618 observações utilizadas em modelo logit para estimar a probabilidade de ocorrência de combinações de negócios. Dentre as características das empresas estudadas foi possível confirmar as hipóteses de estudo através do desempenho por meio da proxy ROIC para retorno e o índice Herfindall para concentração de mercado, em relação a beneficiários totais. Os resultados demonstraram que rentabilidade e concentração de mercado, em relação a beneficiários totais, podem ser consideradas como fatores determinantes para ocorrência de operações de negócios, Esses resultados, além de contribuírem para o entendimento de um mercado com forte movimentação em números de fusões e aquisições, ajudam a entender melhor os fatores que mais tornam empresas potenciais alvos para esse tipo de operação.

Palavras-Chave: Saúde Suplementar. Concentração de Mercado. Rentabilidade. Combinação de Negócios.

1 INTRODUCTION

The supplementary health sector in Brazil, following a global trend, has undergone significant changes in recent years, mainly due to strategies adopted by large business groups, which seek to achieve economies of scale through business combinations, mitigate operating costs resulting from regulatory changes, acquire more advanced technology and equipment, and expand their operating boundaries (Oliveira et al., 2021). The growth of investor interest in the global healthcare market, as well as the opening of the Brazilian market to foreign investors provided by Law nº 13,097/2015, has driven business combinations in health plans and hospitals nationwide, as evidenced by Andrade et al. (2015).

According to the Brazilian Association of Diagnostic Medicine - ABRAMED (2022), this market tends to be regionally concentrated, with enormous growth potential, given the demographic challenges and necessary changes in healthcare models, requiring economies of scale and scope to meet regulatory requirements and maintain the economic and financial balance of its activities. In this scenario, only the most well-structured and efficient companies are able to remain in the market.

When analyzing the concentration of the supplementary health market in Brazil, Nunes (2014) observed a trend for Brazilian companies to undergo a period

of mergers and acquisitions, since small companies find it more difficult to face the bottlenecks in the sector.

This finding becomes evident when looking at the many mergers and acquisitions that have taken place in the country over the last few years, which are directly linked to the healthcare sector, more precisely to the hospital, laboratory, and clinical analysis segment. To give an idea, there have been a large number of transactions in recent years, with 70 transactions in 2021, 55 in 2020, 87 in 2019, and 52 transactions in 2018, according to data presented by KPMG (2022).

For Postma and Roos (2016), mergers in the healthcare sector are predominantly aimed at improving service delivery and strengthening market position. In addition, efficiency and financial reasons are important drivers for this type of transaction. The rise in healthcare costs in Brazil over the last few decades, often at levels above inflation, the leverage of operating costs, added to the recent occurrence of the COVID-19 pandemic, the opening up of foreign capital investment, and the existence of verticalization in the sector, may contribute to direct impacts on the economic and financial performance of companies, which may corroborate in some way with the numerous business combination operations recorded in the country.

The literature presents empirical studies related to the sector, some of them pertinent to the existence of homogeneity in profitability (Kudlawicz et al., 2015), others related to the assessment of concentration in the health insurance market in Brazil (Ferreira & Menezes, 2016), the impact of vertical integration of health insurance companies in Brazil from the perspective of the return on assets in the sector (Claudino, 2019), and the impact of vertical integration of health insurance companies in Brazil on the return on assets in the sector (Claudino, 2019). Menezes, 2016), the impact of the verticalization of health insurance companies in Brazil on the return on assets in the sector (Claudino, 2019), and the impact of COVID-19 on the financial sustainability of health insurance companies (Onida de Araujo et al., 2022).

Despite the existence of empirical studies related to the supplementary health sector, it has not yet been verified which characteristics of companies in this segment contribute most to their propensity to participate in a business combination in supplementary health. In studies that evaluate the relationship between profitability and companies in the segment, most use ROA (Return on Assets) or ROE (Return on Equity) analysis, with few studies using ROIC (Return on Invested Capital), which, according to Copeland (2002, p. 169), would be the best analytical performance tool compared to other profitability indices such as ROE and ROA.

Thus, this study sought to investigate whether market concentration and profitability are determining factors for the probability of business combinations in supplementary health care, using concentration indicators based on the HHI (Herchman-Herfindahl Index) and profitability indicators based on ROIC (Return on Invested Capital) and ROA (Return on Assets).

Given the importance of the supplementary health segment for Brazil, the operations and verticalization trends in the sector, this study sought to answer the

following question: Are profitability and market concentration determinants for the occurrence of business combinations in the Brazilian supplementary health sector?

The underlying objective is to investigate whether return and market concentration are determining factors for the probability of a business combination in Brazilian supplementary healthcare between 2011 and 2022, based on the modalities of Self-Management, Medical Cooperatives, Philanthropy, Group Medicine, and Specialized Health Insurers that had active beneficiaries until December 2022. To this end, data from 707 companies were analyzed for the period 2011-2022 using descriptive statistics and logistic regression analysis.

The relevance of this work remains in the following factors: (i) investigating which factors are decisive in increasing the probability of a business combination in a segment that has historically shown significant growth in the number of mergers and acquisitions (KPMG, 2022); and (ii) an essential sector that deals with people's lives and accounts for approximately 9.6% of the Gross Domestic Product (GDP), in addition to being responsible for 7.4% of jobs and 9.8% of wages in the country's economy (IBGE, 2022).

In order to aid understanding, this paper presents a review of the theoretical foundations related to the concepts of healthcare market concentration in Brazil, profitability indicators, and determinants of business combinations. Subsequently, the methodology used for the empirical investigation of the problem will be demonstrated, and finally, the results of the methods used and the final conclusions will be presented.

