

POLÍTICA DE DIVIDENDOS DO SETOR ELÉTRICO DO BRASIL E DOS ESTADOS UNIDOS: UMA ANÁLISE NÃO LINEAR POR MEIO DE REGRESSÃO LOGÍSTICA

DIVIDEND POLICY OF THE ELECTRIC SECTOR OF BRAZIL AND THE UNITED STATES: A NON-LINEAR ANALYSIS THROUGH LOGISTIC REGRESSION

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Aprovado em 07/2025

Resumo

O objetivo deste trabalho é comparar, por meio de análise de regressão logística, a formação de preços das ações e o pagamento de dividendos entre empresas do setor elétrico brasileiro e as dos Estados Unidos. Metodologia: foram coletados dados de pagamentos de dividendos e de valores diários de ações de empresas do setor elétrico do Brasil e Estados. Foi compreendido o período de 01 de janeiro de 2000 até 31 de dezembro de 2022. Resultados: yield acima de 6% nas empresas brasileiras do setor elétrico não interferem no preço do ativo. O contrário é verdadeiro quando não há pagamento de dividendos. A ocorrência de não pagamento de dividendos relacionou-se a variação negativa de preços. Quanto às empresas dos EUA, tanto yield nulo como yield maior de 6% tiveram relação negativa com a variação de preços das ações. Em relação às empresas brasileiras, o yield das empresas dos EUA foi menor.

Palavras-chave: finanças corporativas; política de dividendos; setor elétrico

Abstract

The objective of this study is to compare, through logistic regression analysis, the formation of stock prices and the payment of dividends between companies in the Brazilian and USA electric sector. Methodology: data on dividend payments and daily values of shares of companies in the electric sector in Brazil and the States. The period covered was from January 1, 2000 to December 31, 2022. Results: a yield above 6% in Brazilian companies in the electric sector does not affect the price of the asset. The opposite is true when there is no payment of dividends. The occurrence of non-payment of dividends was related to a negative variation in prices. As for USA companies, both a zero yield and a yield above 6% had a negative relationship with the variation in stock prices. In relation to Brazilian companies, the yield of USA companies was lower.

Keywords: corporate finance; dividend policy; electric sector

INTRODUCTION

Dividends are a portion of net profits that are distributed to investors as a form of remuneration for their capital. The amount to be paid and the form of distribution are complex decisions that have generated numerous studies on the subject (VANCIN, 2014). The optimal dividend policy is one that achieves a balance between current dividends and future growth, maximizing the price of shares (LEMES-JÚNIOR et al, 2002).

Brazil's dividend policy differs from that established in developed countries such as the United States and England. Mandatory dividend payment arrangements, transaction accounting aspects, and taxation on this type of income are examples of comparative differences (BRUGNI et al., 2011). Brazilian regulators, aiming to improve legal protection for minority shareholders,

established a mandatory minimum dividend through Law 6,404/76. Despite this, according to Mota (2007), the conclusions of international studies cannot be directly applied to the Brazilian market, since there are a number of particularities, among which the following stand out: (a) existence of a mandatory minimum dividend; (b) possibility of paying interest on equity; (c) high concentration of ownership; and (d) dividends, from a fiscal perspective, are more advantageous than share buybacks. According to the author, the existence of cash flow, the stability of these flows, the lack of commitment to debt, the concern with corporate governance and the existence of few investment opportunities are factors that lead companies to distribute a greater part of their profits in the form of dividends and/or interest on equity.

One characteristic of companies in the electricity sector is that they pay high dividends (BRIGHMAN et al, 2001), in some cases with a payout of over 100%, a fact that is also present in companies in the electricity sector in Brazil (RODRIGUES et al, 2016). High profitability, associated with low profit volatility, according to Myers (1984), also ends up serving as a motivation for the payment of high dividends. The use of logistic regression is justified as a statistical analysis tool in social sciences as an alternative to linear models, especially when there is a violation of the assumptions of the linear model.

