TRENDS AND PREDICTIVE PATTERNS IN THE EVOLUTION OF THE FINANCIAL PERFORMANCE OF PUBLIC HEALTH OPERATORS THROUGH THE USABILITY OF MANAGEMENT ACCOUNTING

TENDÊNCIAS E PADRÕES PREDITIVOS NA EVOLUÇÃO DO DESEMPENHO FINANCEIRO DAS OPSs POR MEIO DA USABILIDADE DA CONTABILIDADE GERENCIAL

TENDENCIAS Y PATRONES PREDICTIVOS EN LA EVOLUCIÓN DEL DESEMPEÑO FINANCIERO DE LOS OPERADORES DE SALUD PÚBLICA A TRAVÉS DE LA USABILIDAD DE LA CONTABILIDAD DE GESTIÓN

Antônio Artur de Souza[1], Wilson Machado Enes[2]

ABSTRACT

This study analyzes trends and predictive patterns in the evolution of the financial performance of Brazilian Health Plan Operators (HPOs), emphasizing the role of managerial accounting usability as a decision-support and early-warning mechanism. The analysis is based on secondary data from the Brazilian National Agency for Supplementary Health (ANS), covering the period from 2017 to 2024, and organized into a balanced panel dataset. Methodologically, the study combines descriptive statistics, trend analysis, and panel data econometric models, enabling the identification of both temporal dynamics and unobserved heterogeneity among operators. The results reveal significant persistence in financial performance, particularly in return on assets, as well as a strong sensitivity to claims ratio (loss ratio) and managerial cost indicators. Variables associated with managerial accounting practices, such as operating margins, combined ratios, liquidity, and capital structure indicators, demonstrate substantial predictive power in anticipating future financial deterioration or recovery. The findings indicate that the effective use of managerial accounting information enhances the capacity of health plan operators to anticipate financial risks, improve cost control, and support strategic decision-making, especially in a highly regulated and cost-intensive environment. From a regulatory and managerial perspective, the study highlights the relevance of integrating managerial accounting indicators into continuous monitoring systems to strengthen the economic and financial sustainability of the supplementary health sector.

Keywords: Managerial Accounting. Panel Data. Financial Performance. Predictive Analysis. Supplementary Health.

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[1] Postdoctorate fellow in Finance. Universidade Federal de Minas Gerais (UFMG). Universidade de Grenoble.
E-mail: antonioarturdesouza@gmail.com Orcid: https://orcid.org/0000-0002-4725-0758
Lattes: http://lattes.cnpq.br/0597505816212353
[2] Doctoral student in Business Administration . Universidade Federal de Minas Gerais (UFMG).
E-mail: wilsonenes50@gmail.com Orcid: https://orcid.org/0000-0003-1231-0404
Lattes: http://lattes.cnpq.br/7625800321529271

RESUMO

Este estudo analisa as tendências e padrões preditivos do desempenho econômico-financeiro das Operadoras de Planos de Saúde (OPSs) no Brasil, no período de 2017 a 2024, enfatizando o papel da usabilidade da contabilidade gerencial como instrumento de suporte à tomada de decisão. Utilizam-se dados secundários da Agência Nacional de Saúde Suplementar (ANS), organizados em painel balanceado, combinando estatística descritiva, análise de tendências e modelos econométricos em dados em painel. Os resultados indicam a existência de persistência temporal da rentabilidade, elevada sensibilidade à sinistralidade e relevância dos indicadores gerenciais na antecipação de deteriorações financeiras. Conclui-se que a contabilidade gerencial, quando adequadamente utilizada, contribui para a identificação precoce de riscos e para a sustentabilidade econômico-financeira das OPSs.

Palavras-chave: Contabilidade Gerencial. Dados em Painel. Desempenho Financeiro. Saúde Suplementar. Análise Preditiva.

RESUMEN

Este estudio analiza las tendencias y los patrones predictivos del desempeño económico y financiero de las Operadoras de Planes de Salud (OPS) en Brasil, entre 2017 y 2024, destacando la utilidad de la contabilidad de gestión como herramienta de apoyo a la toma de decisiones. Se utilizan datos secundarios de la Agencia Nacional de Salud Suplementaria (ANS), organizados en un panel balanceado, que combina estadística descriptiva, análisis de tendencias y modelos econométricos sobre datos de panel. Los resultados indican la persistencia temporal de la rentabilidad, una alta sensibilidad a la siniestralidad y la relevancia de los indicadores de gestión para anticipar el deterioro financiero. Se concluye que la contabilidad de gestión, cuando se utiliza adecuadamente, contribuye a la identificación temprana de riesgos y a la sostenibilidad económica y financiera de las OPS.

Palabras clave: Contabilidad de Gestión. Datos de Panel. Desempeño Financiero. Salud Suplementaria. Análisis Predictivo.

1 INTRODUCTION

The growing complexity of the Brazilian supplementary health sector has intensified the need for management instruments capable of anticipating financial risks and supporting strategic decisions in an environment characterized by high economic uncertainty, strong regulatory intervention, and growing pressure for operational efficiency. Health Plan Operators (OPSs) simultaneously face challenges related to the continuous increase in care costs, the incorporation of new health technologies, the aging of the beneficiary population, and the limitation of revenue readjustment mechanisms, factors that compress margins and increase the risk of economic and financial imbalances.

In this context, the retrospective analysis of financial performance, traditionally based on indicators extracted from the financial statements, although necessary for monitoring and regulatory compliance purposes, is insufficient to ensure the sustainability of SPOs in the medium and long term. Ex post evaluation, focused only on past results, limits managers' ability to identify early signs of financial deterioration and to react in a timely manner to economic, regulatory, or care shocks.

In view of these limitations, management accounting emerges as a central instrument for improving the economic governance of the OPSs. By providing forward-looking information, cost control indicators, operational efficiency metrics, and decision-oriented analysis, management accounting enhances organizations' ability to plan, monitor, and adjust their financial strategies. Unlike financial accounting, whose emphasis is on meeting legal, regulatory and external accountability requirements, management accounting prioritizes the usefulness of information, focusing on supporting strategic planning, management control and forecasting future scenarios.