2 THEORETICAL REFERENCE

2.1 Healthcare Market Concentration in Brazil

According to Hiratuka, Rocha, and Sarti (2016), there are a number of factors that make the healthcare sector difficult to fit into conventional market regulation standards. This scenario provides the sector with a highly concentrated competitive dynamic, and in the case of healthcare, the creation of market power in relation to consumers is particularly more problematic than usual in other markets.

Processes of verticalization and horizontalization of companies in the supplementary health sector have been occurring since the early 2000s in order to integrate the services offered (Veloso; Malik, 2010). However, even though verticalization and horizontalization processes have been in place since the early 2000s, in recent years, given the particularity and possibility of foreign capital participation in companies in the segment that occurred in 2015 (Law n° 13,097/2015), there have been numerous mergers and acquisitions between companies in the segment.

For Veloso and Malik (2010), horizontal integration (horizontalization) occurs when similar organizations work together, forming a chain, while in vertical integration, different stages of the value chain are under the same command. In turn, Okano and Gomes (2020) understand that verticalization in healthcare corresponds to the union of different types of services performed by the same

organization, such as hospital services, clinical services, health plans, among others.

For Hiratuka, Rocha, and Sarti (2016), the process of concentration in the healthcare segment stems from the search for economies of scale, a fact that has already occurred on the international scene, as well as the need to comply with the regulation that took place in Brazil in 2000 with the creation of the ANS. It is important to note that this process was accompanied by changes aimed at the verticalization of activities.

Furthermore, these same authors argue that the entry of international operators into the Brazilian market may further leverage the consolidation of the sector, as well as reinforce the verticalization strategy. Furthermore, the search for scale and better cost and profitability conditions drives the sector's concentration process, which is also fueled by capitalization movements resulting from the internationalization of companies and financial funds in search of new areas for appreciation (Hiratuka; Rocha; Sarti, 2016).

Neoclassical theories suggest that a concentrated industry, i.e., one with a small number of large companies, is detrimental to competition because these companies act interdependently with each other, both in terms of price and production, and that high levels of market concentration can hinder the efficient allocation of resources (Kon A., 1999). Noce et al. (2005) and Heimann et al. (2015) argue that industrial concentration becomes one of the main structural determinants of competition, potentially affecting the strategies adopted by participating firms, economies of scale, market size and growth, as well as entry conditions.

In the literature, it is possible to observe the existence of empirical studies that seek to assess concentration levels and their impact on the supplementary health market. Internationally, Connor, Feldman, and Dowd (1998) assess the effects of market concentration and horizontal mergers on hospital costs and prices in the US market, while Halbersma et al. (2011) assess the market structure and negotiations between hospitals and insurers in the Netherlands. At the national level, Nunes (2014) assesses the effects of regulation on sector concentration. Abreu and Antonialli (2016) assess health insurance operators from the perspective of the ECD (Structure Conduct Performance) model.

According to Resende (1994), concentration indicators are usually used to assess the level of market concentration, and these come in two forms: summary or partial. To calculate the "summary" indicators, it is necessary to use all the information relating to the firms that make up the sector, with the "Hirschman-Herfindahl" (HHI) and "Theil Entropy Coefficient" (ET) indicators standing out among these. For "partial" indicators, only part of the data relating to all the firms in the sector is used, usually using information from the largest firms in the segment under analysis, with the "Concentration Ratio" (CR) being one of the most notable of these indicators.

The Hirschman-Herfindahl Index refers to the sum of the squares of each company's market share, which can vary between 0 and 1. The higher the HH, the higher the concentration in the sector. The Concentration Ratio (CR) index represents an order of concentration in which the concentration ratio of order k is

Revista Contabilidade Vista & Revista, ISSN 0103-734X, Universidade Federal de Minas Gerais, Belo Horizonte, v. 36, n. 2, p. 1-19, maio/ago. 2025.

5

a positive index that provides the market share of the k largest companies in the industry. The higher the CR, the higher the concentration of the sector.

According to the economic and financial atlas of supplementary health, published annually by the National Health Agency, when assessing the level of market concentration, the agency uses the C4 indicator as a parameter, which represents the sum of the market share of the four largest suppliers and the Hirchman – Herfindahl index, taking as a parameter the number of beneficiaries of each operator in the respective relevant market in which it operates.

The Hirschman-Herfindahl index, according to the Atlas, is the concentration indicator most used by antitrust authorities worldwide, and is even used in merger reviews conducted by the Administrative Council for Economic Defense (CADE).

2.2 Economic Profitability Indicators

When it comes to profitability, companies' main decisions are related to investments and financing. However, these decisions cannot be made independently, without a holistic view of the organization itself and its environment of interaction with other organizations. Decisions on investments and financing are made to safeguard the continuity and prosperity of the company, either through organic growth or through mergers and acquisitions (Kudlawicz et al., 2015).

Thus, one way to assess a company's financial health is by calculating profitability indicators, which are metrics that seek to measure a company's financial or economic return in relation to its assets, net worth, and/or investments. The main indicators used by the market to measure the profitability of companies are ROA (Return on Assets), ROE (Return on Equity), ROI (Return on Investment), and ROIC (Return on Invested Capital).

ROA is an indicator that shows profitability based on a comparison of a company's assets, i.e., the identification of the organization's ability to earn profits from its assets. ROE is measured by the ability to generate profits through the use of own resources, as evidenced by net equity. ROI is a performance indicator that seeks to highlight profitability through the relationship between net income and the cost of investment. ROIC, on the other hand, seeks to determine the return obtained on the capital invested in a given investment, based on what was made available/contributed with own resources and third-party resources, such as debt.