The objective of this work is to compare, through logistic regression analysis, both univariate and multivariate, the formation of stock prices and the payment of dividends between companies in the Brazilian electricity sector and those in the United States. The article is divided as follows: this introduction, the theoretical framework, where the themes of dividend policy in the electricity sector are discussed in depth, non-linear analysis models, which include logistic

regression, and the hypotheses to be tested are formulated. The methodology and results follow, demonstrating the statistical analysis of the data collected and its discussion in light of the literature, as well as the formation of univariate and multivariate models. The article ends with final considerations, where the results achieved and the perspectives for future work are reviewed.

THEORETICAL FRAMEWORK

Firms that exploit natural monopolies, such as the electricity sector, lead to a variety of economic performance problems: overpricing, production inefficiencies, costly duplication of facilities, low service quality, and potentially undesirable distributional impacts (ŠKAPA, 2012). Regulated firms, therefore, use dividend policy to mitigate agency conflicts (SILVA; KIRCH, 2023b; LOZANO; DE MIGUEL; PINDADO, 2002). In Brazil, companies in the electricity sector are leveled at the same level of corporate governance thanks to the regulation of the sector (SOUZA et al., 2015). In addition, they pay high dividends to their shareholders compared to other unregulated firms (SILVA, 2019b). Silva and Kirch (2019a), when comparing stocks in the electricity system with those belonging to the Bovespa index, demonstrated that stocks in the electricity system are more likely to generate increases in share prices above 2% than those in the Bovespa index group, after paying dividends. Silva (2019a), studying the dividend policy of the Brazilian electricity system during the period from 1994 to 2007, showed that the distribution of dividends is unrelated to investments. Companies, especially larger ones, because they have greater access to credit, often subsidized, can afford this higher dividend payment. This higher dividend payment, in turn, could be used as a signal of the company's good functioning (Signaling Effect). In Brazil, in

the period before 1976, company directors had free will to determine the amount to be paid to shareholders in the form of dividends. This is because the legislation determined that if the amount to be paid was not provided for in the bylaws, the decision would be made at a general meeting based on the board's proposal. In this context, legislators saw the need to create mechanisms to protect non-controlling shareholders, in a scenario in which the country sought to expand its capital market. In this sense, the Corporations Law - Law No. 6404/76 was created, which brought articles that proposed mandatory amounts for distribution (GELBCKE et al, 2018).

The Corporations Law (LSA), Law No. 6404, 1976, establishes in its article 202 that shareholders have the right to receive as a mandatory dividend, in each fiscal year, the portion of the profits established in the bylaws, or if this is silent, the amount will be half of the net accounting profit of the fiscal year minus or plus the following amounts: a) Quota intended for the constitution of the legal reserve; b) Amount allocated to the formation of reserves for contingencies and reversal of the same reserves formed in previous fiscal years; and, c) Unrealized profits transferred to the respective reserve and profits previously recorded in this reserve, which have been realized in the fiscal year. In the second paragraph of the same article, it is established that, in the event that the bylaws are not silent regarding its distribution, the minimum mandatory dividend may not be less than 25% of the adjusted net income (GELBCKE et al., 2018).

In turn, the USA – the country where most of the theories and studies on this subject originate – has tax legislation that is different from that of Brazil regarding dividend policy. The main heterogeneities of Brazilian legislation on this matter are: (a) the receipt of dividends by

shareholders does not constitute a taxable event; (b) there are mandatory minimum dividends; (c) there is an additional form of distribution of resources called interest on equity, which is deductible from the calculation basis for taxes on the profits of the company that distributes them, but consists of a taxable event for the shareholder who receives them (FORTI et al, 2015).

