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ANALYSIS OF THE OPERATING PERFORMANCE OF BRAZILIAN HEALTH PLANS

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ABSTRACT

This paper presents the results of a survey aimed at analyzing the efficiency of Brazilian health plan operators from financial indicators and highlight which characteristics of these organizations can influence the determination of (in) efficiency. It was found that the efficiency of the health plan operators was homogeneous. With regard to the organizations considered effective by the model, it follows that the majority belongs to the "group medicine" segment. As for the location of companies considered to be efficient, all are in the southeast of the country. Regarding the size of the organizations, none of the companies considered efficient was small.

Keywords: Health Insurance Providers; Performance Analysis; Financial Indicators.

1. INTRODUCTION

This paper reports the results of recent research aimed at analyzing the efficiency of health insurance providers in Brazil. It builds on financial indicators and features of these organizations that are related to their (in) efficiency scores. The organizations' environment has become ever more complex, which has implied increasing demand for accurate information (Souza, *et al*., 2008). Several management tools have been developed to assist managers in the decision-making process. Common, useful tools are performance assessment tools that support the analysis of performance indicators.

Performance assessment is a process that supports a comparative analysis of planned and actual results. Unlike companies that do not use diagnosis indicators, companies that do can use performance measures to monitor their actual status and improve the activities that are not aligned with their objectives (Fernandes, 2004).

Financial measures are valuable tools that show the economic results of actual actions and allow managers to assess whether the company's strategy and its implementation and execution really contribute to improving financial results (Kaplan *et* Norton, 1997). The use of such measures is also suitable for series analyses and comparative analyses of any given number of companies (Martins, 2005).

The health care industry in Brazil is a sector that accounts for significant, yet largely unknown, amounts of capital in the economic system. Access to accurate, detailed information on these amounts of structure, distribution, and evolution over time is crucial for both the decision making process and the formulation and monitoring of public policies in the sector (Brasil, 2002).

A survey carried out in 2011 showed that a private health insurance is one of the most desired products among the Brazilians living in the eight metropolitan areas that were approached (IESS, 2011). Only 23.9% of the Brazilian population has a private health insurance, and 67% of the respondents claimed that they wish they had a private health insurance (IESS, 2011). The sector's increase has been significant since the 1980s, and recent research points out that it will likely increase both in representativeness and coverage. Health care insurance is, therefore, a theme of great interest in the society, and studies on it are of great value to the population.

With a view to protecting the society's interest and correcting market failures, the Brazilian government began to regulate the sector in 1998 and created an agency called Agência Nacional de Saúde (ANS) (National Health Agency) in order to monitor and regulate the sector in 2000 (Brazil,

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1998, 2000, 2002). The current regulation requires a great understanding in terms of the features and relationships structuring between them in the activities of the health care insurance providers in Brazil.

2. LITERATURE REVIEW

2.1 Performance assessment

Performance assessment is a process focused on quantifying efficiency and efficacy of past actions upon collecting, classifying, analyzing, interpreting, and disclosing relevant data (Neely, 1998). In any organization, Slack et al. (2002) claim, performance measures are, to a greater or lesser extent, a pre-requisite to improve results. Performance assessments are a bridge between planning (i.e., identifying the company's objectives and developing strategies and process to reach them) and controlling (i.e., monitoring employees to keep track of the objectives) (Atkinson, 2000).

The aim of a performance assessment should go beyond the report of past events and, therefore, includes features that support the analysis of future events or the estimation of feature results. In order to accomplish this goal, managers can resort to accounting and financial analysis by preparing traditional accounting and financial reports, statements, and related materials (Iudícibus, 1998). Performance measurements can be approached from a monetary perspective, usually through accounting and financial data, as well as from a non-monetary perspective (Hendriksen et Van Breda, 1999).

The globalized competition has pushed the industries to rethink their activities (Antunes et Tabak, 2004), which has reflected on their levels of efficiency, especially when they resort to information technologies and risk management techniques. The production units in competitive industries fall in two different groups according to a given performance standard (Barr et al., 2002): the efficient and the inefficient groups. The successful production of the largest amount of an output, given the available inputs, defines an efficient company for Farrell (1957).

In a highly complex environment, a way to carry out an efficiency-oriented performance assessment is to determine a benchmark. Benchmarking is a systematic process aimed at identifying the best practice and changing its current understanding with a view to reaching a superior level of performance (Camp, 1989). Thus, the objective of carrying out a benchmarking is to emulate the practices of successful companies or improve performance on the basis of the performance of such companies.

