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An appraisal of Brazilian private health plan operators' economic-financial conditions: a note on finance and regulation

Una evaluación de la situación económico-financiera de los operadores brasileños de seguros de salud: una nota sobre finanzas y regulación

Avaliação da condição econômico-financeira de operadoras brasileiras de planos de saúde: uma nota sobre finanças e regulação

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Abstract

Objective: This study aims to evaluate the economic-financial performance of Brazilian private health plan operators and investigate possible sources of relative variations in the studied indicators. The article also discusses the question of regulation based on an economic-financial analysis of the regulated entities.

Methodology: this is an empirical, analytical study with analysis and inference based on secondary data. The methodological base of the article is comprised of standardized economic-financial indicators, indicators adapted to the operational specificities of private healthcare plan operators and multiple range tests. The database in panel form was elaborated using information published by the National Private Healthcare Regulatory Agency and refers to a sample containing the fourteen largest health plan operators in activity in Brazil.

Results: It is concluded that the health plan operators are well-situated in economic-financial terms and that the form of corporate organization, the relative size of the market and the operators' regional markets have a significant influence on their performance. It is considered opportune to discuss whether the current regulatory model for private health provision in Brazil is adequately fulfilling its declared objective of ensuring the continuity of service while charging reasonably modest rates.

Study contributions: the study contributes by showing how a relatively simple technique can benefit not only the regulatory process but also the evaluation of the regulation itself. It further contributes by revealing that the healthcare plan operators in Brazil are in a good situation in economic-financial terms thereby raising the question as to whether the current regulatory model for private health provision in Brazil is adequately fulfilling its declared objective of ensuring the continuity of service while charging reasonably modest rates.

Keywords: Private Healthcare; Health Plan Operators; Economic-financial Performance; Multiple Ranges Test; National Private Healthcare Regulatory Agency.

Resumen

Objetivo: Este estudio tiene como objetivo evaluar el desempeño económico y financiero de las compañías de seguros de salud brasileñas e investigar posibles fuentes de variaciones relativas en las tasas estudiadas. El artículo también analiza el tema de la regulación con base en el análisis económico y financiero de las entidades reguladas.

Metodología: Se trata de un estudio empírico-analítico, con análisis e inferencia estadística de datos secundarios. La base metodológica del artículo comprende indicadores económico-financieros estandarizados, indicadores adaptados a las especificidades operativas de los operadores de planes de salud y pruebas de múltiples amplitudes. La base de datos del panel se elaboró a partir de información publicada por la Agencia Nacional de Salud Complementaria y comprende una muestra que contiene los catorce mayores operadores de planes de salud en funcionamiento en Brasil.

Resultados: Se concluyó que los operadores de planes de salud analizados se encuentran bien posicionados en términos económicos y financieros. También se concluyó que la forma de organización empresarial, el tamaño relativo y el mercado regional del operador tienen una influencia significativa en el desempeño de los operadores de planes de salud. En esta ocasión,

es posible discutir si el modelo actual de regulación complementaria en salud en Brasil es adecuado para lograr el objetivo de continuar el servicio bajo modalidad tarifaria.

Contribuciones del Estudio: Con respecto a las contribuciones, el artículo demuestra que una técnica relativamente simple puede contribuir tanto al proceso regulatorio como a la evaluación de la regulación. En particular, también contribuye al mostrar que los operadores de planes de salud en Brasil están bien posicionados en términos económico-financieros, lo que plantea la discusión del modelo actual de regulación de la salud complementaria en Brasil sobre los objetivos de continuidad del servicio bajo la modalidad tarifaria.

Palabras clave: Salud suplementaria; Operadores de salud; Desempeño financiero; Prueba de rango múltiple de Duncan; Agencia Nacional de Salud Complementaria.

Resumo

Objetivo: Este estudo objetiva avaliar o desempenho econômico-financeiro de operadoras brasileiras de planos de saúde e investigar possíveis fontes de variações relativas dos índices estudados. O artigo discute, ainda, a questão da regulação a partir da análise econômico-financeira dos entes regulados.

Metodologia: Trata-se de estudo empírico-analítico, com análise e inferência estatística de dados secundários. A base metodológica do artigo compreende indicadores econômico-financeiros padronizados, indicadores adaptados às especificidades operacionais das operadoras de planos de saúde e teste das amplitudes múltiplas. A base de dados em painel foi elaborada a partir de informações publicadas pela Agência Nacional de Saúde Suplementar e compreende uma amostra contendo as catorze maiores operadoras de planos de saúde em operação no Brasil.

Resultados: Concluiu-se que as operadoras de planos de saúde analisadas estão bem posicionadas em termos econômico-financeiros. Concluiu-se, ainda, que a forma de organização empresarial, o tamanho relativo e o mercado regional da operadora têm influência significativa sobre o desempenho das operadoras de planos de saúde. Desta feita, é possível se discutir se o modelo atual de regulação da saúde suplementar no Brasil é adequado para se atingir o objetivo de continuidade do serviço sob modalidade tarifária.

Contribuições do Estudo: No que tange às contribuições, o artigo demonstra que uma técnica relativamente simples pode contribuir tanto para o processo regulatório como da avaliação da regulação. Em particular, contribui ainda ao evidenciar que as operadoras de planos de saúde no Brasil estão bem posicionadas em termos econômico-financeiros, levantando a discussão do modelo atual de regulação da saúde suplementar no Brasil quanto aos objetivos de continuidade do serviço sob modalidade tarifária.

Palavras-Chave: Saúde Suplementar; Operadoras de Planos de Saúde; Desempenho Econômico-Financeiro; Teste das Amplitudes Múltiplas; Agência Nacional de Saúde Suplementar.