More recently, the American Taxpayer Relief Act of 2012 (HR 8) was passed by the United States Congress and signed into law by President Barack Obama in early 2013. This legislation extended the capital gains and dividend tax rates from 0 percent to 15 percent for taxpayers whose income does not exceed the thresholds set for the highest income tax rate (39.6 percent). Those exceeding these thresholds (\$400,000 for single filers; \$425,000 for heads of household; \$450,000 for joint filers; \$11,950 for estates and trusts) were subject to a maximum rate of 20 percent for capital gains and dividends (DIVIDEND TAX, 2023). Silva (2023), based on data on dividend payments and daily stock values of companies in the electricity sector in Brazil, the United States, and Germany, from January 1, 2000 to December 31, 2022, using Student's t-test and univariate and multivariate regressions using ordinary least squares, found that Brazilian companies in the electricity sector pay more dividends than companies in the same sector listed on the New York and Frankfurt stock exchanges. When using dividend variables as dependent variables, a significant positive relationship was found only between yield and GDP variation, which is in line with Silva (2019a).

Also according to Silva (2023), stock prices were negatively influenced by dividends in companies in the United States and Germany, but there was no correlation between changes in asset prices and dividend payments in the case of Brazil. This

last statement could be justified by comparing the variability (in the form of standard error) of dividends and earnings in different countries: the standard error of these attributes in Brazil is several dozen times greater than in the USA and Germany. However, univariate and multivariate regressions did not detect statistically significant correlations in the group of Brazilian companies between dividend variables and price variables. These results are in line with the studies by Silva and Kirch (2020) and Silva and Kirch (2023a).

Silva (2024a), with the aim of searching for differences in the dividend payment policy on shares of companies in the electricity sector in Brazil, the United States and Germany, since their tax laws on the subject are different from each other, used the same sample as Silva (2023) using the chi-square test for analysis. The author found greater dilution of dividend payments in the USA, i.e., a greater annual number of payments, which may be related to the legal framework based on common law and which, according to LaPorta et al (2000) and Ferris et al (2010), is used as a way of greater protection for minority shareholders. Armitage's (2012) catering dividends theory was also able to justify some differences found between countries, such as the greater appreciation of assets in the US compared to Brazil in terms of dividends with diluted payments.

Silva (2024b), using the same sample as Silva (2023), analyzed the influence of the stock split and consolidation of companies in the electricity sector in Brazil, the United States, and Germany on dividend policy and asset prices. The results showed that in relation to dividends and changes in asset prices, there was a higher dividend payment in companies that did not split in Brazil, while the opposite occurred in the USA, which is in line with the results of Lakonishok and Lev (1987) for the North American group, but not for

Brazil. However, the results of the Brazilian group regarding price variation, which was the same between the split and non-split groups, are in line with Silva and Kirch (2020) when analyzing a period of time longer than 3 months. The higher income payout in the Brazilian group due to undivided assets is not only at odds with Silva and Kirch (2020), who found no differences, but also with Fama's own work (1969), which showed that splitting leads to an increase in dividend payouts. There were no significant differences between the aggregations, which is in line with Comiran (2009) for the Brazilian market.

The ordinary least squares (OLS) linear model is one of the most widely used tools in the Social Sciences (KRUGER; LEWIS-BECK, 2008; FERNANDES et al, 2021). As long as its assumptions are respected, the coefficients estimated from a random sample provide the Best Unbiased Linear Estimate of the population parameters (KENNEDY, 2005). Unbiased because it neither systematically overestimates nor underestimates the value of the parameter, and better because it presents the smallest variance among all possible estimates (LEWIS-BECK, 1980).

If assumptions are violated, according to Fernandes et al (2021), techniques that are more appropriate to the nature of the data should be adopted. For example, a survey that investigates the impact of campaign revenue on the chance of a candidate being elected or not. Since the dependent variable is binary, some assumptions of the least squares model are violated (homoscedasticity, linearity and normality) and the estimates may be inconsistent. Logistic regression is the best tool for dealing with dichotomous dependent variables, that is, when y can only assume two categories. Lottes, DeMaris and Adler (1996) argue that, despite the popularity of logistic regression in the Social

Sciences, there is still great confusion regarding its correct use.