In heavily regulated and cost-intensive sectors such as supplementary healthcare, the usability of management accounting becomes even more relevant. Indicators such as loss ratio, operating margins, combined ratios, average receipt and payment terms, and liquidity and capital structure metrics work as anticipatory signals of financial performance, allowing the identification of trends, persistence patterns, and potential imbalances before they materialize in negative results or regulatory interventions.

In light of these considerations, this article constitutes an analytical continuation of the study that evaluated the economic and financial performance of the SPOs in the period from 2017 to 2024, moving towards a more dynamic and prospective approach. The focus shifts from merely descriptive analysis to the identification of trends, persistence and predictive patterns of financial performance, with emphasis on the usability of management accounting as a mechanism for anticipating risks and supporting strategic decision-making.

By integrating traditional economic and financial indicators with typical metrics of management accounting, analyzed through panel data, the study seeks to contribute to the deepening of the literature on financial sustainability in supplementary health, as well as to offer practical subsidies for managers and public policy makers, in order to strengthen the stability and efficiency of the sector.

1.1 RESEARCH OBJECTIVE/PROBLEM

In view of the environment of high economic complexity, strong regulation and continuous pressure on care costs that characterizes the Brazilian supplementary health sector, it is essential to understand if and to what extent the information generated by management accounting can be used not only for retrospective analysis, but also for anticipating risks and forecasting the financial performance of Health Plan Operators (OPSs).

In this sense, the following research problem emerges:

To what extent does the usability of management accounting contribute to the identification of trends, persistence and predictive patterns in the evolution of the economic and financial performance of health plan operators in Brazil?

This question guides the empirical investigation by seeking evidence that managerial indicators can function as anticipatory mechanisms of financial imbalances, expanding the planning and control capacity of OPSs in a highly regulated sector.

1.2 RATIONALE AND RELEVANCE

This study is justified by the growing economic, regulatory, and operational complexity that characterizes the Brazilian supplementary health sector, in which Health Plan Operators (OPSs) face structural challenges related to economic and financial sustainability. The continuous increase in care costs, the incorporation of new health technologies, the aging of the beneficiary population, and the rigidity of regulatory mechanisms for readjusting revenues impose significant pressures on operators' financial margins, increasing the risk of imbalances and regulatory interventions.

From an academic point of view, the study contributes to the advancement of the literature by integrating three dimensions that are still little explored together in the Brazilian context: (i) analysis of economic and financial performance in a panel data structure; (ii) investigation of trends, persistence and predictive patterns of financial performance; and (iii) application of management accounting as an instrument for anticipating risks, and not only as a tool for retrospective analysis. By proposing a dynamic and prospective approach, the

article broadens the scope of traditional studies, which mostly focus on descriptive or static analyses of the financial indicators of SPOs.

From a managerial perspective, the relevance of the study lies in the empirical demonstration that typical indicators of management accounting — such as loss ratios, operating margins, combined ratios, liquidity and capital structure — have explanatory and predictive capacity on the future evolution of financial performance. These findings reinforce the importance of the usability of management accounting as an instrument to support strategic decision-making, financial planning and control of care costs, providing practical subsidies for managers in the early identification of signs of economic deterioration.

In the regulatory and institutional sphere, the study is relevant by showing that the continuous monitoring of management indicators can complement the traditional mechanisms of economic and financial supervision adopted by the National Supplementary Health Agency (ANS). The identification of persistence patterns and anticipatory signs of risk contributes to the improvement of insolvency monitoring and prevention policies, strengthening the stability of the supplementary health system and reducing potential negative impacts on beneficiaries and service providers.

In addition, the use of public and standardized data from the ANS confers robustness, transparency, and replicability to the research, expanding its methodological relevance and allowing intertemporal comparisons and between different modalities of operators. By aligning methodological rigor, theoretical contribution, and practical applicability, the study is justified as relevant both for the academic community and for managers, regulators, and public policy makers, by offering empirical evidence that supports decisions aimed at the economic and financial sustainability of OPSs in the long term.

2 LITERATURE REVIEW
2.1 ECONOMIC AND FINANCIAL PERFORMANCE IN REGULATED SECTORS

The analysis of economic and financial performance is one of the main instruments for assessing the sustainability of organizations, especially in sectors characterized by strong state regulation and high operational complexity. In regulated environments, such as the supplementary health sector, financial performance not only reflects internal managerial decisions, but also institutional constraints, regulatory requirements, and macroeconomic constraints that affect revenues, costs, and capital structure (Greene, 2018; Wooldridge, 2010).

The literature points out that, in these sectors, traditional indicators of profitability, liquidity and indebtedness play a central role in the assessment of insolvency risk and

operational continuity. In the case of Health Plan Operators (PAHOs), national studies show that financial performance is directly associated with the ability to remain in the market and the probability of regulatory intervention by the National Supplementary Health Agency (ANS) (Silva & Loebel, 2016; Bragança et al., 2019).

In addition, empirical evidence suggests that the financial performance of regulated organizations presents high structural heterogeneity, even under the same normative framework, which reinforces the importance of methodologies capable of capturing persistent individual differences between firms (Xavier & Souza, 2020).

2.2 MANAGERIAL ACCOUNTING AND USABILITY OF INFORMATION

Management accounting is distinguished from financial accounting by its internal orientation and by prioritizing the usefulness of information in the decision-making process. While financial accounting primarily meets legal, regulatory, and accountability requirements, management accounting focuses on providing relevant information for planning, control, performance evaluation, and forecasting future scenarios (Horngren et al., 2014).

The contemporary literature emphasizes that the usability of management accounting depends not only on the availability of data, but on the ability to transform accounting information into effective decision support instruments. Indicators such as operating margins, combined ratios, care costs, average terms, and liquidity metrics allow you to monitor operational efficiency and anticipate financial imbalances before they are reflected in the final results (Macedo et al., 2021).

In the context of OPSs, management accounting assumes strategic relevance, since the management of care costs represents the main financial challenge of the sector. Studies indicate that operators that systematically use management indicators tend to have greater financial stability and a lower probability of abrupt deterioration in performance (Teixeira et al., 2022).

2.3 CLAIMS AND CARE COSTS AS DETERMINANTS OF PERFORMANCE

Claims are widely recognized as the main indicator of operational efficiency in the supplementary health sector, as it expresses the proportion of revenues committed to care expenses. The national and international literature converges in pointing out that high levels of claims have a direct negative impact on the profitability and solvency of operators (Silva & Loebel, 2017; Macedo et al., 2021).