1 Introduction

The regulatory framework for private healthcare in Brazil is Law 9.656 enacted in 1998 which, among other aspects, instituted the National Private Healthcare Regulatory Agency

(*Agência Nacional de Saúde Suplementar - ANS*), the body responsible for regulating the healthcare insurance industry. Designed to curb natural monopolies and protect consumers' interests, regulation has represented progress in the consolidation of criteria for the functioning of health plan operators, that is, entities administrating, commercializing or making available health insurance plans (Pietrobon, Prado & Caetano, 2008; Andrade, Maia, Ribeiro, Lima & Carvalho, 2015).

The ANS regulation has market-orientated guidelines, liberating the determination of rates in the case of collective health insurance in the belief that compensatory bargaining power exists in the relations between operators and the beneficiaries of collective health plans. However, irrespective of its market-based orientation, the regulatory activity needs to tabulate and analyze data, not only to form future measures rather than merely subsidize them with information but also to enable continuous evaluation of their effectiveness as an integral part of the national health policy.

In fulfilling its legal attributions, since 2006 the ANS has monitored and verified the Brazilian private health sector. Currently, its main publications are the Yearbook (*Anuário*), the Prism (*Prisma*) and the Atlas. They compile a variety of economic-financial data on the companies of that sector. The regulatory board's constant effort to gather information on the sector companies is attested to by the extant literature on regulation which underscores the need to diminish asymmetry of information regarding the regulated bodies whether that be in regard to costs or demand (Stigler, 1971; Baron & Myerson, 1982; Lewis & Sappington, 1988).

This article endeavors to contribute, not only to the literature on private health insurance regulation but also to that on accounting and financing aspects (Soares, Thóphilo & Corrar, 2009; Guimarães & Alves, 2009; Aguiar, 2014; Sancovschi, Macedo & Silva, 2014), by addressing the following question; **What are the variables that determine the economic-financial performance of private health plan operators in Brazil?** In effect, the article evaluates the economic-financial situations of the Brazilian operators of private healthcare insurance and investigates possible sources of relative variations in the economic-financial indicators it studies resulting from different forms of organization, the state (or Federal District) of domicile of the company headquarters, the company's position in the market and the respective years of the data. On the theoretical side, the article demonstrates how an accounting analysis technique could contribute to the regulatory process. The analysis was able to count on data combined in a panel within the temporal frame of 2010 to 2015 (Sweeney, Williams & Anderson, 2013).

In addition to this introduction, the article is organized as follows: section 2 presents a review of the literature with a brief description of the sector and a summary of correlated studies; section 3 displays the theoretical formulations of the economic-financial performance measurements considered in this research and Duncan's multiple range analyses and describes the method used to compose the database; section 4 is devoted to an empirical analysis and presents a discussion of the results of the indicators and of the multiple range tests comparing them with other results found in the literature, and section 5 concludes the article.

2 Theoretical Reference Framework

2.1 Characterizing the private healthcare insurance sector

At its core, the relationship between consumers and healthcare insurance operators has the aspect of a bilateral contract-governed insurance. In it the customers are the insurees and the operators are the insurers and the healthcare insurance policy is the contract. The healthcare policy establishes that the insuree will pay a certain value to the insurer at a specified moment

and the latter, in turn, will formally commit to covering the costs or losses associated to certain specified events, to compensate for those payments at a certain period of time. The insurer combines the risks and collects the policy premiums from various insurees in the expectation that only a subset of them will require compensations equal to or greater than the premiums they have already contributed (Jost, 2009)

That kind of contractual relationship has certain specificities. Firstly, its viability depends on the insurers capacity to respond to the volume of processed compensations which on occasion may be greater than the total amounts received as policy premiums. Secondly, the insuree needs to be confident that the insurer, when called on to do so, will fulfill its obligations without resorting to any dubious devices such as depreciating the value of the loss or deliberately delaying payment. Thirdly, the insurance contract is an extensive, complex, contract of adherence, usually drawn up by the insurer, that leaves no room for negotiation and contains rigid clauses imposed on the insuree at the moment of calling for compensation. Lastly, the insuree is highly dependent on the market practices of the insurers which are capable of influencing his or her expectations regarding the extent of, and restrictions on the coverage foreseen in the contract terms.

In that context, the relations between consumers and health insurance operators are characterized by problems that arise from informational asymmetry. Adverse selection stems from the fact that, on the one hand, the insuree possesses more information on his or her personal propensity to claim compensation and being aware of that, the insurer must reevaluate the risk forecast and the payment values associated to the various categories of compensation, overestimating the value of the premium to be charged to a potential insuree and/or introducing exceptions in the contracts being offered. On the other hand, in the case of health services, unlike the case of a simple cash payment, the insuree is not always in a position to assess the quality of the proposed service provision and tends to demand, within the limits determined by the contract terms, a greater number of services as a quality factor (Jha & Baker, 2012).

The moral danger, also associated to informational asymmetry, is a function of the insuree's behavior after the services have been contracted, whether it be in relation to the risks he or she runs or in relation to the number of medical services the insuree feels to be adequate. Examples are when the person stops taking normal care of his or her health or seeks medical care without displaying the associated symptoms that would make it necessary. In the case of that moral risk, the insurer must also take such behavior into account in the business model, raising the value of the premiums, introducing contractual restrictions some of which may be vague, such as terms like 'necessary medical services' whereby a decision as to what is necessary is subsequent to a procedure of medical requisition and review in the light of established protocols (Jha & Baker, 2012).

In addition to questions associated to informational asymmetry, the private healthcare insurance sector has agency problems. An agency relationship arises when an individual, the agent, acts on behalf of another, the principal. The problem occurs when the agent's interests are different from those of the principal and consequently the agent does not make the best decisions on behalf of the principal. In the case of the healthcare sector, even though it is the insuree who decides whether to seek for a health service or not, the scope of the products and services he receives is determined by the actual service provider. Given that the service provider's remuneration is proportional to the diagnoses and treatments effectively carried out, the insuree is liable to receive the costliest and most protracted service available (Jha & Baker, 2012).