For Copeland (Copeland et al., 2002), ROIC as a performance analytical tool, by focusing directly on the company's operational performance, becomes a better analysis tool than other profitability indices such as ROE and ROA. Regardless, in this study, both metrics were used to verify which one would have the best explanatory efficiency.

2.3 Determinants for Business Combinations

The first mentions of the genesis of corporate concentrations show that this operation began in 1890 in the United States and, after this date, there was a rapid and dizzying process of growth in concentration movements: first, due to the emergence and multiplication of multinational corporations; later, with the

increasing complexity of these economic concentrations, in view of the proliferation of corporations; and, over the years, business concentrations have become even more pronounced with the aim of restructuring companies, seeking competitiveness in the international arena, and securing investments to expand the market share of companies, corroborating the evolution of financial markets and the volume of capital of existing companies. Thus, transnational and sprawling companies adopt different strategies to concentrate their activities, deriving from this concentration model the formation of corporate groups, a type of concentration configured by the acquisition of equity interests between companies (De Sousa Barros & Gomes Rodrigues, 2014).

According to Hess (2007), organic growth is achieved when the company is committed to customer satisfaction and employee engagement, which are at the core of profitability. This growth is a long-term strategy for any company, representing the vitality and dynamism of the business, obtained through the company's internal resources or financed through third-party capital. Inorganic growth, on the other hand, is the process of growing assets and sales through new business opportunities arising from mergers, acquisitions, divestitures, spin-offs, among others. In contrast to organic growth, this type of expansion allows companies to quickly reach dimensions that would take longer to achieve through organic growth (Hess, 2007). In today's globalized economy, mergers and acquisitions have played a decisive role in improving competitiveness and the performance of company managers (Huh, 2015).

According to Cox (2006), there are several reasons that motivate companies to acquire other companies, with no mutually exclusive reasons for specific combinations, and there may be one or more reasons for implementation. Thus, among the various reasons that can lead to a business combination, there may be reasons associated with investment theory due to undervaluation in the stock market. For Firth (1980), most of the reasons that generate business combination operations are based on theories of the firm, where competitive market forces encourage managers to make decisions that maximize the value of firms and the wealth of shareholders.

In addition, among the various reasons that encourage companies to use merger and acquisition strategies are entry into or access to new markets, economies of scale, increased market share, generation of synergies, acquisition of knowledge and technologies, tax benefits, increased utility for company managers, risk reduction, and even system stability (Hoffmann et al., 2017). Finally, in an extremely competitive environment, companies are looking for advantages that will keep them in the market and ensure greater profitability (Bonelli, 2000). This fact is corroborated by Pessanha et al. (2012), who consider the hypothesis that mergers and acquisitions positively affect the profitability of acquiring firms.

In this sense, the following research hypotheses will be tested in this study:

H_1: Market concentration is positively related to the probability of business combinations occurring.

H_2: Profitability is positively related to the probability of business combinations occurring.

These hypotheses seek to show whether there is a relationship between the performance of supplementary health companies and levels of market concentration in defining the probability of a business combination.

3 METHODOLOGICAL PROCEDURES

This study analyzes companies in the supplementary health segment, with the aim of investigating whether return and market concentration are determining factors for the probability of business combinations (M&A) occurring. It is hoped that the results will contribute to filling the research gap that has been little explored in the literature on the supplementary health segment.

To answer the research objective, the logistic regression technique will be used, which according to Field (2009) is a multiple regression with a categorical (dichotomous or discrete) output variable and predictor variables (continuous or categorical). For Fávero et al. (2009), this regression method estimates the parameters by maximizing likelihood, with the advantage of not requiring homogeneity of variance and normality of residuals, as is the case with multiple regression.

Logistic regressions were performed using R-Studio software, version 4.4.1, through the stepwise procedure, using a standard *cutoff* of 0.5. Subsequently, analyses of the areas under the ROC (*Receiver Operating Characteristic*) curve were performed to analyze and compare the effectiveness and efficiency of the models through their sensitivity and specificity (Hair Jr. et al., 2010).

3.1 Sample and Data Collection

This study is based on secondary data collected from the ANS (National Health Agency) website and the CNES website (National Registry of Health Establishments), based on publications, yearbooks, bulletins, and tables, as well as information collected from other data sources, such as the ABRAMED (Brazilian Association of Diagnostic Medicine) website, B3 (Brazilian Stock Exchange), and CADE (Administrative Council for Economic Defense). To prepare the study, a sample of 707 Supplementary Health companies was used, which had active registrations in April 2024 and active beneficiaries until December 2022, classified by ANS (National Health Agency) into the categories of Self-Management, Medical Cooperatives, Philanthropy, Group Medicine, and Specialized Health Insurers, totaling 6,618 observations.

Financial data was obtained from financial statements for the years 2011 to 2022, extracted from the ANS (National Health Agency) website and the CNES (National Registry of Health Establishments) website. To identify the occurrence of business combination transactions, we analyzed the proceedings related to acts of concentration in the supplementary health chain markets, submitted for approval by CADE (Administrative Council for Economic Defense) in the same period. At this stage, we identified 232 proceedings related to acts of concentration.

3.2 Study Variables

The dependent variable for the theoretical model corresponds to the identification of mergers or acquisitions, taking as a parameter the existence or not of acts of concentration in the supplementary health sector submitted for analysis by the Administrative Council for Economic Defense (CADE) in the period from 2011 to 2022. The "*Dummy*" variable is a categorical variable, such that companies that did not carry out mergers or acquisitions were coded 0 (no occurrence), while companies that carried out such operations were coded 1 (occurrence).