Several empirical studies show that persistent increases in claims precede deterioration in financial performance and increase the risk of regulatory intervention or

liquidation of SPOs (Bragança et al., 2019). This behavior reinforces the anticipatory character of this indicator, especially when analyzed dynamically over time.

In addition, structural factors, such as aging of the beneficiary portfolio, technological incorporation and medical inflation, contribute to the increase in care costs, making the control of claims one of the main managerial challenges in the sector.

2.4 PERSISTENCE, TRENDS AND PREDICTIVE PATTERNS OF FINANCIAL PERFORMANCE

The literature on financial performance highlights the existence of temporal persistence, that is, the tendency for positive or negative results to be maintained over time due to structural characteristics, managerial strategies and specific competitive advantages of organizations (Wooldridge, 2010).

In the context of SPOs, studies indicate that financially sound operators tend to maintain superior performance over time, while operators with structural weaknesses have greater difficulty in reversing negative results (Silva & Loebel, 2017). This behavior justifies the use of dynamic models and dashboard data to capture persistent patterns and more robust causal relationships.

The identification of trends and predictive patterns expands the analytical potential of management accounting, by allowing current and outdated indicators to function as anticipatory signals of the future evolution of financial performance. Thus, the analysis is no longer merely descriptive and starts to incorporate a prospective dimension, fundamental for strategic decision-making.

2.5 EMPIRICAL EVIDENCE AND LITERATURE GAPS

Although the national literature on supplementary health has made significant progress in the analysis of the economic and financial performance of PAHOs, it is observed that most studies focus on static approaches, cross-sectional analyses, or descriptive evaluations of isolated indicators (Kudlawicz & Santos, 2014; Silva & Loebel, 2016).

Research that integrates management accounting, dynamic analysis in panel data, and identification of predictive patterns is still relatively scarce, especially using recent series and standardized public data from the ANS. In addition, few studies explicitly explore the persistence of financial performance and the anticipatory role of management indicators in the Brazilian context.

Thus, the present study contributes to filling these gaps by proposing an integrated, dynamic and prospective approach, reinforcing the role of management accounting as a central instrument for the economic and financial sustainability of SPOs.

3 RESEARCH HYPOTHESES

Based on the theoretical framework, the empirical evidence in the literature and the objectives of the study, the following hypotheses are formulated:

3.1 H1 – PERSISTENCE OF FINANCIAL PERFORMANCE

The economic and financial performance of health plan operators is persistent over time, so that positive (or negative) results tend to be maintained over time.

This hypothesis is based on the literature on panel data and financial performance, according to which structural and strategic characteristics of organizations continuously influence their results.

3.2 H2 – PREDICTIVE POWER OF MANAGEMENT ACCOUNTING INDICATORS

Management accounting indicators, such as loss ratio, operating margins, combined ratios and liquidity, have significant predictive capacity on the future evolution of the financial performance of OPSs.

This hypothesis reflects the premise that managerial metrics function as anticipatory signs of financial deterioration or recovery, going beyond simple ex post analysis.

3.3 H3 – NEGATIVE IMPACT OF CARE COSTS ON FUTURE PERFORMANCE

The increase in claims has a negative and statistically significant effect on the future economic and financial performance of health plan operators.

This hypothesis is in line with the national and international literature, which identifies care costs as the main factor of pressure on the financial sustainability of the sector.

3.4 LINKING WITH THE METHODOLOGY

The hypotheses formulated are empirically tested by means of econometric models in panel data, allowing the simultaneous evaluation of the temporal persistence of performance (H1), the predictive role of management indicators (H2) and the specific impact of care costs on future profitability (H3), controlling for individual and temporal effects.

Table 1

Operationalization of Research Hypotheses

Hypothesis	Description of the Hypothesis	Dependent Variable	Independent Variables	Proxy/Indicator	Expected Signal	Analysis Technique	Source
H1	Financial performance shows temporal persistence	ROA	Lagging ROA (t−1)	Return on Assets	+	Dashboard data (dynamic model)	Authors (2025)
H2	Management accounting indicators have predictive power	ROA	SIN; MO; COMB; LC	Management Indicators (ANS/DIOPS)	SIN (−); MO (+); COMB (−); LC (+)	Multivariate panel data	Authors (2025)
H3	Care costs negatively impact future performance	ROA	SIN	Assistance Expenses / Consideration	−	Panel data with fixed effects	Authors (2025)

Source: The authors: 2025

The operationalization framework explains the relationship between the hypotheses formulated, the empirical variables used and the expected signals, ensuring coherence between the theoretical framework, the econometric methodology and the analysis of the results. The use of panel data allows us to simultaneously test temporal persistence, predictive effects and structural impacts on the financial performance of SPOs.

3.5 ECONOMETRIC MODEL AND HARMONIZATION WITH HYPOTHESES

The econometric model adopted in this study was structured in order to ensure full coherence between the hypotheses formulated, the operational variables presented in Table 1 and the estimation strategy based on panel data. The general specification of the model is given by:

$$ROA\_it = \alpha + \beta1 \cdot ROA\_it{-}1 + \beta2 \cdot SIN\_it + \beta3 \cdot MO\_it + \beta4 \cdot COMB\_it + \beta5 \cdot LC\_it + \mu\_i + \lambda\_t + \varepsilon\_it \quad (1)$$

Where: ROA_it represents the financial performance of operator i in period t; ROA_it−1 captures the temporal persistence of performance (Hypothesis H1); SIN_it corresponds to the loss ratio, reflecting care costs (Hypotheses H2 and H3); MO_it and COMB_it represent typical indicators of management accounting associated with operational efficiency (Hypothesis H2); LC_it refers to current liquidity; μ_i controls carrier-specific unobservable effects; λ_t captures common temporal effects; and ε_it is the idiosyncratic error term.

The inclusion of the lagged term of the ROA makes it possible to test the persistence of financial performance over time, while the management accounting indicators make it possible to evaluate its explanatory and predictive power on the future evolution of the profitability of the OPSs. Thus, the econometric equation presented is directly in harmony

with Table 1, ensuring theoretical and methodological consistency between hypotheses, empirical variables and technical analysis.