One way of addressing the problem of allocation in this sector involves establishing a set of protocols and rules that discipline the respective actors' behaviors. In the case of Brazil, there is the presence of a regulatory board, the ANS, which not only inspects and regulates the

sector but also proposes specific norms and guidelines for it. One important norm is the list of healthcare procedures, a list of the minimum of examinations, consultations, surgeries and other procedures that the health insurance schemes must make available to the insurees. That specified list of procedures curbs contractual exceptions and any discretionary behavior on the part of the operators and service providers and the procedures must be established in alignment with scientific protocols and with due attention for their possible impacts on the respective premiums.

2.2 The private healthcare insurance sector in Brazil

Pietrobon, Prado & Caetano (2008) explain that the current health system in Brazil, in alignment with the terms of the 1988 Federal Constitution, considers that health is a right of all Brazilian people and it is the duty of the State, by means of social and economic policies to not only foster direct health assistance but also to organize health protection and medical care. Against that background, the authors identify two extant health subsystems: the public system, represented by the direct assistance provided by the Unified Health System (*Sistema Único de Saúde* - SUS) and the private system made up of autonomous private services.

In Brazil, the private healthcare subsystem is organized according to the terms of Law 9.656 enacted in 1998 and it is regulated and inspected by the National Private Healthcare Regulatory Agency (*Agência Nacional de Saúde Suplementar* - ANS).

The regulation of the sector is justified by the strong presence of informational asymmetry insofar as the consumers have a limited capability for evaluating the service provider's capacity and the quality of service provision and the service providers have a limited capacity to provide the relevant services in the light of their lack of knowledge of important aspects such as patients' pre-existing diseases and their behavioral habits (Andrade and Lisboa, 2001).

Figure 1 illustrates the products and services chain in the private health sector. The relations between the supplier and service providers, partly regulated by the National Public Health Surveillance Agency (*Agência Nacional de Vigilância Sanitária* – ANVISA) guarantees the provision of materials, equipment, medicines and all the other inputs needed for healthcare service provision. A central part of that relationship is the healthcare provision contract which gives the beneficiary access to healthcare service as the counterpart benefit for the insuree's monthly insurance premium payment to the insurance operator. The difference between the sum of the monthly payments received and the sum of the operator's administrative expenses plus those of the service providers is what determines the operator's net financial results'.

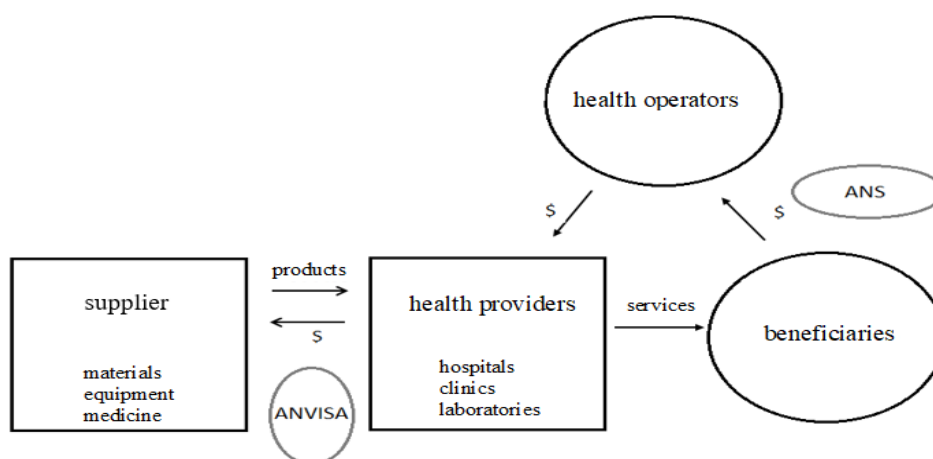


Figure 1 *The products and services chain in the private health sector.*
Source: adapted from IESS (2020).

Another important aspect of this market, in addition to the question of informational asymmetry, is the high cost of developing and producing new equipment and products based on research results.

In those conditions the private healthcare sector has evolved to include various specialized agents. From being a simple direct relationship between patient and doctor, the market today is marked by the presence of various different agents and types of contract designed to address the effects of its imperfections by means of risk management. Situated between patient and doctor we can now verify the presence of health plan operators and benefit administrators as well as the regulatory agency.

The health plan operators are legally constituted entities, duly registered with the ANS that administer, commercialize or provide healthcare plans. Such operators can count on their own or other duly accredited networks of healthcare services provision. The health plan itself, in turn, consists in the continuous provision of services or coverage of healthcare-related costs for an indeterminate period with no financial ceiling, paid for entirely or partially by the operator as the counterpart for the direct payment made by the service consumer. The health plans may be individual or collective in form.

The individual contract is drawn up between an individual and an operator for the purpose of healthcare provision to the plan holder and his or her dependents, whereas the collective contract is drawn up between an operator and a legally constituted entity to cover healthcare for the entity's employees and their dependents. The collective contracts can be classified as corporate contracts or adhesion contracts (Albuquerque et al., 2008).

There is an important difference between those two forms of healthcare plan in regard to their regulation by the ANS. While the agency inspects and guarantees the plan coverage in both cases, the prices are regulated in different ways. In the case of individual plans, the ANS regulates any adjustments to the rates being charged, stipulating and authorizing ceiling values. In the case of collective plans, however, the ANS merely ratifies the price adjustments without interfering in their definition because it assumes that there is no asymmetry of bargaining power between the operator and the collective entity of plan beneficiaries.