Performance assessment is, therefore, a greatly important tool for the companies' survival in the current economic environment. Determining a benchmark is a useful tool to carry out performance assessments because it is aimed at identifying the best practices in the market using the lowest amount of inputs.

2.2 Performance indicators

The use of performance measures is suitable for series analyses and comparative analyses of any given number of companies (Martins, 2005). One of the main financial analysis techniques is the analysis of indicators (Matarazzo, 2010). Performance measures are the vital signs of an organization; they support management on facts, rather than guesses of feelings (Hronec, 1994). The performance indicators work as guides aimed at providing support to the assessment of not only the efficiency of the actual actions, but also the skewness between planed and actual behavior or results (Kardec, 2002 apud Carvalho, 2007, p. 28). Indicators are, therefore, crucial tools for both managing an organization and assessing its performance (Lenz et Kuhn, 2004).

A company can hardly accomplish an excellent result if it only controls the financial data of their past performance (Kaplan et Norton, 1997); managers actually need further indicators to understand some management issues. Performance measures are, therefore, a top management concern, because it is more than a managerial measure; it is a strategic tool for the company's survival (Miranda et Silva, 2002).

It is possible to compare the financial indicators of a company with the indicators of others in the same or in a different sector and with the sector as whole (Assaf Neto, 2006; Matarazzo, 2010; Silva, 1995). The present study uses benchmarking alongside financial indicators as a method of performance assessment.

3. METHODOLOGY

This is a descriptive, exploratory, ex post facto study using a quantitative approach to data (Lakatos, 2004; Gil, 1999). It is a quantitative study because it deploys mathematic processes to measure the health care insurance providers' efficiency and identify companies' features that are related to their (in) efficiency. It is also an exploratory study because it focuses on a topic and takes a particular approach that, to the best of our knowledge, is incipient in the Brazilian context. As Collins and Hussey (2005) argue, exploratory research is usually carried out when the phenomena have not been extensively approached in previous studies, that is, this sort of research is concerned with emerging issues/topics.

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This study uses mostly secondary data, which implies that there is at least one level of interpretation between the fact and its recording/report (Charnes, Cooper et Rhodes, 2003). These data were collected from the ANS' 2011 annual report. They were selected using a representative parameter: the object of study is the subsector of the most representative private health care insurance providers in the Brazilian market. Thus, the population comprised medical and hospital care insurance providers, as they represent 74% of the national coverage of private insurance. A sample with 30 providers in a population of 1.3 private medical and hospital care insurance providers was selected for processing and analysis using the SIAD software, an integrated system to support decision making (Angulo et al., 2005). This limitation is due to limited access to data and low resources.

A non-probabilistic quota sample was used with a view to assuring significant comparison power in relation to the population. This type of sampling consists of selecting entities proportionally to a given criterion and arranging them in subgroups in the sample. The providers were, therefore, chosen and distributed in four groups. Upon deciding on how to segment the sample, each subgroup was checked for their proportionality to the population in order to determine the number of companies that would be included in each subgroup (see Figure 1). The amount of companies was adjusted in a subgroup in order to account for at least one company in the specialized health care insurance provider. Figure 2 summarizes the features of the sample used in this study. It includes the pseudonyms adopted for each provider, as well as their juridical status, size, and state where they are located.

The study approached six financial indicators, namely: Return on Total Assets (ROA); Current Ratio (CR); Total Asset Turnover (TAT); Mean Time before Paying for a Service Event (MTPE); Debit Ratio (DR); Administrative Expenses (AE). The three first indicators are "the greater, the better" measures, and the remaining are "the lower, the better" measures.

ROA is a profitability indicator. It is a relation between net earnings and total assets. It measures the percentage of profit that the company earns in relation to the invested capital. CR is a liquidity indicator. It is the relation between current assets and current liabilities. A LC indicator that is greater than 1 point in relation to a reasonable amount of assets that can be used to pay short term liabilities. TAT is a financial cycle indicator. It relates total sales to total assets. It represents, therefore, the number of times the entire asset is capable of generating sales revenue or sales income.

MTPE is also a financial cycle indicator. It indicates the mean time it takes for the provider to pay for the health care service events. DR is a capital indicator. It relates current liabilities to total asset. AE shows how the administrative expenses relate to the total sales or total income of the insurance provider (effective counterpart, compensation). Figure 3 shows the equations for each financial indicator.