In logistic regression, the dependent variable has only two categories. In general, the occurrence of the event of interest is coded as "1" and its absence as "0". It is worth remembering that coding changes the sign of the coefficients and, therefore, their substantive interpretation. When X (independent variable) assumes lower values, the probability approaches zero. On the other hand, as X increases, the probability approaches one. For Kleinbaum and Klein (2010), the fact that the logistic function varies between 0 and 1 explains the popularity of this model. This is because, as the binary nature of the dependent variable violates some assumptions of the linear model (homoscedasticity, linearity, normality), the use of the linear model to analyze binary variables can generate inefficient and biased coefficients.

Although it is more flexible than other statistical techniques, logistic regression is sensitive, for example, to problems of multicollinearity (high levels of correlation between independent variables). There are different procedures to minimize this problem. The simplest is to increase the number of observations (KENNEDY, 2005). An additional solution is to use some data reduction technique to create a summary measure from the variance of the original variables. According to Fernandes et al (2021), one should not simply exclude one of the independent variables, under penalty of producing specification errors in the model. In logistic regression, sample size is essential (HAIR et al, 2009). Small samples tend to produce inconsistent estimates. On the other hand, excessively large samples increase the power of statistical tests in such a way that any effect tends to be statistically significant, regardless of its magnitude.

In the interpretation of results, according to Fernandes et al (2021), many studies limit themselves to analyzing the statistical significance of the estimates and do not pay attention to the magnitude of the coefficients. The authors suggest that researchers interpret the coefficients and discuss substantively how the results relate to the research hypothesis. Unlike linear regression, in which the coefficients are easy to interpret, the estimates produced in the logistic model are less intuitive. This is because the logit transformation informs the effect of the independent variable on the variation of the natural logarithm of the odds of the dependent variable. For example, when considering a coefficient of 0.6, an increase of 0.6 units in the logit of Y is expected whenever X increases by one unit. The main disadvantage of this approach is its lack of intelligibility. Stating that the amount of logit increased by 0.6 units is not very intuitive and does not help to understand the relationship between the variables.

A second possibility (FERNANDES et al, 2021) is to analyze the impact of the independent variables on the odds of Y. To do this, the researcher must obtain the exponential of the coefficient itself. In our example, the exponential of 0.6 = 1.82. This means that for each additional unit in X, an increase of 1.82 is expected in the chance of Y occurring, keeping the other variables constant. In logistic regression, the exponential of a positive value (+) produces a coefficient greater than 1. Conversely, a negative coefficient (-) returns an exponential less than 1. A coefficient of zero produces an exponential equal to 1, indicating that the independent variable does not affect the chance of the dependent variable occurring. So, write it down in your notebook: the further away the coefficient is from one, regardless of the direction, the greater the impact of a given independent variable on the chance of the event of interest occurring. The third possibility is to

estimate the percentage increase in the chance of Y occurring. To do this, you must subtract one unit from the exponentialized regression coefficient and multiply the result by 100, in this case, $(1.82-1 * 100)$. Thus, a one-unit increase in X is associated with an 82% increase in the chance of Y occurring (*ceteris paribus*).

As described above, the following hypotheses were established:

H0A: there is no difference between companies in the Brazilian and US electric sector regarding dividends.

H1A: there is a difference between companies in the Brazilian and US electric sector regarding dividends.

H0B: there is no difference between companies in the Brazilian and US electric sector regarding the variation in their share prices.

H1B: there is a difference between companies in the Brazilian and US electric sector regarding the variation in their share prices.

METHODOLOGY

From the Yahoo Finance website (YAHOO FINANÇAS, 2023), data on dividend payments and daily stock values of companies in the electricity sector in Brazil and the United States, traded on the São Paulo and New York stock exchanges, respectively, were collected. The values corresponded to the closing of the daily trading session. The period from January 1, 2000 to December 31, 2022 was included. In addition, data on the GDP of the countries under study and the main indexes of each stock exchange were also included for data analysis: in Brazil, the Ibovespa and in the USA, the SP&500.