An OPS can sell its health plans directly to the beneficiary or through the intermediation of a Health Plan Benefits Administrator (*administradora de benefícios de saúde* - ABS). An ABS is a legally constituted entity that proposes the contracting of a collective healthcare plan in the condition of the stipulator or that provides services to legally constituted entities contracting collective healthcare plans. Insofar as it performs as an intermediary, the ABS can compile a diversified portfolio of health plans which enables it to commercialize healthcare coverage at lower prices than those being operated in the case of direct contracts between the beneficiary and the OPS.

Although both OPSs and ABSs commercialize health plans, they are not considered to be competitors under the terms of the respective jurisprudence of the Administrative Council for Economic Defense (*Conselho Administrativo de Defesa Econômica* - CADE)(CADE, 2012a, 2012b, 2012c).

2.3 Earlier studies on the private healthcare insurance sector

The development of the private healthcare sector, its regulation, and its importance have caught the attention of professionals and researchers in Brazil. Since it was created, the ANS has accompanied the sector either by means of technical studies or through the constitution of

databases and information registration. The first normative directive it issued for the provision of information for the registration of beneficiaries was published in 2002. Two years later, in 2004, it launched the Register of Information on Private Healthcare Beneficiaries, Operators and Plans (*Caderno de Informações de Beneficiários, Operadores e Planos de Saúde*).

According to Xavier (2017), empirical studies on the economic-financial performance of OPSs are fairly recent, with the year 2000 marking their beginning. Prior to that, the literature registered studies on the performance of health services providers such as hospitals and clinics. In Brazil, empirical studies of the private healthcare sector began to appear after the establishment of the legal framework for sector regulation and the creation of the ANS. An outstanding feature of such studies is their use, from 2006 on, of the agency's database composed of various indicators published in the ambit of sector regulation.

Regarding the OPSs, there are studies that evaluate their economic-financial performances in general, or in relation to a given factor such as plan modality, size, coverage and the specificity of the regulation, among others. Generally speaking, the studies, albeit conducted using different methodologies and analyzing different periods, indicate relatively favorable and homogeneous financial conditions as would be expected given that the OPSs are companies that perform in a regulated sector (Malta et al., 2004). The literature identifies some differences in specific indicators for profitability, liquidity, activity and sinistrality, among others and in response to endogenous factors (such as administration and modality) or exogenous factors (year and location). Table 1 displays a non-exhaustive list of recent studies that address the economic-financial performance of OPSs in Brazil.

Table 1

Previous studies of OPS economic-financial performance

Study	Methodology – Period	Results
Cipparrone, Jurban & Jurban (2004)	Data Envelopment Analysis (DEA) – 2003	Two OPS in a sample of 13 classified as efficient in regard to property, profit and number of beneficiaries.
Soares (2006)	Exploratory Analysis of Indicators – 2004	Capital structure, liquidity and profitability contain important information for regulation effects.
Alves (2009)	DEA; Stochastic Frontier – 2008	OPS number of beneficiaries positively influences efficiency and degree of OPS vertical integration negatively influences it.
Sampaio, Oliveira & Ignácio (2009)	DEA – 2001-05	Management and solvency explained by OPS size.
Hashimoto (2010)	DEA– 2003-08	Results influenced by OPS modality and region.
Baldassare (2014)	Hierarchic Models – 2001-12	Results influenced to a greater extent by the Company factor and to a lesser extent by modality and size.
Fernandes, Ferreira & Rodrigues (2014)	Dupont Model – 2007-12	Profitability and sales turnover determined by company decisions and by regulation.
Silva & Loebel (2016)	Analysis of Indicators and Median Tests – 2008-12	Return on assets, short-term debt and sinistrality show statistically significant differences among OPSs.
Silva & Loebel (2016)	Variance Analysis – 2007-14	Financial performance explained by operator, modality, size and region.
Xavier (2017)	Correlations; Median Tests; DEA – 2010-15	Financial indicators related to modality, size, region, headquarters location, accreditation seal, and period of OPS registration.
Melo & Dantas (2018)	Exploratory Analysis of Indicators	Results influenced by sector regulation and by the judicialization of the so-called right to health.
Avelar et al. (2020)	Estimation Panel – 2001-16	Results explained by the OPS modality and region.
Xavier & Souza (2020)	Benchmarking; Median Tests; DEA– 2010-15	Relative efficiency mainly determined by modality: few companies considered efficient.

Silva, Rocha & Britto (2021)	Variance Decomposition – 2007-16	Differences in profitability explained by OPS coverage and brand: the effect of the year was significant but inexpressive.
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Source: *Research data*.

3 Methodological procedures

This study can best be classified as an empirical-analytical one insofar as it gathered data and used descriptive statistics and inference techniques. The main method used for quantitative analysis was the multiple range test applied to a set of classic financial indicators.

The data source is the ANS yearbook. The sample consists of annual information on fourteen healthcare plan operators for the period 2010 to 2015 so the data sample was made up of 84 company-year pairs. The period selected was restricted by the availability of (public) data via the ANS system and the information may have been affected by changes in economic-financial parameters and OPS accompaniment procedures in 2016, by the new method for readjusting compensations in 2018, by the reimbursement model based on values for 2019 and by the new way of receiving accounting data in 2020 (ANS, 2020). Data tabulation and analysis were performed using SAS[®].

3.1 Multiple range testing

The multiple ranges test, also known as Duncan's test, makes a comparison of the means obtained for the results of different treatments in the case of experimental data or of the means for the indicators of filtered subsets of observable data samples. The test is based on the identification of a significant minimum difference between means calculated for different pre-defined filtered subsets of the data (Gomes, 2000).