Several techniques were used for data analysis, namely: Descriptive statistics, Kruskal-Wallis tests, Spearman's rank correlation test, and Data Envelopment Analysis (DEA). Specially, DEA was deployed to measure the company's efficiency. DEA was developed by Charnes, Cooper et Rhodes (1978) with a view to determining the efficiency of production units. There are two classical DEA models: (1) CRS (Constant Returns to Scale), or CCR (Charnes, Cooper et Rhodes); and (2) VRS (Variable Returns to Scale), or BCC (Banker, Charnes et Cooper). The present study relies on the input-oriented BCC model, which indicates an optimal point where the use of the inputs provides the best financial result.

DEA is built on identifying an efficient frontier that comprises the potential points where a perfectly efficient company generates a given result. Companies with the lowest ratio between inputs and outputs are considered efficient; they lie on the frontier and have a score of 1. The inefficient companies are below the frontier and get a score ranging from zero to 1.

As the DEA is restricted concerning variable homogenization, the financial indicators were escalated and standardized (Lobo, 2010). As DEA intrinsic logic does not allow for negative variables for both inputs and outputs, the standardization also involved transforming negative numbers into positive numbers. This consisted of dragging the axis

Segment	Population	Proportion	Sample Size	Adjustede Sample Size
Medical cooperative	325	40%	12	12
Philantropic Organization	88	11%	3	3
Group Medicine	387	48%	14	14
Specialized Health Care Insurance Provider	13	2%	0	1
Total	813	100%	29	30

Figure 1. Sample data according to segment
Source: research data

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Juridical status	*ANS registration number*	*Pseudonym*	*Size*	*State*
Medical cooperative	319996	DMU 1	Large	SP
Medical cooperative	343731	DMU 2	Large	RJ
Medical cooperative	382876	DMU 3	Large	GO
Medical cooperative	360767	DMU 4	Medium	SP
Medical cooperative	338559	DMU 5	Medium	MA
Medical cooperative	321958	DMU 6	Medium	CE
Medical cooperative	318213	DMU 7	Medium	SC
Medical cooperative	320510	DMU 8	Medium	SP
Medical cooperative	320897	DMU 9	Small	RJ
Medical cooperative	335690	DMU 10	Large	SP
Medical cooperative	393321	DMU 11	Large	RJ
Medical cooperative	312720	DMU 12	Medium	PR
Philanthropic organization	316491	DMU 13	Large	SP
Philanthropic organization	342807	DMU 14	Medium	MG
Philanthropic organization	333808	DMU 15	Small	SP
Group Medicine	403911	DMU 16	Large	RJ
Group Medicine	355097	DMU 17	Large	SP
Group Medicine	412384	DMU 18	Large	RJ
Group Medicine	302091	DMU 19	Large	SP
Group Medicine	401846	DMU 20	Medium	SP
Group Medicine	352586	DMU 21	Medium	SP
Group Medicine	411256	DMU 22	Medium	SP
Group Medicine	325074	DMU 23	Large	SP
Group Medicine	411582	DMU 24	Medium	RJ
Group Medicine	375268	DMU 25	Small	SP
Group Medicine	306622	DMU 26	Large	SP
Group Medicine	309222	DMU 27	Large	RJ
Group Medicine	345091	DMU 28	Small	SP
Group Medicine	351091	DMU 29	Small	CE
Specialized Health Care Insurance Provider	000582	DMU 30	Large	SP

Figure 2- Sample distribution according to juridical status, size, and location

Source: research data

Financial ratio	**Formula**
Return on Total Assets (ROA)	$ROA = \frac{Earnings\ available\ for\ commom\ stockholders}{Total\ assets}$
Current Ratio (CR)	$CR = \frac{Current\ assets}{Current\ liabilities}$
Total Asset Turnover (TAT)	$TAT = \frac{Sales}{Total\ Assets}$
Mean Time Before Paying for a Service Event (MTPE)	$PMPE = \left[\frac{Payable\ service\ events}{Net\ covered\ events}\right] x360$
Debt Ratio (DR)	$DR = \frac{Total\ liabilities}{Total\ Assets}$
Administrative Expenses (AE)	$AE = \frac{Administrative\ expenses}{Sales}$

Figure 3- Financial variables included in the Data Envelopment Analysis (DEA)

Source: Adapted from Bernstein and Wild (2000), Fridson and Alvarez (2002), Penman (2007), Silva (1995), and Matarazzo (2010).