Table 1 – Descriptive Statistics of the Brazilian Sample (n = 182)

	Mean \pm Standard error	minimum	pct25	median	pct75	maximum
D_preco	0.062 \pm 0.028	-0.803	-0.123	0.011	0.199	2.334
Prsp	-0.009 \pm 0.028	-1.029	-0.205	-0.011	0.175	2.456
yield	0.061 \pm 0.005	0	0.016	0.044	0.09	0.548

Abbreviations: D_preco: annual variation in share price; PRSP: annual variation in share price, discounted by the annual variation of the Ibovespa index; pct = percentile.

Table 2 – Descriptive Statistics of the USA Sample (n = 651)

	Mean \pm Standard error	minimum	pct25	median	pct75	maximum
D_preco	0.066 \pm 0.01	-0.818	-0.0591	0.068	0.186	1.595
Prsp	-0.0004 \pm 0.01	-1.057	-0.142	-0.015	0.115	1.3
yield	0.04 \pm 0.001	0	0.031	0.039	0.047	0.179

Abbreviations: D_preco: annual variation in share price; PRSP: annual variation in share price, discounted by the annual variation of the SP&500 index; pct = percentile.

To test the hypotheses, the collected data were converted as follows: dividends were converted to yield. From the yield, two dummies were created: the first (hereinafter known as *altyiel*) was established as yield values greater than 6%, numbered as “1” and non-occurrence as “0”; The second (hereinafter referred to as *yield0*) was established as the non-payment of dividends in the year as “1” and “0” as the occurrence of the payment of some dividend producing a yield. Only annual yields greater than 0.1% were considered. The others were considered as zero yield.

The prices, in turn, were converted into annual price variation, where the closing value of the asset on the last day of the year was collected in relation to the value of the previous year (hereinafter *D_preco*) and also through the difference between *D_preco* and the annual variation of the stock index of the respective country (hereinafter *Prsp*). Companies for which there was only one year of data were excluded, which would make the conversion to the variables described above unfeasible.

The data were analyzed through logistic regression initially between the individual countries and, subsequently, between them. The level of statistical significance was set at 0.1.

RESULTS

On the São Paulo Stock Exchange (B3), 17 companies were found, for a total of 182 company-years. On the New York Stock Exchange, 35 companies were found, but Eletrobras was discarded because it was already traded on B3. Thus, through 34 companies, a total of 651 company-years were found.

Table 1 shows the descriptive statistics of companies in the Brazilian electricity sector, while the descriptive statistics of companies in the US electricity sector are in Table 2.

It is worth noting that, with the appropriate price corrections through variations in indexes between the different countries, the results between Brazil and the US are very similar. The yield itself, even

with Brazilian legislation that requires the payment of mandatory dividends and with American legislation that taxes the payment of dividends (SILVA, 2024a; SILVA, 2024b), the median results are practically the same, diverging in the average yield, which is 50% higher in Brazil.

Table 3 shows the frequency of yields above 6% and zero dividends in Brazil and the USA. It is clear that Brazilian companies pay a higher frequency of yields above 6% (four times higher), as well as almost twice as many zero yields compared to the USA. It is noteworthy that this finding occurs in an environment where USA legislation does not require the payment of dividends and, even so, the frequency of zero yields is lower.

The logistic regression of Brazilian companies, shown in Table 4, did not demonstrate statistically significant findings when the dependent variable was dividends above 6%. However, regarding the non-occurrence of dividends (yield0), a significant negative relationship was found, both for d_preco and for Prsp, demonstrating that the absence of dividend payments is related to the fall in asset prices.