The test procedure is to first arrange the means calculated for a given indicator in decreasing order and then calculate the minimum significant difference (*msd*) between the highest and the lowest means for *k* means using equation (1) (Harter, 1960),

$$msd_{\alpha,k} = z_{(\alpha,k-1)} \times \sqrt{mss/r} \quad (1)$$

where *z* is the value of statistic *z* to a significance level of α , for *k* – 1 degrees of freedom; the *mss* is the mean of the sum of squared residuals from the variance analysis and *r* is the number of repetitions of the experiment.

Based on that statistic, it is verified whether *msd*_{*a,k*} is greater than, or equal to the difference between the extreme means in which condition the null hypothesis of equality of the means is not rejected. If the contrary condition is verified then the test is repeated iteratively for the new mean *k-h*, *h* = 1,2,...*k-1*, until *msd*_{*a,k*} is greater than, or equal to the difference between the extreme means values.

One way of presenting the test is to form a list of the means in order and underline those in the interval of values that correspond to the non-rejection of the null hypothesis (Gomes, 2000). Considering, as an example, the means A, B, C, D arranged in increasing order, then panel 1 in Figure 2 shows that there are no statistical differences among them; panel 2 informs us that A, B, and C do not differ statistically from one another but they do differ statistically from D ; panel 3 informs that A and B do not differ but they do differ from means C and D while B, C and D do not differ from one another but they do differ from A. This last example illustrates that the test does not observe the principle of transitivity.

A B C D	A B C D	A B C D
Panel 1	Panel 2	Panel 3

Figure 2 *An example of the Duncan Test.*

Source: *Present research data.*

In the present study, Duncan's test is performed for each of the selected financial indicators, considering different subsets of the data filtered: by state, by legal classification of the entity and by the company's position in the market. It can be seen that all the samples are the same, consisting of 14 OPSs each and that the number of repetitions is 6 corresponding to the number of years of the period under analysis.

3.2 Financial performance measurements

Analysis of financial statements produces important, useful information to support the decision-making process especially when developed temporally and by sectors (Assal Neto, 2013). Such analyses involve distinct but interacting aspects associated to the concepts of solvency, activity, financial leverage and profitability (Soares, Thóphilo & Corrar, 2009).

Solvency refers to a company's capacity to fulfill its obligations and is associated to the state of indebtedness in which the debtor has assets whose value exceeds the value of its liabilities. Given the variation in the time taken for assets to mature or for liabilities to fall due, solvency analysis makes use of various indicators with the commonest being the general liquidity index for long-term considerations and the current liquidity index for the short-term perspective (Ross, Westerfield & Jaffe, 2007).

Analyzing a company's activities provides knowledge of its operational cycle, showing the time intervals between purchases of production inputs or goods for sale and receipt of sales revenue. Good management of company activities means striking a balance between cost reduction and the continuity of operations with special attention paid to payments and receipts and, accordingly, to working capital requirements (Brigham & Ehrhardt, 2010).

Diagnosing the financial leverage provides evidence on the gains and risks associated to capturing resources from third parties to finance investments. Greater leverage, on the one hand contributes towards enhancing shareholder gains whenever the returns on investments are greater than the cost of capturing such resources; on the other hand it increases the risk of insolvency insofar as it generates liabilities with fixed interest rates and due dates (Ross, Westerfield & Jaffe, 2007)..

Lastly, analyzing profitability reveals the composition of the remuneration of shareholders, and/or creditors, depending on the index adopted as a proportion of the investment made and showing whether it is adequate for the business risk involved (Ross, Westerfield & Jaffe, 2007). The Table 2 lists the indicators used in this study covering the conceptual aspects addressed above and presents the respective formulae.

Table 2
Economic and financial indicators used in the analysis

View	Indicator	Formula
Solvency	General Liquidity Index	$GLI = (CA + LTR) / (CL + LTL)$
	Current Liquidity Index	$GLI = CA / CL$
Activity	Average Payment Term for Assistance Events	$APAE = (ES / NIE) \times 360$
	Average Payment Receipt Period	$APRP = (PR / AS) \times 360$
	Assistance Expenses Index	$AEI = NIE / PAC$
	Selling Expense Index	$SEI = SE / PAC$
Leverage	Indebtedness Index	$II = TD / TA$
Profitability	Return on Assets	$ROA = NP / TA$
	Return on Equity	$ROE = NP / NE$
	Gross Profit Margin	$GPM = GP / PAC$
	Net Profit Margin	$NPM = NP / PAC$
	Average Ticket	$AT = PAC / (12 \times NB)$

Notes: CA is current assets, LTR is long-term receivables, CL is current liabilities, LTL is long-term liabilities, ES represents events to be settled, NIE denotes net indemnifiable events, PR is the value of accounts payable receive, AS is the annual sales, PAR is the payments actually received, SE is the value of selling expenses, TD is the total debt, TA is the total assets, NP is the net profit, E is the net equity, GP is gross profit, and NB is the monthly average of the number of beneficiaries.

Source: Research data.

3.3 The data and their sources

According to the National Private Healthcare Regulatory Agency yearbook, in 2010 the Brazilian private healthcare industry had 1,045 healthcare plan operators in activity which by 2015 had fallen to 824 operators, an average annual drop of 4.64%. Over the same period the number of beneficiaries increased by 1.9% a year (ANS, 2016)

From 2010 to 2015, the revenues, in real terms, from premium payments plus other operational revenues increased, on average, 5.1% a year. On the other hand, annual expenses increased by an average 5.3% a year. The industry's turnover in 2015 was more than 100 billion reals, a value close to 2% of the Brazilian GDP for that year (ANS, 2016).