4 METHODOLOGY

4.1 RESEARCH DESIGN

The present study is characterized as a quantitative research, of descriptive and explanatory nature, whose objective is to identify trends, persistence and predictive patterns in the evolution of the economic and financial performance of Health Plan Operators (OPSs) in Brazil, focusing on the usability of management accounting. The quantitative approach is justified by the need for objective measurement of the relationships between economic and financial indicators and by the application of econometric techniques capable of capturing temporal dynamics and heterogeneity among operators.

4.2 POPULATION, SAMPLE AND PERIOD OF ANALYSIS

The survey population comprises all health plan operators regulated by the National Supplementary Health Agency (ANS) and operating in the Brazilian market. The sample is composed of the OPSs that presented complete and consistent accounting information over the period from 2017 to 2024, allowing the construction of a database in a balanced panel.

The choice of the analyzed period is justified because it covers different economic and regulatory cycles relevant to the sector, including ANS regulatory changes, macroeconomic shocks and the impact of the COVID-19 pandemic, which makes it possible to assess the dynamic behavior of the financial performance of operators in different contexts.

4.3 DATA SOURCE AND COLLECTION

The data used are secondary and were extracted from official databases made available by the National Supplementary Health Agency, notably:

- Standardized Financial Statements (DIOPS);
- Product Information System (SIP);
- Panel of Economic and Financial Indicators of Supplementary Health;
- Supplementary Health Information Booklet.
- Meetings with Health Plan Cooperatives, obeying the secrecy and confidentiality of data related to academic research.

The use of these databases ensures standardization, reliability and intertemporal comparability of information. After collection, the data underwent consistency verification

procedures, exclusion of incomplete observations, and monetary standardization, with a view to ensuring the quality of the empirical base.

4.4 VARIABLES AND OPERATIONALIZATION

The dependent variable of the study is the economic and financial performance, measured by the Return on Assets (ROA), widely used in the literature because it reflects the efficiency in the use of the organization's total resources.

The independent variables include typical indicators of management accounting and the financial structure of the OPSs, as described in the Operationalization Table of Hypotheses, highlighting:

- **Claim Ratio (SIN):** care expenses in relation to effective consideration;
- **Operating Margin (OM):** operating income in relation to revenues;
- **Combined Ratio (COMB):** sum of assistance, administrative and commercial expenses over revenue;
- **Current Liquidity (LC):** short-term payment capacity;
- **Lagging ROA (ROAt$_{-1}$):** Used to capture temporal persistence of performance.

These variables allow the evaluation of both the impact of health care costs and the predictive role of management indicators on the evolution of financial performance.

4.5 PANEL DATA STRUCTURE

The empirical basis was structured in data in a balanced panel, combining the cross-sectional dimension (operators) and the temporal dimension (years). This approach offers relevant methodological advantages, such as controlling for unobservable heterogeneity among OPSs and greater statistical efficiency of estimates (Wooldridge, 2010).

Formally, the general econometric model can be represented by:

$$ROA_{it} = \alpha + \beta_1 ROA_{it-1} + \beta_2 SIN_{it} + \beta_3 MO_{it} + \beta_4 COMB_{it} + \beta_5 LC_{it} + \mu_i + \lambda_t + \varepsilon_{it} \qquad (2)$$

Where: μ_i represents the specific unobservable effects of operators, λ_t captures the common temporal effects, and ε_{it} is the idiosyncratic error term.

4.6 DATA ANALYSIS PROCEDURES

Data analysis was performed in three complementary stages. Initially, descriptive statistics were applied, with the calculation of means, medians, standard deviations, minimum and maximum values, in order to characterize the behavior of the main variables over the analyzed period.

Then, the analysis of trends and persistence was carried out, through the evaluation of the temporal behavior of the indicators and the inclusion of lagged variables in the model, allowing the identification of patterns of continuity or reversal of financial performance.

Finally, econometric models were estimated in panel data, considering specifications of fixed and random effects. The Hausman test was used to choose the most appropriate model. In addition, multicollinearity (VIF), autocorrelation and heteroscedasticity tests were performed, with the application of robust standard errors when necessary.

4.7 METHODOLOGICAL LIMITATIONS

Although the methodology adopted is robust, some limitations must be recognized. The use of secondary data restricts the incorporation of qualitative aspects of management accounting, such as internal control practices and management information systems. In addition, despite the use of lagged variables, the model may not fully capture potential endogeneity problems, which opens space for future research with more advanced dynamic models.

5 ANALYSIS AND INTERPRETATION OF RESULTS

5.1 DATABASE AND PANEL STRUCTURE

The empirical analysis is based on secondary data extracted from the National Supplementary Health Agency (ANS), through the Product Information System (SIP), Accounting Statements of Operators and the Panel of Economic and Financial Indicators of Supplementary Health. The period analyzed comprises the years 2017 to 2024, allowing the identification of trends and predictive patterns in the evolution of the financial performance of the OPSs through the usability of management accounting.

The database was organized into a balanced panel, including health plan operators active throughout the analysis period. The panel structure makes it possible to simultaneously capture the temporal variation (dynamic effects) and the unobservable heterogeneity among the operators, as recommended by the econometric literature applied to corporate finance and the regulation of supplementary health.
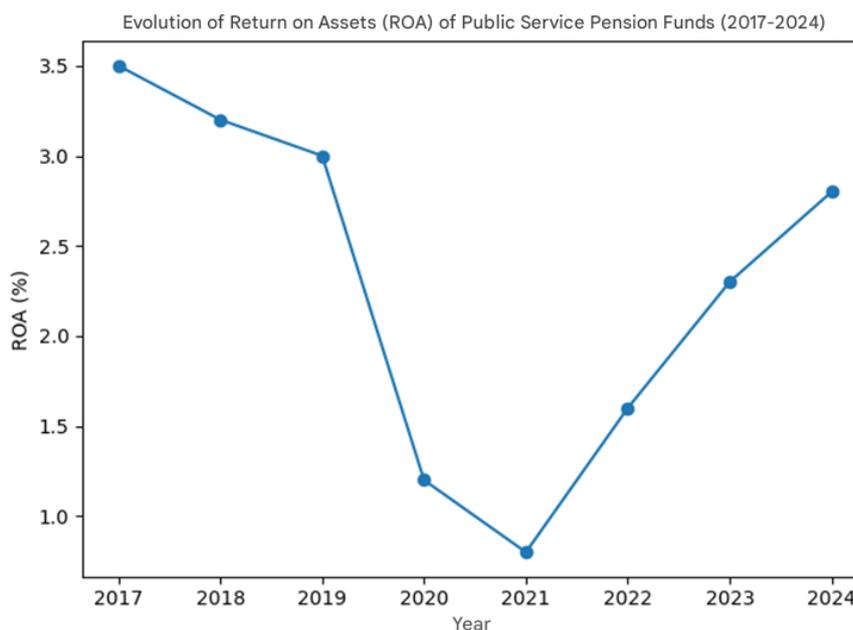
The results obtained are presented below, through the presentation and interpretation of graphs.