Table 5 shows the results of the logistic regression performed on USA companies. First, unlike Brazilian companies, the payment of dividends above 6% was related to negative variations in asset prices, which is in line with the results of Silva (2023). However, this effect disappeared when the variation in assets was

Table 3 – Frequency of dividends above 6% and zero dividends between countries

Country	Altyiel (%)	Yield0 (%)
Brazil	75/182 (41.2)	23/182 (12.6)
USA	66/651 (10.1)	51/651 (7.8)

Abbreviations: Altyiel: yield above 6%; Yield0: zero yield.

Table 4 - Logistic Regression in Brazilian companies (n = 182)

Dependent variable: altyiel ¹			
Independent Variable	Coefficient ± Standard Error	Exponential	Adjusted R ²
const	-0.372 ± 0.153*	0.689	-0.014
D_preco	0.257 ± 0.394	1.293	
const	-0.353 ± 0.151*	0.702	-0.009
Prsp	0.542 ± 0.41	1.719	
Dependent variable: yield0 ²			
Independent Variable	Coefficient ± Standard Error	Exponential	Adjusted R ²
const	-1.943 ± 0.23**	0.143	0.005
D_preco	-1.516 ± 0.745*	0.22	
const	-2.156 ± 0.264**	0.116	0.04
Prsp	-2.177 ± 0.727**	0.113	

Abbreviations: ¹ altyiel: yield greater than 6% = 1; ² zero yield = 1; d_preco: annual share price variation; Prsp annual variation in share price, discounted by the annual variation of the SP&500 index; * p < 0.1; ** p < 0.01.

Table 5 - Logistic Regression on USA Firms (n = 651)

Dependent variable: altyiel¹

Independent Variable	Coefficient \pm Standard Error	Exponential	Adjusted R ²
const	-2.135 \pm 0.13**	0.118	0.005
D_preco	-1.361 \pm 0.546*	0.256	

const	-2.184 \pm 0.13**	0.112	-0.009
Prsp	0.313 \pm 0.531	0.731	

Dependent variable: yield0²

Independent Variable	Coefficient \pm Standard Error	Exponential	Adjusted R ²
const	-2.483 \pm 0.153**	0.083	-0.011
D_preco	0.241 \pm 0.581*	1.273	

const	-2.466 \pm 0.146**	0.085	-0.011
Prsp	-0.156 \pm 0.591	0.856	

Abbreviations: ¹ altyiel: yield greater than 6% = 1; ² zero yield = 1; d_preco: variação anual de preço da ação; Prsp annual variation in share price, discounted by the annual variation of the SP&500 index; * p < 0.1; ** p < 0.01.

corrected by the SP&500 index. The same case of disappearance of effect occurred with the dependent variable yield0: while, unlike Brazilian peers, the zero yield was related to positive price variations, when corrected by the SP&500 index this occurrence was no longer detected.

Table 6 shows the logistic regression between countries, both univariate and multivariate. Among the univariate variables, yield showed a strong negative correlation with US companies ($p < 0.01$ and very low exponential) in relation to Brazilian companies, which can be seen in tables 1 and 2, where the yield of Brazilian companies is 50% higher, in agreement with Silva (2023) and, therefore, accepting H1A. There was no correlation regarding d_preco, even with the correction by the indexes, rejecting H0B. A significant positive correlation occurred between USA companies and the variation in GDP, again in agreement with Silva (2023).

Both the altyiel and yield0 dummies had a significant negative correlation with US

companies in relation to Brazilian companies, again accepting H1A. As seen in table 3, Brazilian companies in the electricity sector had a higher frequency of yields above 6% as well as zero yields. The latter seems paradoxical, since USA companies would not have a legal requirement to pay dividends, unlike Brazilian companies. Thus, where one would think that American companies would stop paying dividends more frequently, the opposite occurred.

When performing the multivariate analysis, a model with yield, GDP and Prsp as independent variables was initially used. As shown in Table 6, yield and GDP assumed different signs than in the univariate analysis. The same occurred when altyiel, GDP and Prsp were used as independent variables. The justification for this fact was the occurrence of a strong correlation between GDP and Prsp through OLS ($p < 0.001$), leading to multicollinearity, as demonstrated by Fernandes et al (2021).