Based on the data on beneficiaries for each OPS the study selected the bigger operators who, together, accounted for at least 50% of the total number of beneficiaries registered for that year. According to the ANS (2016), the total number of beneficiaries of private healthcare plans in 2015 was 49,397,350. Table 3 presents the fourteen operators considered in this study together with the numbers of beneficiaries registered in 2015.

The four largest OPS in Table 3 concentrate more than 30% of the beneficiaries. The sum of the market participations of the four largest (CR4) is precisely 30.36% showing a high degree of concentration in the industry. The last OPS on the list (table 3), Unimed Seguros Saúde S/A, has less than 10% of the number of beneficiaries of the leading operator.

Table 3
Fourteen largest private health plan operators in Brazil, 2015

Operator	UF	Number of Beneficiaries
AMIL Assistência Médica Internacional S/A	SP	5.772.770
Bradesco Saúde S/A	RJ	4.041.725
Hapvida Assistência Médica Ltda	CE	3.084.203
Sul América Companhia de Seguro Saúde	RJ	2.098.751
Notre Dame Intermédica Saúde S/A	SP	1.828.978
Central Nacional Unimed	SP	1.744.026
Unimed BH	MG	1.457.904
Unimed-Rio	RJ	963.735
Porto Seguro	SP	774.702
Unimed do Estado de São Paulo	SP	756.911
Unimed Porto Alegre	RS	637.517
Unimed Campinas	SP	587.465
Unimed Curitiba	PR	570.256
Unimed Seguros Saúde S/A	SP	507.262
TOTAL		24.826.205

Source: Research data.

Based on the ANS yearbooks, the study constructed a database containing the legally registered names of the fourteen OPS, the federative unit (state or federal district) where its headquarters are, the number of associated beneficiaries and the twelve economic-financial indicators set out in table 2.

The database combines the filtered data sets (fourteen operators) with a temporal series (of six years). Given that each operator in the study sample has all the indicators for the years 2010 to 2015 the study obtained a balanced panel made up of eighty-four observations.

4 Results Presentation and Discussion

4.1 Economic-financial indicator calculations and results of multiple range tests

The study used the descriptive statistics of the economic-financial indicators displayed in Table 4 with annual representations accompanied by the mean for the period.

A quick analysis of the healthcare plan operators' economic-financial conditions over the period reveals the registration of considerably expressive returns albeit the indicators do show a slight deterioration in the first years of the series.

In particular, the average return on equity of 13.08% for the period can be considered eminently satisfactory. For the purpose of comparison, over the same period, financial sector companies listed in the Bovespa registered a return on equity of 12.8% and of 8.9% in the case of the average banks. Considering a broader sample that includes industrial, commercial and services companies but excluding the OPSs, the average for the period was 8.1% (IA, 2012).

From the returns on equity and the net profit margin results it can be seen that there is a assets turnover of 3.74, indicating that the average annual value of the counterpart payments received by the OPS was 2 times greater than the average assets value over the period, an important contribution of the commercial performance to the shareholders' returns.

The average indebtedness of the 14 OPSs measured by the liabilities index, was 64.4%, slightly lower than other Brazilian industries whose average third-party participation in the

capital for the period was 66.8% (IA, 2012). Over the period, liability oscillated very little but always remained above 60% thus indicating a reasonable financial leverage and partially explaining the performance of the Return on Equity.

Table 4
Descriptive Statistics

	2010	2011	2012	2013	2014	2015	Total
Return on Assets (%)							
Mean	6.86	6.43	5.50	5.36	3.29	8.07	5.92
Median	7.00	5.00	5.00	5.00	4.00	7.50	5.00
S.D.	0.04	0.05	0.05	0.05	0.07	0.07	0.06
Return on Equity (%)							
Mean	18.36	17.36	14.00	18.00	-4.29	15.07	13.08
Median	19.00	18.50	16.00	16.00	9.00	16.00	16.00
S.D.	0.09	0.11	0.09	0.17	0.54	0.26	0.28
Gross Profit Margin (%)							
Mean	21.71	17.00	16.43	16.86	13.36	16.07	16.90
Median	18.50	15.50	17.00	18.00	12.50	16.50	16.75
S.D.	10.43	5.92	7.23	5.26	4.70	6.41	0.07
Net Profit Margin (%)							
Mean	5.50	3.07	4.36	3.57	1.79	4.14	3.74
Median	4.00	2.00	1.50	2.00	2.50	3.00	2.25
S.D.	6.38	2.87	6.59	3.76	3.26	3.86	0.05
Indebtedness Index (%)							
Mean	63.07	62.64	62.57	67.86	63.64	66.64	64.40
Median	63.00	64.50	65.00	71.00	65.00	62.50	64.75
S.D.	18.58	18.10	17.93	11.67	15.25	23.19	0.17
Assistance Expenses Index (%)							
Mean	81.29	83.50	84.36	83.07	85.50	76.21	82.32
Median	81.00	85.50	85.50	82.50	86.00	80.00	84.00
S.D.	5.17	6.12	6.98	6.37	6.26	20.35	0.10
Índices de Despesas da Comercialização (%)							
Mean	3.93	3.36	3.93	3.86	4.00	4.36	3.90
Median	4.50	3.50	4.50	4.00	4.00	4.50	4.25
S.D.	2.84	3.00	2.87	2.54	2.54	2.73	0.03
Selling Expense Index							
Mean	1.29	1.53	1.32	1.30	1.43	1.34	1.37
Median	1.21	1.41	1.25	1.31	1.35	1.30	1.31
S.D.	0.25	0.54	0.29	0.23	0.31	0.30	0.34
Current Liquidity Index							
Mean	1.71	1.55	1.30	1.28	1.34	2.03	1.54
Median	1.46	1.39	1.24	1.29	1.33	1.43	1.36
S.D.	0.87	0.51	0.41	0.29	0.36	2.63	1.17
Average Payment Receipt Period (Days)							
Mean	12.77	12.76	10.42	20.62	19.89	17.79	15.71
Median	9.32	8.45	8.47	16.86	15.70	14.20	11.76
S.D.	9.37	9.98	7.70	13.16	15.17	11.10	11.68
Average Payment Term for Assistance Events (Days)							
Mean	21.89	30.57	30.79	38.20	32.45	33.14	31.17
Median	25.98	31.08	32.76	32.81	30.25	32.73	31.90
S.D.	12.29	12.04	11.36	25.06	9.96	14.01	15.33
Average Ticket (R\$) – values of 2015. deflator IPCA							
Mean	239.48	208.22	239.72	245.85	289.18	208.99	238.58
Median	207.83	209.17	213.50	207.78	221.97	203.09	210.50
S.D.	135.95	76.10	147.84	168.47	293.88	90.35	164.99