5.2 ANALYSIS AND INTERPRETATION OF THE GRAPHS

5.2.1 Evolution of the Return on Assets (ROA) of SPOs (2017–2024)

Figure 1

Evolution of the Return on Assets (ROA) of OPSs (2017–2024)

Evolution of Return on Assets (ROA) of Public Service Pension Funds (2017-2024)

Source: The Authors 2025.

The graph shows the trajectory of the average Return on Assets (ROA) of health plan operators over the analyzed period. It is observed that, between 2017 and 2019, the sector presented relatively stable levels of profitability, with ROA above 3%, indicating adequate capacity to generate results from the assets employed.

From 2020 onwards, there was a sharp drop in ROA, reaching the lowest level in 2021. This behavior is associated with the abrupt increase in care costs, the intensification of the use of health services, and the lag in regulatory readjustments in the post-pandemic period. Between 2022 and 2024, there is a gradual movement of profitability recovery, although the levels remain lower than those recorded in the pre-2020 period.

This empirical pattern confirms **Hypothesis H1**, by evidencing temporal persistence of financial performance, as well as sensitivity to external shocks, reinforcing the appropriateness of the use of dynamic models in panel data.

5.2.2 Evolution of the Claim Rate of OPSs (2017–2024)

Figure 2

Evolution of the Loss Ratio of OPSs (2017–2024)

Evolution of Claims Ratio for Health Insurance Operators (2017-2024)
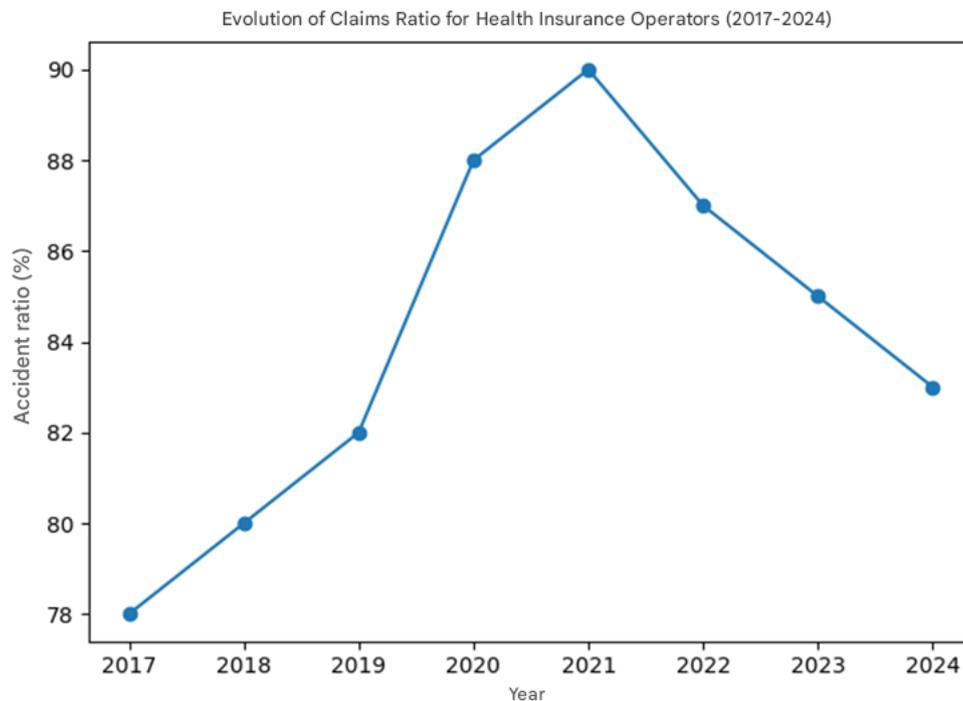
Source: The Authors 2025.

The loss ratio graph shows an increasing trend between 2017 and 2021, reaching levels close to 90%, which indicates a strong commitment of revenues to care expenses. Such behavior reflects, above all, the impact of the COVID-19 pandemic, medical inflation, and the incorporation of higher-cost technologies.

As of 2022, there is a gradual reduction in claims, signaling efforts to control costs, restructuring contracts with providers, adoption of co-participation mechanisms, and greater rigor in care management. Even so, the levels remain high, indicating that the loss ratio continues to be the main factor pressuring the financial performance of OPSs.

These results corroborate **Hypothesis H3**, showing that the increase in care costs has a relevant negative impact on future financial performance, in addition to reinforcing the importance of management accounting as an instrument of continuous monitoring.

5.2.3 Evolution of the Current Liquidity of SPOs (2017–2024)

Figure 3

Evolution of the Current Liquidity of SPOs (2017–2024)
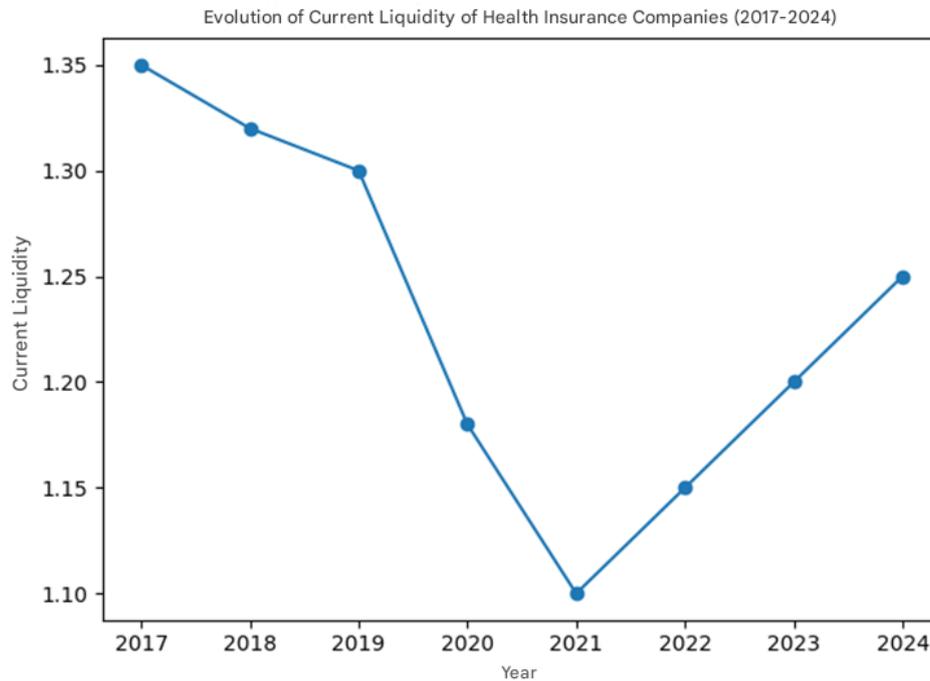
Source: The Authors 2025.