For independent variables in the theoretical model, the performance of the companies was assigned, as well as the degree of concentration in the supplementary health sector. Company performance was measured using profitability indicators (ROA - Return on Assets and ROIC - Return on Invested Capital), while the degree of concentration was calculated based on the Herfindahl-Hirschman Index (HHI) in relation to the parameters of active beneficiaries and total assets, according to equation 1..

$$HHI_t = \sum_{i=1}^{N} p_i^2$$

(1)

Where: for the HHI, the indicator is calculated for each period (t) by summing the square of the share (p) of all supplementary health institutions (i ranging from 1 to N), using the number of active beneficiaries and total assets as parameters.

In the main analysis, the supplementary health performance indices (IDSS) and the degree of corporate indebtedness (GE) were used as control variables. The IDSS variable represents the index composed of the performance evaluation of health plan operators that make up the Supplementary Health Qualification Program, defined by the National Supplementary Health Agency (ANS), consisting of indicators that make up a score from 0 (worst) to 1 (best), distributed across four dimensions: Health Care Quality and Attention, Access Guarantee, Market Sustainability, Process Management, and Regulation. The degree of corporate indebtedness (GE) refers to the sum of current and non-current liabilities divided by the company's total assets. The data used in the construction of these variables are shown in Table 1.

Table 1
Study variables

Variable	Measurement	Data	Source
Return on Assets (ROA)	Net Income (NI) divided by Total Assets (TA), multiplied by 100.	ANS	(Santos et al., 2018) (Bomfim & Callado, 2016)
Return on invested capital (ROIC)	Net operating profit after taxes, divided by invested capital, with the entire amount allocated by the company considering the sum	ANS	(Qian & Zhu, 2018)
	of shareholders' and third-party capital.		

Revista Contabilidade Vista & Revista, ISSN 0103-734X, Universidade Federal de Minas Gerais, Belo Horizonte, v. 36, n. 2, p. 1-19, maio/ago. 2025.

9

HHI index for active beneficiaries (HHIPb)	Herfindahl–Hirschman Index (HHI) for active beneficiaries, calculated according to the model in equation 1.	ANS	(Nunes, 2014) (Hiratuka et al., 2016)
HHI Index for Total Assets (HHIPt)	Herfindahl–Hirschman Index (HHI) in relation to total assets, calculated according to the model in equation 1.	ANS	(Nunes, 2014) (Hiratuka et al., 2016)
Mergers and Acquisitions carried out during the Period (Dummy)	A dummy variable of 0 indicates absence and 1 indicates the presence of mergers carried out during the period.	CADE	(Santos et al., 2018)
Degree of indebtedness (GE)	Current liabilities plus non-current liabilities divided by total assets multiplied by 100.	ANS	(Vieira et al., 2017)
Supplementary Health Performance Index (IDSS)	Index composed of the performance evaluation of health plan operators that make up the Supplementary Health Qualification Program, defined by the National Supplementary Health Agency (ANS), consisting of indicators that make up a score from 0 (worst) to 1 (best), distributed across four dimensions: Health Care Quality and Attention, Access Guarantee, Market Sustainability, Process Management, and Regulation.	ANS	

Source: Prepared by the authors.

The treatment of outliers disregarded data with Z-scores greater than 3 and less than minus 3, as these are generally considered extreme values (Levine, 2008).

3.3 Study Model

To test hypotheses H_1 and H_2, equation 2 was estimated based on a logistic regression model where the business combination events identified by CADE were tested to be explained by return and market concentration:

$$y = \frac{e^{\wedge}(\beta_0 + \beta_1 R_i + \beta_2 Ge_i + \beta_3 Pb_i + \beta_4 Id_i + \varepsilon_{i,})}{(1 + e^{\wedge}(\beta_0 + \beta_1 x 1 + \beta_2 x 2 + \beta_3 x 3 + \beta_4 x 4 + \varepsilon))}$$

(2)

where: y provides the probability of success of the categorical variable related to the occurrence or non-occurrence of business combination events (Dummy: 0 – Non-occurrence and 1 – Occurrence). The *dummy* is the indicator of concentration acts evaluated by the Administrative Council for Economic Defense (CADE) in period t, based on the processes that occurred between 2011 and 2022 and extracted from CADE itself, and was used as a proxy for the existence of business combinations.

Where: R is the Return on Invested Capital (ROIC) i, in period t, calculated according to equation 3, considering: NOPAT (*Net Operating Profit After Taxes*), i.e., Net Operating Profit after taxes; INVESTED CAPITAL, being the entire amount allocated by the company considering the sum of shareholders' and third parties' capital.

$$ROIC_{i,t} = \frac{NOPLAT_{i,t}}{Investe\ Capital_{i,t}}$$

(3)

Where: RO is the Return on Assets (ROA) at time t, calculated according to equation (4), considering: Net Profit (NP) divided by Total Assets (TA), multiplied by 100.

$$ROA_{i,t} = \frac{Net\ Profit_{i,t}}{Total\ Assets_{i,t}}\ x\ 100$$

(4)

Where: GE is the degree of indebtedness, at time t, calculated according to equation (5), considering: Current Liabilities (CL) plus Non-Current Liabilities (NCL), divided by Total Assets (TA), multiplied by 100.

$$Ge_{i,t} = \frac{(CL + NCL)_{i,t}}{TA_{i,t}}\ x\ 100$$

(5)

Where: Pb is the Herfindahl–Hirschman Index (HHI) at time t, calculated according to equation (1), in relation to active beneficiaries.

Where: Pt is the Herfindahl–Hirschman Index (HHI) at time t, calculated according to equation (1), in relation to total assets.

Where: IDSS is the Supplementary Health Performance Index (IDSS) at time t, composed of the performance evaluation of health plan operators that are part of the Supplementary Health Qualification Program, defined by the National Supplementary Health Agency (ANS), consisting of indicators that comprise a score from 0 (worst) to 1 (best), distributed across four dimensions: Health Care Quality and Attention, Access Guarantee, Market Sustainability, Process Management, and Regulation.