Note: IPCA is the National Wide Consumer Price Index (*Índice Nacional de Preços ao Consumidor Amplo*, or IPCA).

Fonte: Dados da pesquisa.

In regard to liquidity, the current average for the indicator for the OPS over the period was 1.54, a value similar to that registered by industrial, commercial and services companies in general, except for health services for which the value was 1.58 (IA, 2012). In the same way the general liquidity indicator registered a value higher than 1. Both the liquidity indicators indicate low risk of insolvency insofar as the value of the net assets is higher than the value of the (fixed) capital liabilities for all the years of the analyzed period.

In regard to the average payment and receipt times the indicators show an average dealignment, defined as the difference between the average period for effectuation of the payment for healthcare events and the average period for receipt of counter payments, in this case, 15.7 days. That separation favors the OPSs insofar as it configures a situation of a reduced need for working capital

From the beginning of 2010 to the end of 2015, the average insurance premium paid by each of the beneficiaries of the fourteen healthcare plan operators was R\$ 238.58, considering values for the year 2015 monetarily updated according to the IPCA. In real terms, the average ticket registered an accumulated increase of 21.8% over the period.

It can safely be concluded that the selected healthcare plan operators of this study registered a good economic-financial condition for the period in question in all four of the analyzed aspects, both in absolute terms and in comparison with other economic sectors.

4.2 Multiple range test applied to OPS characteristics

Multiple range testing takes into account four sources of variations in the economic-financial indicators: (a) year; (b) form of business organization (incorporated, INC; limited liability company, LL); (c) company position in the market (whether it as among the four biggest OPS in terms of beneficiary numbers, CR4) and (d) the state (or federal district) where the OPS has its headquarters. The Duncan's multiple range test was applied only to those sources of significant variation detected in the earlier variance analysis.

The presentation of the results of the Duncan's multiple range tests to a significance level of 5% are presented in graph form as announced in the methodology section. Effectively, lines or unbroken underlines indicate that the values do not differ from one another significantly.

The results of the multiple range tests are as follows:

- The Federative Unit was the only source of significant variation for the ROA index (p -value = 0.0166). In the Duncan's range comparison tests it was found that the mean for Minas Gerais state was significantly greater than the one registered for the state of Paraná. There were no significant differences among the other federative units.

$\overline{\text{ROA}}$	0.0083	0.0333	0.0609	0.0683	0.0767	0.0817
	PR	RS	SP	CE	RJ	MG

- For the GPM (Gross Profit Margin) index. the only source of significant variation proved to be the form of business organization (p -value = 0.0481). The Duncan's test, however, did not reveal any significant differences between the mean GPM of the corporation operators and that of the limited liability company operators.

$\overline{\text{GPM}}$	0.1695	0.1754
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LL Inc

• The form of business organization ($p\text{-value} = 0.0008$) and Federative Unit ($p\text{-value} = 0.0002$) were significant in regard to explaining the variation in the NPM (Net profit margin) index. Furthermore, the application of Duncan’s test showed that: there was no significant difference between the mean NPM of operators that were corporation and that of operators that were limited companies; the mean NPM of Rio de Janeiro was greater than those of all the other states; the mean NPM of Minas Gerais was significantly higher than that registered for Paraná whereas the indexes of all the other federative units did not differ significantly from one another.

$\overline{\text{NPM}}$	0.0358	0.0433				
	LL	Inc				
$\overline{\text{NPM}}$	0.0067	0.0133	0.0267	0.0302	0.0550	0.0728
	PR	RS	CE	SP	MG	RJ

• The form of business organization ($p\text{-value} = 0.0008$), CR4 ($p\text{-value} < 0.0001$) and Federative Unit ($p\text{-value} = 0.0211$) were significant for explaining the II index variation. It was found that: the mean II of the corporation operators was significantly greater than that of the limited company operators; the mean IIs of the four major operators (CR4) was significantly higher than that registered for all the other operators; the mean index of the operators in Paraná state was significantly greater than the ones registered for São Paulo and Minas Gerais states; and the mean index registered for Minas Gerais state was significantly lower than those registered for all the other states and the Federal District.

$\overline{\text{II}}$	0.5458	0.6902				
	Inc	LL				
$\overline{\text{II}}$	0.67235904	0.5904				
	CR4	No CR4				
$\overline{\text{II}}$	0.4600	0.6188	0.6933	0.6933	0.6983	0.8217
	MG	SP	CE	RJ	RS	PR

• For the SEI, the form of business organization ($p\text{-value} < 0.0001$) and CR4 ($p\text{-value} = 0.0128$) were significant insofar as: the mean IDC of the corporation operators was significantly superior to that of the limited company operators; and the mean SEI of the of the four biggest operators (CR4) was significantly greater than those registered for all the others.