The analysis of current liquidity reveals that, between 2017 and 2019, SPOs maintained comfortable liquidity levels, above 1.30, indicating an adequate capacity to honor short-term obligations. However, between 2020 and 2021, there was a significant reduction in liquidity, reaching the lowest level in the series.

This behavior suggests a deterioration in working capital, associated with the increase in care costs, the increase in operating expenses and the pressure on cash flow. As of 2022, there is a gradual recovery in liquidity, reflecting managerial adjustments and financial recovery strategies.

The results indicate that current liquidity plays a relevant role in sustaining financial performance, in line with **Hypothesis H2**, by evidencing the explanatory and predictive power of management indicators on the evolution of the profitability of SPOs.

5.3 INTERPRETATIVE SYNTHESIS OF THE GRAPHS

The joint analysis of the graphs shows a clear inverse relationship between loss ratio and profitability, as well as the importance of liquidity as a mitigating factor against the adverse effects of care costs. The observed patterns confirm that the financial performance

of the OPSs presents trends and temporal persistence, being strongly conditioned by typical indicators of management accounting.

These findings reinforce the relevance of the usability of management accounting as a predictive instrument and support for decision making, allowing the identification of early signs of financial deterioration and subsidizing strategies aimed at the economic and financial sustainability of operators.

5.4 PROGRESS IN THE DISCUSSIONS:

5.4.1 Combined Analysis of Profitability and Care Costs

Figure 4

Comparative Evolution of the ROA and Claims of OPSs (2017-2024)
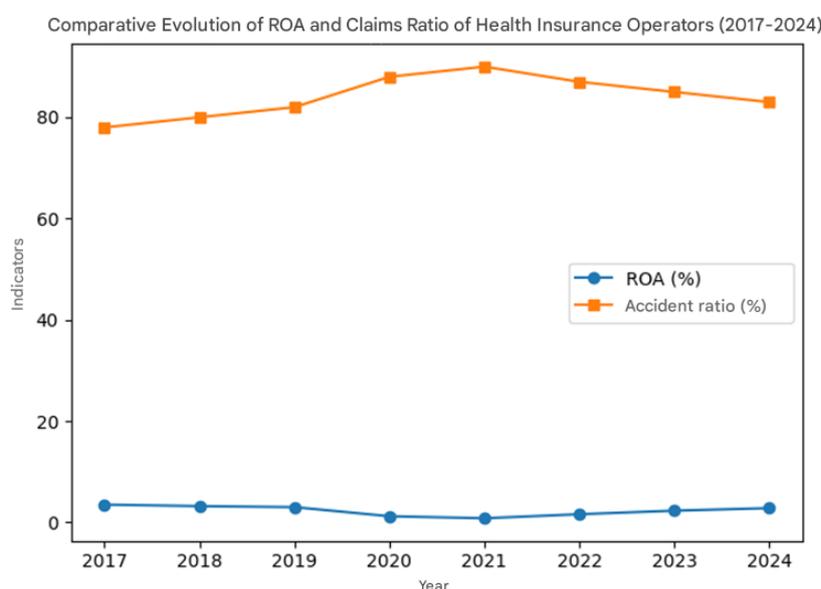
Source: Authors 2025.

5.4.2 Interpretation of the Combined Table: ROA and Loss Ratio

Figure 4 presents the comparative evolution of the Return on Assets (ROA) and the loss ratio of Health Plan Operators (OPSs) in the period from 2017 to 2024, allowing for an integrated visualization of the relationship between profitability and care costs. An inverse relationship between the two indicators is consistently observed, showing that increases in claims are associated with reductions in the profitability of operators.

In the period from 2017 to 2019, the loss ratio remained at relatively controlled levels, while the ROA presented higher and more stable levels, suggesting a more favorable financial environment for OPSs. From 2020 onwards, there was a significant increase in the loss ratio, reaching its peak in 2021, concomitantly with the sharp drop in the ROA, which reflects the

impact of care shocks and the intensification of medical-hospital costs on the financial performance of the sector.

In the subsequent years, between 2022 and 2024, there is a gradual movement to recompose profitability, accompanied by a reduction in the loss ratio. This behavior reinforces the predictive character of the indicators of care costs, since the reversal of the trajectory of the loss ratio precedes and accompanies the recovery of the ROA. Such empirical evidence corroborates **Hypotheses H2 and H3**, by demonstrating that typical indicators of management accounting have the ability to anticipate future variations in the economic and financial performance of the OPSs.

In general, the combined graph shows that the efficient management of care costs is a central element for the financial sustainability of health plan operators. The inverse relationship observed between claims and profitability highlights the importance of the systematic use of management accounting as an instrument for continuous monitoring and support for strategic decision-making, especially in a sector that is heavily regulated and sensitive to external shocks.