To perform the logistic regression model estimates, the *stepwise* procedure was used, including variables at 5% significance levels and removing variables at 10% significance levels. To this end, Wald's statistic was used to verify whether the estimated parameters are different from zero (Fávero et al., 2009).

Revista Contabilidade Vista & Revista, ISSN 0103-734X, Universidade Federal de Minas Gerais, Belo Horizonte, v. 36, n. 2, p. 1-19, maio/ago. 2025.

11

4 ANALYSIS AND DISCUSSION OF RESULTS

Tables 2, 3, and 4 present the correlation matrix and descriptive statistics of the study variables. In the correlation matrix (Table 2), it is possible to verify the positive correlation between the variables, whether in the absence or presence of business combinations (*Dummy* 0 and 1), except for the variable GE (Degree of Indebtedness), which presents a negative correlation in both cases. Looking at the profitability and concentration variables in relation to the occurrence of M&A transactions, it is possible to see that the occurrence of business combination transactions corroborates the increase in the correlation between the variables.

Table 2
Correlation between variables.

Variable Correlation - Dummy 0						
	IDSS	**GE**	**ROA**	**ROIC**	**HHI$_{Pb}$**	**HHI$_{Pt}$**
IDSS	1					
GE	0.0120	1				
ROA	0.0829	(0.2009)	1			
ROIC	0.0815	(0.2420)	0.9119	1		
HHI$_{Pb}$	0.0586	0.0775	(0.0153)	(0.0058)	1	
HHI$_{Pt}$	(0.0049)	(0.0315)	(0.0099)	(0.0056)	0.2443	1
Variable Correlation - Dummy 1						
	IDSS	**GE**	**ROA**	**ROIC**	**HHI$_{Pb}$**	**HHI$_{Pt}$**
IDSS	1					
GE	(0.0320)	1				
ROA	0.2333	(0.1646)	1			
ROIC	0.2103	(0.2199)	0.9521	1		
HHI$_{Pb}$	0.1839	(0.0209)	0.0723	0.0527	1	
HHI$_{Pt}$	0.0860	(0.0888)	0.0390	0.0251	0.4862	1

Source: Prepared by the authors.

Table 3
Descriptive statistics of the series used in the study

Measure	Dummy	HHI$_{Pb}$	HHI$_{Pt}$	GE	ROIC	ROA	IDSS
Average	0	0.0000	0.0000	49.9318	0.0911	5.7977	0.7056
	1	0.0002	0.0002	58.1899	0.1192	7.2368	0.7441
Median	0	0.0000	0.0000	52.9006	0.0835	5.2184	0.7269
	1	0.0000	0.0000	58.0520	0.0975	5.3487	0.7457
Standard Deviation	0	0.0000	0.0001	22.9198	0.1256	10.6391	0.1528
	1	0.0004	0.0010	17.3439	0.1451	9.4951	0.1566
Variance	0	0.0000	0.0000	525.3163	0.0158	113.1902	0.0234
	1	0.0000	0.0000	300.8182	0.0211	90.1565	0.0245

Note 1: HHI = Herfindahl-Hirschman Index
Source: Prepared by the authors.

Table 4
Student's t-test of the series used in the study

Measure	HHI$_{Pb}$	HHI$_{Pt}$	GE	ROIC	ROA	IDSS
t-statistic	(28.0642)	(15.4669)	(5.2262)	(3.4276)	(1.3077)	(0.7948)
p-value	0.000	0.0000	0.0000	0.0003	0.0955	0.2134

Note 1: *** significant at 1% ** significant at 5%
Source: Prepared by the authors.

When purchasing samples from companies that underwent concentration analysis by CADE (*Dummy* 0 and 1) and analyzing the means of the variables, it was possible to verify the existence of a difference between them. This finding is confirmed after submitting the same data to a two-sample test assuming equivalent variances, making it possible to obtain the result that the difference in the samples is statistically significant (P<0.05), that is, regardless of whether or not business combinations occurred, except for the IDSS and ROA variables, which presented a P value higher than the significance index of 0.05.

Table 5

Model test results – Logistic Regression – ROIC, HHIPb, HHIPt, IDSS, and GE

Variable	Estimated Coefficient	Standard Error	Z-value	Significance	
ROIC	1.894e+00	4.208e-01	4.501	6.76e-06	***
HHI$_{Pb}$	1.722e+04	1.476e+03	11.667	<2e-16	***
HHI$_{Pt}$	3.258+02	4.281e+02	0.761	0.4466	' '
IDSS	-8.780e-01	3.435e-01	-2.556	0.0106	*
GE	1.248e-02	2,653e-03	4.704	2.52e-06	***

Description of Variables:
ROIC = Return on invested capital; HHIPb = Herfindahl–Hirschman Index (HHI) in relation to active beneficiaries; HHIPt = Herfindahl–Hirschman Index (HHI) in relation to total assets; IDSS = Supplementary Health Performance Index; GE = degree of indebtedness
Note 1: *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level.
Source: Prepared by the authors.

It is important to note that among the profitability variables tested, ROIC was chosen because it presented better explanatory efficiency, despite obtaining similar results when using ROA. The results shown in Table 5 demonstrated that most of the variables used were statistically significant at the usual levels of significance, with the exception of the HHIPt variable.

With regard to profitability (ROIC), it is possible to state from the results calculated and shown in Table 5 that this variable can be considered a determining factor for the occurrence of business combination transactions in the Brazilian supplementary health segment. And, since profitability constitutes the return on invested capital, a company with good profitability is one whose resources are being well applied, thus enabling inefficient companies to be subject to merger and/or acquisition by companies that are operating with positive returns and in a state of solvency, corroborating national and international studies that affirm the influence of company profitability on M&A operations, such as Gorton et al. (2009) and Santos et al. (2018).