$\overline{\text{SEI}}$	0.0343	0.0487
	LL	Inc
$\overline{\text{SEI}}$	0.0412	0.0373

CR4	No CR4
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- The variables Year (p -value = 0.0260), form of business organization (p -value = 0.0212) and Federative Unit (p -value = 0.0012) were significant for explaining the variation in the APRP index, given that: the mean indexes for the years 2013, 2014 and 2015 were significantly greater than those for the year 2012; and the mean index for the state of Ceará was superior to those registered for the states of Rio de Janeiro, Paraná, Minas Gerais and Rio Grande do Sul.

$\overline{\text{APRP}}$	10.419	12.758	12.769	19.055	19.892	20.618
	2012	2011	2010	2015	2014	2013
$\overline{\text{APRP}}$	8.360	9.985	11.225	13.686	18.277	24.293
	RS	MG	PR	RJ	SP	CE

- For the GLI index, the only source of significant variation was the CR4 variable (p -value = 0.0172), given that the mean index of the four major operators was significantly superior to those registered for the others.

$\overline{\text{GLI}}$	1.4396	1.3342
	CR4	No CR4

- The only source of significant variation for the AT index was the auxiliary variable form of business organization (p -value < 0.0001), given that the mean index of the limited company operators was significantly greater than that of the corporation operators.

AM	194.81	197.02
	Inc	LL

- None of the sources of variation was significant for explaining the variations of the ROE, AEI, APAE and CLI indicators.

4.3 Discussion of the Results

The analysis of the OPS indicators for the period under study indicates that the companies are well situated in economic-financial terms in comparison with the major banks, medium-sized banks, industry in general and the commerce and services sector (with the exception of health services) (IA, 2012). The results of the analysis are similar to those Silva & Loebel (2016) registered for the period 2008 to 2012 not only in terms of profitability but also in terms current liquidity, indicating consistent performance over time. In regard to variability, the indicators demonstrate a reasonable degree of homogeneity, in alignment with the result presented by Xavier & Souza (2020) based on information for the period 2010 to 2015. The explanation for the homogeneity of the indicators could be attributable to the

regulated environment, especially in terms of the products and consumers' rights (Malta et al., 2004).

The economic-financial indicators were submitted to Duncan's multiple range test based on previously determined data filtering. It was found that the year, the form of organization of the business, the relative size of the business and the Federative Unit of location all had a significant influence on at least one health plan operator performance indicator.

It is worth underscoring the following results. The return on equity index proved to be sensitive to the federative unit where the company has its headquarters Both corporate OPSs and those that are limited companies failed to present significantly different gross profit margins. OPSs with headquarters in Rio de Janeiro had the best performance in regard to net profit margins. Limited company health plan operators worked with a higher level of liabilities than the corporate OPSs The commercialization expenses index was significantly greater for the OPSs that were corporations. the mean period for receivable counter compensations was relatively longer for the only operator with headquarters in the state of Ceará. The four biggest OPSs registered general liquidity greater than all the others and the mean ticket value was statistically greater for the limited company operators.

Generally speaking, the results are similar to those of other studies despite the differences in methodological procedures. As examples: using hierarchic models, Baldassare (2014) found performance differences in the aspects of returns, liquidity and sinistrality that were related to the nature and size of the operator and modality; with their variance analysis, Silva & Loebel (2016) found that year and operator size and region had a significant influence on economic-financial performance as shown by the indicators for profitability, liability, liquidity and sinistrality; using Data Envelopment Analysis, Xavier (2017) identified differences in economic-financial performance explained by modality, size, region, headquarters location, and seal of accreditation; and lastly, Silva et al. (2021), by means of variance decomposition indicated that national or regional coverage and the OPS brand explain most of the differences in profitability.

It should be underscored that although some indicators have registered statistically distinct values, the mean values do not appear to be very different, confirming the results that Malta et al. (2004) obtained, whereby companies in regulated sectors tend to register similar performances, precisely because of the regulation itself.

5 Final considerations

The regulatory activity presupposes that an agency will monitor the regulated sector with a view to addressing any existing market failures and meeting the needs of society. To be able to carry out its activities, the regulatory agency needs not only to have extensive knowledge of the sector it regulates but also to continuously accompany its performance.

Against that background, this article offers a contribution to the literature on the regulation of private healthcare activities and also to the literature on the respective accounting and financing, insofar as it investigates eventual differences among the economic-financial performances of healthcare plan operators in Brazil. The article evaluates the performance of the healthcare plan operators and identifies relative variations resulting from differences in their forms of organization, in the federative entity where they are headquartered, in their market status and in the year of analysis. The study made use of data combining filtered data sets and a temporal series that included the fourteen largest OPSs in terms of beneficiary numbers and considering the years 2010 to 2015.

The analysis of the solvency, activity, leverage and profitability indicators showed that the fourteen health plan operators are financially and economically well-situated in both absolute and relative terms, results that are in alignment with the literature.

Multiple range test methodology was used to analyze differences in economic-financial performances and the results showed that some of the analyzed variables explain the differences among OPSs to a certain extent for the period studied. The form of corporate organizations is related to differences in the gross and net margins, in the average ticket value, in the expenses and commercialization index and in liabilities; the relative position in the market is related to the differences in commercialization expenses, general liquidity and liability; and the state or federal district of location identifies differences in the returns on assets, in the net margin and in the average time of receipt of the counterpart contributions.

The results also suggest that the indicator means, even though significantly distinct, are not so very different, which confirms the idea that the financial conditions of companies operating in the same sector tend to be similar.

In the light of the observed results it is thought to be possible, in future studies, not only to expand the analysis to embrace a much larger sample, especially in regard to the temporal horizon, after checking for any eventual structural break in the data, but also to discuss ways in which to improve the current model for regulating private healthcare in Brazil in such a way as to ensure the continuity of service provision in an ambit of moderate fees.

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