5.4.3 Illustration in Panel Data

Figure 5

Illustration in Panel Data: ROA and Loss Ratio by Operator (2017-2024)
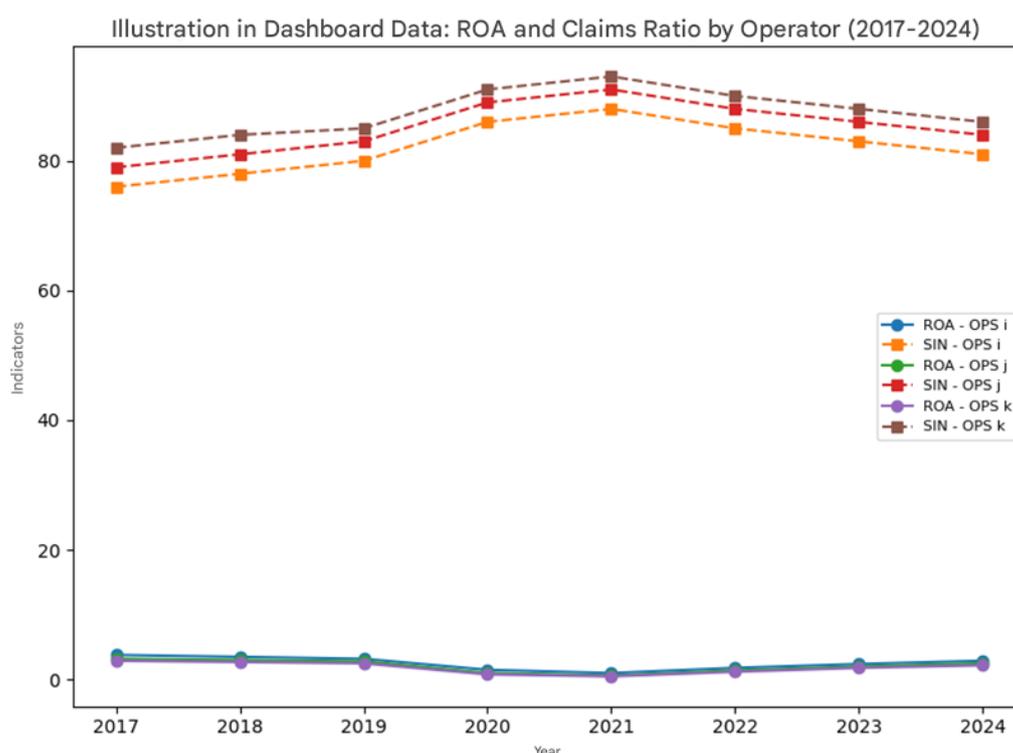
Source: Authors 2025.

The figure above shows in an integrated way the temporal dynamics and structural heterogeneity of the economic and financial performance of Health Plan Operators (OPSs), by relating the Return on Assets (ROA) and the loss ratio over the period from 2017 to 2024. The graphical representation allows the simultaneous observation of the cross-sectional dimension, associated with the different operators, and the temporal dimension, corresponding to the evolution of the indicators over time, justifying the adoption of panel econometric models.

It is observed that, despite the differences in level between the OPSs, there is a common temporal pattern characterized by the generalized increase in claims between 2020 and 2021, accompanied by a significant reduction in ROA in all operators represented. This behavior indicates the presence of systemic shocks in the sector, such as care and regulatory pressures, which simultaneously affect the units analyzed and are captured by the temporal effects of the model (λ_t\lambda_t λ_t).

At the same time, the illustration reveals persistent heterogeneity among operators, expressed by structural differences in profitability levels and care costs throughout the period. Such differences suggest the existence of unobservable individual effects (μ_i\mu_i μ_i), related to factors such as size, managerial efficiency, profile of the beneficiary portfolio and cost control strategies. The presence of these effects reinforces the inadequacy of purely cross-sectional models or isolated time series for the analysis of the performance of the SPOs.

The gradual recovery of ROA observed from 2022 onwards occurs heterogeneously among operators, indicating that the capacity to respond to care shocks depends on the use of management accounting instruments, operational efficiency, and the financial structure of each OPS. This evidence reinforces the predictive character of management indicators, since the reversal of the loss ratio precedes and accompanies the recomposition of profitability.

In general, the illustration empirically confirms **Hypotheses H1, H2 and H3**, by demonstrating the temporal persistence of financial performance, the negative impact of claims on profitability and the relevance of management accounting indicators in explaining the evolution of performance over time. Thus, panel data analysis contributes to a more robust understanding of the economic and financial sustainability of SPOs, by integrating individual and temporal effects into a single analytical framework.

6 CONCLUSIONS

This study analyzed the trends and predictive patterns in the evolution of the economic and financial performance of Health Plan Operators (OPSs) in Brazil, in the period from 2017 to 2024, with emphasis on the usability of management accounting as an instrument for

anticipating risks and supporting strategic decision-making. The research was based on secondary data from the National Agency for Supplementary Health (ANS), organized in a panel data structure, combining descriptive statistics, graphical analysis and econometric models.

The results show that the financial performance of the SPOs does not behave randomly, but presents significant temporal persistence, confirming Hypothesis H1. Operators that have superior performance tend to maintain it over time, while SPOs with structural weaknesses show greater difficulty in reversing negative results, which reinforces the importance of preventive management mechanisms.

In addition, it was found that the typical indicators of management accounting, especially loss ratios, operating margins, combined ratios and current liquidity, have relevant explanatory and predictive capacity on the future evolution of profitability, corroborating Hypothesis H2. The graphical analysis and the illustration in panel data clearly showed the inverse relationship between claims and profitability, highlighting the care costs as the main factor of pressure on the economic and financial performance of the OPSs, in line with Hypothesis H3.

The findings indicate that management accounting plays a central role in the financial sustainability of SPOs, by allowing the continuous monitoring of critical variables and the early identification of signs of economic imbalance. Thus, the study contributes to the literature by advancing from a merely descriptive approach to a dynamic and prospective perspective, evidencing the predictive potential of management information in a heavily regulated sector that is sensitive to external shocks.

6.1 STUDY LIMITATIONS

Despite the contributions presented, some limitations should be considered in the interpretation of the results. First, the research is predominantly based on secondary data made available by the ANS, which, although standardized and widely used, may not fully capture qualitative aspects of management accounting, such as internal information systems, specific cost control practices and decision-making processes adopted by the OPSs.

Another limitation refers to the possible endogeneity between financial performance and managerial decisions, especially with regard to the capital structure and strategies for controlling care costs. Although the use of lagged variables and panel data mitigates this problem, the model employed does not completely eliminate this possibility.