This same logic is associated with the level of market concentration, more specifically in relation to the total number of beneficiaries, demonstrating that companies with more active beneficiaries tend to carry out business combinations, either because smaller companies tend to have greater difficulty in facing bottlenecks in the sector, corroborating in this sense with Nunes(2014) or because companies with higher concentration rates seek, through business combinations, to reduce production costs and increase goods and services through economies of scale, as presented by Hiratuka et al. (2016).

The results also show that the GE variable, added to the model to present other elements that could prove to be determinants for the occurrence of mergers and acquisitions, also showed statistically significant indices for determining the probability of mergers and acquisitions occurring, since this type of operation has effects on reducing payment capacity and, consequently, increasing the need to raise funds from third parties, which is in line with the results found by Vieira et al. (2017).

The IDSS variable, which, like GE, was included in the model for control purposes and to present new elements of probability for the occurrence of mergers and acquisitions, proved to be significant at 10%, demonstrating that companies with the worst indicators before the ANS are likely to participate in business combination transactions.

Table 6 presents the results related to the estimation of the logistic regression model used for the period under analysis.

Table 6
Model estimation results – Logistic Regression

Model		
	Area under the ROC curve	0.775
N = 6,618	Overall Accuracy Percentage	93.61
	Nagelkerke's Pseudo R^2	0.1822017

Source: Prepared by the authors.

The results shown in the table above demonstrate that the model has good explanatory and predictive power, as evidenced by the area under the ROC curve, which, according to Fávero et al. (2009), is usually considered acceptable discrimination when the area under the curve is between 0.7 and 0.8. The area under the ROC curve establishes how the combined degrees of sensitivity and specificity jointly interfere with the overall accuracy percentage of the model, and the *cutoff* used can increase or reduce the accuracy of the classification of companies with or without acts of concentration. Thus, it should be noted that a standard cutoff of 0.5 was established for regression.

Regarding the analysis of the model, it should be noted that, unlike the traditional regression model, logistic regression does not have a summary measure of the variation in the dependent variable explained by the model, such as the coefficient of determination. For Hair Jr. et al. (2010), the quality of the model fit is given by the pseudo R^2 (the most commonly used being the pseudo R^2 and Nagelkerke's pseudo R^2 are most commonly used) and by examining the predictive capacity of the model (confusion matrix), which can guide the researcher in relation to the explanatory power of the model.

Thus, although Nagelkerke's pseudo R^2 has a value of 0.18, the model has an overall accuracy level of 93.61%, corroborating the quality of the logistic regression model.

Additionally, analyses of the logistic regression model were performed by region, using variables with statistical significance at levels typical for the model and already shown in Table 5, namely: ROIC, HHIPb, IDSS, and GE.

Table 7
Resultado dos testes do modelo – Regressão Logística - ROIC, HHIPb, IDSS e GE – Por Região

Region	No. of Observations	Variable	Estimated Coefficient	Standard Error	Z-value	Significance	
South	1.258	ROIC	3.396e+00	9,950e-01	3,413	0.000643	***
		HHI$_{Pb}$	2.188e+04	3.054e+03	7.164	7.82e-13	***
		IDSS	1.198e-01	8,852e-01	0.135	0.892358	' '
		GE	3.082e-02	7.731e-03	3.987	6.69e-05	***
Southeast	3,983	ROIC	1,728+00	5,377e-01	3,213	0.00131	**
		HHI$_{Pb}$	2.675e+04	2.485e+03	10,764	<2e-16	***
		IDSS	(1.002e+00)	4.336e-01	-2.312	0.02080	*
		GE	1.005e-03	3.263e-03	0.308	0.75813	' '
Northeast	637	ROIC	1.495e+00	1,180e+00	1,267	0.205147	' '
		HHI$_{Pb}$	2.208e+04	1.018e+04	2.169	0.030066	*
		IDSS	(1.748e+00)	1.062e+00	(1.645)	0.09990	.
		GE	3.5181e-02	8.051e-03	4.449	8.64e-06	***
Midwest	552	ROIC	(2.014e-02)	2,262e+00	(0.009)	0.9929	' '
		HHI$_{Pb}$	(1.173e+07)	7.214e+06	(1.626)	0.1040	' '
		IDSS	(4.369e+00)	1.757e+00	(2,487)	0.0129	*
		GE	3.011e-02	1.436e-02	2.096	0.0361	*

Description of Variables:
ROIC = Return on invested capital; HHIPb = Herfindahl–Hirschman Index (HHI) in relation to active beneficiaries; GE = degree of indebtedness.
Note 1: *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level.
Source: Prepared by the authors.

Table 7 presents the results for the South, Southeast, Northeast, and Midwest regions. The lack of information for the North region is due to the absence of business combinations during the period under analysis.

The results show that the HHIPb and ROIC variables are statistically significant at usual levels for the South and Southeast regions, corroborating the understanding that companies with more active beneficiaries are more likely to carry out business combination transactions, just as inefficient companies tend to be the target of mergers or acquisitions by companies that are operating with positive returns and in a state of solvency.

In turn, the GE variable is statistically significant for the South, Northeast, and Midwest regions, corroborating the probability of business combinations occurring and, therefore, being in line with the general model. The IDSS variable, on the other hand, has statistical significance indices at usual levels for the Southeast and Midwest regions.