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of abscissa from zero to the minimum value of each indicator and then adding one unit to the minimum value so that the result could stand as higher than zero. Finally, a logarithmic transformation was used to reduce scale variation (Gujarati, 2002).

4. RESULTS

4.1 Correlation Analysis

This study considered a 0.80 correlation (whether negative or positive) as the threshold for high correlation levels. This test was used in order to prevent an overlap of indicators' potential to explain a given matter, which would yield redundant results. The correlation test, therefore, was used for the entire sample, that is, 30 entities (see Figure 4).

	CR	*MTPE*	*TAT*	*ROA*	*DR*	*AE*
CR	1					
MTPE	-0.1814	1				
TAT	0.1888	-0.2768	1			
ROA	0.5466	-0.4602	0.2459	1		
DR	-0.3203	0.3219	0.0354	-0.6566	1	
AE	-0.3917	0.0146	-0.1787	-0.1544	-0.2703	*1*

Figure 4 - Correlation between the variables
Source: results provided by software Stata

As shown in Figure 4, no indicator was correlated to another above the 0.80 threshold that was set as an inclusion criterion. This is probably derived from the fact that the variables were selected by means of a preliminary review of the literature. The variables are, therefore, weakly correlated to each other and reliable in the model.

4.2 Efficiency Analysis

The analysis consisted of applying DEA to analyze the aforementioned financial indicators. The BCC version of the DEA model was used expecting that any change in the inputs yields inversely proportional changes in the outputs. The model was output-oriented (i.e., aimed at maximizing outputs), which is suitable for the assessment of the providers' financial efficiency.

MTPE, DR and AE were included as inputs and CR, ROA, and GAT were included as outputs of the model. Given the model's orientation to maximizing outputs, the expected results are that the greater the CR, ROA, and GAT, the more efficient the companies. Figure 5 exhibits the DEA-based results for the health care insurance providers' efficiency indicators.

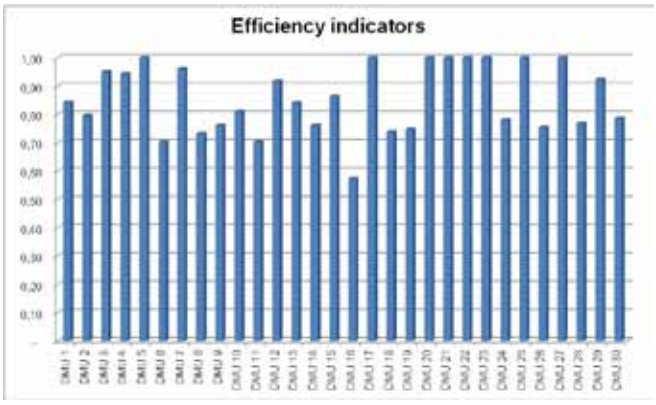

Figure 5- Sample Providers' Efficiency
Source: research data

In Figure 5, the indicator results for DMUs 5, 17, 20, 21, 22, 23, 25, and 27 are 1, that is, they lie on the efficient frontier and are, therefore, efficient. This means that 8 out of the 30 providers are efficient according to the model. Overall, most companies have a high level of efficiency, which ranges from 70% to 95%.

Figure 6 provides some features of the perfectly efficient companies. These features are concerned with the companies' financial management and organizational characteristics, and were collected with a view to analyze their relation to the efficiency results.

DMU	*Juridical status*	*Size*	Number of Users	Total Assets	Index of Complaints	Construct Index-PHPI	State
DMU5	Group Medicine	Large	291.996	95.805	1.48	0.614	RJ
DMU17	Philanthropic organization	Medium	44.555	82.918	0.31	0.8468	MG
DMU20	Group Medicine	Large	180.338	116.097	0.23	0.7384	SP
DMU21	Group Medicine	Large	102.322	35.637	0.13	0.7047	RJ
DMU22	Group Medicine	Large	244.769	41.241	0.89	0.7441	SP
DMU23	Group Medicine	Medium	75.812	25.076	0.62	0.5579	SP
DMU25	Group Medicine	Medium	46.051	5.958	0.23	0.5723	SP
DMU27	Group Medicine	Medium	28.098	13.953	0.00	0.792	RJ

Figure 6 - Further information on the efficient private health care insurance providers
Source: research data

Most efficient private health care insurance providers are "group medicine" organizations, that is, they are medical companies. As the sample consisted of 14 group medicine organizations, half of the subgroup represented efficient companies. These are types of organization that trade or provide private health care insurance in Brazil. The ANS (2011) reports that 75% of the clients of these organizations are companies that contract business plans for their employees and eligible dependents.