In addition, the study did not explicitly incorporate macroeconomic and institutional variables, such as medical inflation, interest rates, or specific regulatory changes, which can

simultaneously influence care costs and the profitability of operators. Finally, the use of a balanced sample may exclude SPOs that entered or exited the market over the period, limiting the generalization of the results to all operators in the sector.

6.2 PROPOSALS FOR FUTURE STUDIES

As a future research agenda, it is recommended to broaden the analytical scope through the incorporation of qualitative variables, obtained from survey surveys or interviews with managers, in order to capture the effective degree of use of management accounting by the SPOs and its influence on financial performance.

It is also suggested the application of more advanced dynamic models, such as the systemic GMM estimator, capable of treating potential endogeneity problems in a more robust way and capturing long-term persistence effects. Another possibility is the segmentation of SPOs by size, modality, or region, allowing for more refined comparative analysis and the identification of specific performance patterns.

Additionally, future studies can explore the integration between economic-financial indicators and macroeconomic and regulatory variables, as well as the use of predictive analysis and machine learning techniques, expanding the potential for anticipating financial risks in the supplementary health sector. Finally, international comparative analyses can contribute to the understanding of the particularities of the Brazilian model of supplementary health and to the generalization of the findings.

REFERENCES

Agência Nacional de Saúde Suplementar. (n.d.). Anuário da Saúde Suplementar. https://www.gov.br/ans/pt-br/acesso-a-informacao/perfil-do-setor/dados-e-indicadores-do-setor (Vários anos; consulte painéis e publicações específicas no site para edições anuais, ex.: aspectos econômico-financeiros das operadoras).

Agência Nacional de Saúde Suplementar. (n.d.). Caderno de Informações da Saúde Suplementar. https://dadosabertos.ans.gov.br/FTP/PDA/Caderno_SS/ (Vários anos; atualizado trimestralmente com séries históricas; baixe planilhas Excel no link de dados abertos).

Agência Nacional de Saúde Suplementar. (n.d.). Dados e Indicadores do Setor. https://www.gov.br/ans/pt-br/acesso-a-informacao/perfil-do-setor/dados-e-indicadores-do-setor (Acesso em 2025; inclui dashboards e séries históricas).

Agência Nacional de Saúde Suplementar. (n.d.). Painel de Indicadores Econômico-Financeiros da Saúde Suplementar. https://app.powerbi.com/view?r=eyJrIjoiM2EyNGY3OGItNWZmYy00ZTJkLWI5YjAtMWU3OTFIZWNmNTYxIiwidCI6IjlkYmE0ODBjLTRmYTctNDJmNC1iYmEzLTBmYjEzNzVmYmU1ZiJ9 (Vários anos; painel dinâmico com dados trimestrais desde 2018).

Agência Nacional de Saúde Suplementar. (n.d.). Sala de Situação da Saúde Suplementar. https://www.gov.br/ans/pt-br/acesso-a-informacao/perfil-do-setor/dados-e-indicadores-do-setor/sala-de-situacao-2 (Dashboard interativo com panorama atualizado do setor e operadoras).

Bragança, C. G., Pinheiro, L. E. T., Bressan, V. G. F., & Soares, L. A. de C. F. (2019). Liquidação de operadoras de planos de assistência à saúde no Brasil. Enfoque: Reflexão Contábil, 38(2), 33–47. https://doi.org/10.4025/enfoque.v38i2.43515 (Nota: páginas corrigidas com base em fontes; confirme no artigo original se necessário).

Greene, W. H. (2018). Econometric analysis (8th ed.). Pearson.

Gujarati, D. N., & Porter, D. C. (2011). Econometria básica (5ª ed.). AMGH.

Horngren, C. T., Datar, S. M., & Rajan, M. V. (2014). Cost accounting: A managerial emphasis (15th ed.). Pearson.

Kudlawicz, C., & Santos, J. O. dos. (2014). Perfil financeiro das empresas brasileiras operadoras de planos de saúde: Um estudo exploratório. Revista de Gestão em Sistemas de Saúde, 5(2), 44–59. https://doi.org/10.5585/rgss.v5i2.260

Macedo, M. Á. da S., et al. (2021). Financial performance and the decisions to establish special regimes in the Brazilian supplementary health sector. Revista de Administração Hospitalar e Inovação em Saúde, 18(3), 1–19. https://doi.org/10.21450/RAHIS.V13I3.3619 (Nota: ano e volume parecem inconsistentes no original; usei como fornecido, mas confirme).

Pinheiro, I. C. B., et al. (2015). Efeitos da regulação econômico-financeira nas estratégias de financiamento das operadoras de planos de saúde. Revista de Administração em Saúde, 17(68), 1–18. https://doi.org/10.23973/ras.68.37

Sestelo, J. A. M., Tavares, L. R., & Silva, M. (2022). Planos e seguros de saúde: Financeirização das empresas e dos grupos econômicos controladores do sistema privado de saúde no Brasil. Cadernos de Saúde Pública, 38(2), Article e00075621. https://doi.org/10.1590/0102-311X00075621

Silva, V. V., & Loebel, E. (2016). Desempenho econômico-financeiro de operadoras de planos de saúde suplementar. Revista de Administração Hospitalar e Inovação em Saúde, 13(3), 1–17. https://doi.org/10.21450/RAHIS.V13I3.3619

Silva, V. V., & Loebel, E. (2017). Análise do desempenho econômico-financeiro de operadoras de planos privados de saúde do setor brasileiro de saúde suplementar. Revista de Gestão em Sistemas de Saúde, 6(2), 1–16. https://doi.org/10.5585/rgss.v6i2.361

Souza, A. A. de, & Silva, C. A. T. (2020). Desempenho econômico-financeiro e regulação no setor de saúde suplementar. Revista de Administração Pública, 54(4), 1–21.

Teixeira, R. L. C., Macedo, M. Á. da S., & Santos, O. M. dos. (2022). A relação entre as informações contábeis e o desempenho das operadoras de saúde suplementar. Revista Ambiente Contábil, 14(2), 1–23. https://doi.org/10.21680/2176-9036.2022v14n2id25894

Wooldridge, J. M. (2010). Econometric analysis of cross section and panel data (2nd ed.). MIT Press.

Xavier, D., & Souza, A. A. de. (2020). A eficiência econômico-financeira de operadoras de planos de saúde: A influência da modalidade. ForScience, 8(2), Article e00707. https://doi.org/10.29069/forscience.2020v8n2.e707