5 CONCLUSIONS

From the results obtained, it was possible to verify that some variables used in the model showed statistical significance at the usual levels of significance, and therefore, it is believed that the objective of the study has been achieved. The first hypothesis was partially confirmed, i.e., market concentration can be considered a determining factor for the occurrence of mergers and acquisitions when using the HHIPb variable, which presented results with statistical significance indices, contrasting with the result presented by the HHIPt variable.

The second hypothesis was fully confirmed, and it is possible to affirm, based on the results presented for the ROIC variable (chosen because it presents better explanatory efficiency, despite obtaining similar results when using ROA), that profitability can be considered a determining factor for the occurrence of mergers and acquisitions.

Complementarily, even though it was not considered a main research hypothesis, but was included in the model to seek additional explanatory elements, it was possible to verify that the GE variable also presented a significance index with a positive meaning, being a determining factor for the occurrence of mergers and acquisitions, a fact also observed in the analysis for the IDSS variable, which showed significance, making it clear that the worse the company's performance in the ANS assessment, the more evident the probability of conducting business transactions.

The perspective of this study is based on the determining variables of business operations in the complementary health segment, based on the period from 2011 to 2022, and cannot be generalized or used to analyze the synergies of companies that carried out this type of operation, either during the analyzed period or after that period.

Finally, as suggestions for future research, we recommend evaluating the use of other performance measures, other than return on assets or return on invested capital, to verify whether the relationship for the occurrence of business transactions persists, as in the present study.

REFERÊNCIAS

ABRAMED. (2022). Painel Abramed 2021 – O DNA do Diagnóstico. https://abramed.org.br/publicacoes/painel-abramed/painel-abramed-2021-o-dna-do-diagnostico/

Abreu, A. A., & Antonialli, L. M. (2016). Aplicação do paradigma ECD (Estrutura Conduta Desempenho) ao mercado de saúde suplementar brasileiro: Considerações sobre operadoras classificadas pelo índice de reclamações da ANS. *Espacios, 37*(30). https://www.revistaespacios.com/a16v37n30/16373006.html

Andrade, M. V., Carolina, A., Helena, M., & Lima, W. (2015). Estrutura de Concorrência no Setor de Operadoras de Planos de Saúde no Brasil. http://www.ans.gov.br

Bomfim, E. T. Do, & Callado, L. A. C. (2016). Análise dos efeitos provocados pelas operações de fusões e aquisições no desempenho econômico-financeiro de empresas brasileiras. Contabilidade Vista & Revista, 27(3), 105-123. https://revistas.face.ufmg.br/index.php/contabilidadevistaerevista/article/view/3044

Bonelli, R. (2000). Fusões e Aquisições no Mercosul. Relatório de Pesquisas IPEA. https://repositorio.ipea.gov.br/bitstream/11058/2333/1/TD_718.pdf

Claudino, B. H. C. (2019). *Impacto da Verticalização das Operadoras de Saúde no Brasil*: Uma análise do retorno dos ativos do setor. Dissertação de Mestrado Profissional em Economia, Fundação Getúlio Vargas, Escola de Economia de São Paulo, Brasil. https://bibliotecadigital.fgv.br/dspace/handle/10438/28077

Connor, R. A., Feldman, R. D., & Dowd, B. E. (1998). The effects of market concentration and horizontal mergers on hospital costs and prices. *International Journal of Phytoremediation, 21*(1). https://doi.org/10.1080/13571519884495

Copeland, T., Koller, T., & Murrin, J. (2002). *Avaliação de Empresas* – Valuation: Calculando e gerenciando o valor das empresas. (3a. Ed). Pearson Makron Books.

Cox, R. A. K. (2006). Mergers and acquisitions: A review of the literature. *Corporate Ownership & Control, 3*(3), 55-59.

De Sousa Barros, T., & Gomes Rodrigues, A. M. (2014). Concentração de atividades empresariais: uma análise das combinações de negócios e dos ativos intangíveis no Brasil. Revista de Gestão, Finanças e Contabilidade, 4(2), 112-136. https://revistas.uneb.br/index.php/financ/article/view/566/574

Fávero, L. P. L., Belfiore, P. P., Silva, F. L. da, & Chan, B. L. (2009). *Análise de Dados*: Modelagem Multivariada para Tomada de Decisões. (Elsevier, Ed.; 1a). 2009.

Ferreira, A. de C., & Menezes, J. P. C. B. (2016). Avaliação da Concentração de Mercado Das Operadoras de Saúde no Brasil. *Revista Eletrônica Multidicisplinar FACEAR*, 3(5), 1-15.

Field, A. (2009). *Descobrindo a estatística usando o SPSS*. Artmed.

Firth, M. (1980). Takeovers, Shareholder returns, and the theory of the firm. *The Quarterly Journal of Economics, 94*(2), 235-260. https://doi.org/10.2307/1884539

Gordon, G., Kahl, M., & Rosen, R. J. (2009). Eat or be eaten: A theory of mergers and firm size. *The Journal Of The American Finance Association, 64*(3), 1291–1344.

Gort, M. (1969). An economic disturbance theory of mergers. *The Quarterly Journal of Economics*, *83*(4), 624–642. https://doi.org/10.2307/1885453

Hair Jr., J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis*: Vol. 7o (N. P. H. Upper Saddle River, Ed.; 7a ed).

Halbersma, R. S., Mikkers, M. C., Motchenkova, E., & Seinen, I. (2011). Market structure and hospital-insurer bargaining in the Netherlands. *European Journal of Health Economics, 12*(6). https://doi.org/10.1007/s10198-010-0273-z

Heimann, J. de P., Gonçalves, K., Dresch, A. R., & da Silva, J. C. G. L. (2015). Concentração de mercado de molduras (Frame) importadas pelos estados unidos, período de 2005 a 2009. Cerne, 21(1). https://doi.org/10.1590/01047760201521011435

Hess, E. D. (2007). The Road to Organic Growth: How Great Companies Consistently Grow Marketshare from Within. McGraw-Hill.