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Figure 3 also shows that no small-sized company was identified as efficient. The efficient companies are equally distributed as the small-sized (4) and large-sized (4). However, the Kurskal-Wallis test revealed that the differences in the providers' efficiency levels were not significantly related to organization size. In other words, the different performances cannot be ascribed statistically and significantly to organization size. This result compares to the Spearman's rank of correlation test results, which pointed to no significant correlation between efficiency and number of users.

Figure 6 also shows that only one philanthropic organization is added to the group of efficient results. This is a medium-sized company out of a subgroup of three philanthropic organizations. This is, on the one hand, one of the three companies with the lowest number of users; however, its total assets are one of the three largest in the group of efficient companies. Nonetheless, the Kurskal-Wallis did not point to significant differences ascribable to the companies' juridical status. The study also approached the complaint indexes, that is, it also account for the consumers' point of view, negative experiences, and demands for information. According to ANS (2011), the mean complaint ration was 0.40 in December 2011. Compared to this overall index, half of the group of efficient private health care providers was below this threshold. Corroborating this result, the Spearman's correlation test also pointed to no statistically significant correlation between efficiency and complaint index.

Another feature studied was the Private Health Insurance Performance Index (PHPI), built on indicators determined by ANS, a regulating agency. This index consists of four dimensions: (1) health assistance; (2) economical and financial status; (3) structure and operation; and (4) users' satisfaction. It measures whether a provider is operating in compliance with ANS's regulations. This index ranges from zero to 1: the closer to 1, the better the provider's compliance with the agency's norms and guidelines. ANS determined 0.80 as the threshold for satisfactory performance. Having this in mind, only the philanthropic organization stood out in the group of efficient companies. Once again, the Spearman's correlation test also pointed to no statistically significant correlation between efficiency and PHPI.

The study also considered the providers' location. The results show that all of them are in Southeastern Brazil. However, the Kurskal-Wallis did not point to significant differences ascribable to the companies' location.

5. CONCLUDING REMARKS

The private health care insurance industry in Brazil is heterogeneous when considering such parameters as quality and fragmented/discontinued assistance. This heterogeneity negatively impacts the efficacy and efficiency of the health care system. Therefore, identifying efficiency standards and patterns in the sector would be of great value to improving services and elaborating policies. Against this background, this study aimed to analyze the efficiency of private health care insurance providers in Brazil and identify features of the efficient providers that may be used as benchmarking by the inefficient companies.

The present proposal of efficiency analysis was built on the DEA model. The analysis indicated eight efficient providers out of the 30 companies that were included in the sample. The providers' efficiency was homogeneous, as most efficiency scores fell somewhere in a 75-95% continuum. This result may imply that the measures taken by the sectors involved with the analyzed sectors are somehow uniform. This can be explained by the sector's regulation, with an agency that establishes limits and obligations for all private health care insurance providers.

All but one of the organizations considered efficient according to the model fall in the "group medicine" segment. This implies that companies in this segment share some features that contribute to their better efficiency compared to the other providers. Organizations of this type are usually focused on the sales of health insurance and are not responsible for the management of hospitals. This results to some degree of specialization, as these organizations perform a lesser complex activity compared to the other providers.

All companies are also located in Southeastern Brazil. This is a region that concentrates most of the largest cities and has the highest population density in Brazil. It is also the most important industrial, commercial, and financial region in Brazil, and hosts most of the best universities in the country, that is, it holds most of the countries' intellectual capital in many fields of knowledge. The efficient organizations were either large or medium-sized organizations but none of them was small sized. Therefore, the small-sized companies were the least efficient providers in the sample.

Overall these results point to factors that are shared by the efficient companies and may be indicative of (in)

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efficiency. These results, however, should be interpreted with caution, as some of the analysis techniques did not point to statistically relevant differences between some variables. Further studies are necessary to reliably determine the factors impacting the private health care insurance providers' efficiency.

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