Table 6 - Logistic Regression Between Countries

Dependent variable: Bra = 0; USA = 1			
Independent Variable	Coefficient \pm Standard Error	Exponential	Ajusted R ²
const	2.032 \pm 0.155**	7.628	0.046
yield	-15.807 \pm 2.61**	1.36478E-07	
const	1.271 \pm 0.086**	3.565	-0.0045
D_preco	0.05 \pm 0.3	1.051	
const	1.275 \pm 0.084**	3.578	-0.004
Prsp	0.103 \pm 0.3	1.108	
const	1.03 \pm 0.1**	2.801	0.014
GDP	0.149 \pm 0.036**	1.161	
const	1.7 \pm 0.105**	5.467	0.091
altyiel	-1.823 \pm 0.199**	0.161	
const	1.328 \pm 0.089**	3.774	-0.0003
yield0	-0.531694 \pm 0.267*	0.588	
const	1.784 \pm 0.163**	5.954	0.061
yield	-0.143 \pm 0.33**	0.867	
GDP	-16.082 \pm 2.624**	1.04E-07	
Prsp	0.159 \pm 0.038	1.172	
const	1.453 \pm 0.12**	4.276	0.104
altyiel	0.15 \pm 0.039**	1.162	
GDP	-1.838 \pm 0.203**	0.159	
Prsp	-0.064 \pm 0.325	0.938	
const	1.79 \pm 0.163**	5.989	0.063
yield	-16.076 \pm 2.624**	1.04E-07	
GDP	0.155 \pm 0.037**	1.168	
const	1.456 \pm 0.119**	4.289	0.106
altyiel	-1.839 \pm 0.202**	0.159	
GDP	0.148 \pm 0.038**	1.159	

Abbreviations: * p < 0.1; ** p < 0.01; altyiel: yield greater than 6%; yield0: zero yield Prsp: annual variation in share price, discounted by the annual variation of the SP&500 index, or Ibovespa when applicable.

Removing Prsp, the signs of the coefficients returned to being the same as in the univariate analysis and the statistical significance was maintained. negative for yield and altyiel and positive for GDP for US companies in relation to Brazilian ones, once again accepting H1A. The

benefit, in this case, was that the coefficient of determination (R²) was higher than in the univariate analyses.

To resume, the logistic regression performed within the group of Brazilian companies showed that the presence of zero yield is associated with

negative price variations. In the group of US companies, a yield above 6% had a negative relationship with price variation, while zero yield had a positive relationship with price variation. Both relationships disappeared when the price variation was corrected by the variation of the SP%500 index.

In the univariate logistic regression between countries, the yield in Brazilian companies is higher. Both zero yield and high yield had a negative relationship in relation to USA companies. In the multivariate logistic regression between countries, both zero yield and high yield had a negative relationship in relation to USA companies.

FINAL CONSIDERATIONS

The use of logistic regression proved to be feasible and useful, when systematized according to Fernandes (2021), even in the face of its limitations, such as the multicollinearity demonstrated between the GDP variables and price variation corrected by index.

The results showed that high dividends in Brazilian companies in the electricity sector do not interfere with the price of the asset. The opposite is true when there is no payment of dividends. The occurrence of non-payment of dividends was related to negative price variation.

As for US companies, both zero yield and high yield had a negative relationship with the variation in stock prices. In relation to Brazilian companies, the yield of USA companies was lower.

The prospects for future work are to continue applying this non-linear analysis method in other situations, as well as addressing other aspects of corporate finance and financial markets, such as trading volume. The study of the topic of dividend

policy applied to utilities in different countries can provide valuable information on the functioning of the legal institutions that regulate their operation.

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YAHOO FINANÇAS. Disponível em: <https://br.financas.yahoo.com> Acessado em 11 de outubro de 2024.