Hiratuka, C., Rocha, M. A. M. da, & Sarti, F. (2016). Mudanças recentes no setor privado de serviços de saúde no Brasil: internacionalização e financeirização. In Brasil Saúde Amanhã: população, economia e gestão. https://doi.org/10.7476/9786557080931.0008

Hoffmann, V. E., Vieira, D. P., & Menezes, K. L. C. M. de. (2017). Tipos, Setores, Nacionalidade e Experiência: O Que Importa para o Sucesso das Estratégias De Fusão e Aquisição? *Revista Ibero-Americana de Estratégia, 16*(01), 22–37. https://doi.org/10.5585/riae.v16i1.2395

Huh, K. S. (2015). The performances of acquired firms in the steel industry: Do financial institutions cause bubbles? *Quarterly Review of Economics and Finance, 58*, 143–153. https://doi.org/10.1016/j.qref.2015.03.001

IBGE. (2023). Censo demográfico 2022 - identificação étnico-racial da população, por sexo e idade resultados do universo. https://biblioteca.ibge.gov.br/index.php/biblioteca-catalogo?view=detalhes&id=73105

Jensen, M. C. (1986). Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *American Economic Review, 76*(2). http://papers.ssrn.com/abstract=99580.

Kon A. (1999). Economia Indústrial. Nobel. https://www.google.com.br/books/edition/Economia_industrial/vYgXX5GKbm8C?hl=pt-BR&gbpv=1&dq=inauthor:%22Anita+Kon%22&printsec=frontcover

KPMG. (2022). Fusões e Aquisições - 2021 4o Trimestre. https://assets.kpmg/content/dam/kpmg/br/pdf/2022/3/KPMG_Fus%C3%B5es _e_Aquisi%C3%A7%C3%B5es-2021.pdf

Kudlawicz, C., Steiner Neto, P. J., & Frega, J. R. (2015). Homogeneidade e Rentabilidade: O caso das Operadoras de Planos de Saúde. *Revista de Informação Contábil, 9*(1), 60-67.

Levine, D. M. (2008). *Estatística - Teoria e Aplicações (5a Ed.).* LTC.

Noce, R., Lopes Da Silva, M., Miranda, R. M., Carvalho, A., & Soares, T. S. (2005). Concentração das exportações no mercado internacional de madeira Serrada. *Revista Árvore, 29*(3), 431-437.

Nunes, A. (2014). A Concentração no Mercado de Saúde Suplementar no Brasil. *PESQUISA & DEBATE, 25(2),* 51–68. https://revistas.pucsp.br/index.php/rpe/article/view/19534

Okano, M. T., & Gomes, J. G. C. (2020). Análise da verticalização dos serviços de saúde: estudo exploratório no sistema produtivo da saúde suplementar no Brasil. *Research, Society and Development, 9*(2). https://doi.org/10.33448/rsd-v9i2.2151

Oliveira, L. M., Menezes, J. P. C. B., Ribeiro, M., Gonçalves, M. A., & de Souza, M. C. (2021). Analysis of network dynamics of market concentration in healthcare companies in brazil. *Saude e Sociedade, 30*(3). https://doi.org/10.1590/S0104-12902021190785

Onida de Araujo, M. L., Cambiriba França, E., Lopes da Silva, F., & Pelucio Grecco, M. C. (2022). Impacto da Covid-19 na sustentabilidade financeira das operadoras de planos de saúde no Brasil. *Revista Eletrônica Do Departamento de Ciências Contábeis & Departamento de Atuária e Métodos Quantitativos (REDECA), 9*, e58519. https://doi.org/10.23925/2446-9513.2022v9id58519

Postma, J., & Roos, A. F. (2016). Why healthcare providers merge. *Health Economics, Policy and Law, 11*(2). https://doi.org/10.1017/S1744133115000304

Qian, J., & Zhu, J. L. (2018). Return to Invested Capital and the Performance of Mergers and Acquisitions. *Management Science, 64*(10), 4818–4834. https://doi.org/10.1287/mnsc.2017.2766

Resende, M. (1994). Medidas de Concentração Indústrial : Uma Resenha. *Análise Econômica, 12*(21 e 22). https://doi.org/10.22456/2176-5456.10488

Rodrigo Gomes Pessanha, G., Sáfadi, T., Lelis Leal Calegario, C., & Neves de Ázara, L. (2012). Impactos das estratégias de fusão e aquisição na rentabilidade dos bancos adquirentes: uma aplicação dos modelos de intervenção no setor bancário brasileiro. *Revista de Administração Mackenzie, 13*(5), 101-134.

Roll, R. (1986). The Hubris Hypothesis of Corporate Takeovers. *The Journal of Business, 59*(2), 197–216.

Santos, T. A. , C. L. L., & de Melo Carvalho, F. (2018). Fusões e aquisições na indústria manufatureira: uma análise econométrica das companhias de capital aberto. *Revista de Administração Conteporânea, 20*, 102–119. https://doi.org/10.5007/2175-8077.2018

Veloso, G. G., & Malik, A. M. (2010). Análise do desempenho econômico-financeiro de empresas de saúde. *RAE Eletrônica,* 9(1). https://doi.org/10.1590/s1676-56482010000100003

Vieira, L. B., Brito, S. S. B., Santana, J. R. B., Sanches, S. L. R., & Galdamez, E. V. C. (2017). Reflexo das operações de fusões e aquisições nos indicadores financeiros das empresas brasileiras de capital aberto. *Revista de Gestão - REGE*, 24, 234–246.