





Impact of Lava-Jato Operation on the Financial Performance of Brazilian Companies: an Event Study

O Impacto da Operação Lava-Jato no Desempenho Financeiro de Empresas Brasileiras: um Estudo de Eventos

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ABSTRACT

This article aims to analyze the impact of Operation Lava-Jato, promoted by the Federal Police of Brazil, on the financial performance of companies listed on the São Paulo Stock Exchange (B3) from 2014 to 2017. This operation revealed the greatest scandal of political corruption in the country, with large amounts of public money transferred to cartels, politicians, and large Brazilian corporations in corruption schemes over the years. Data were collected from 106 Brazilian publicly traded companies related to ten different economic sectors. Documentary research was conducted on financial reports, and information was extracted from 11 different financial variables on the Bloomberg platform. The variable that measured the impact of Lava-Jato Operation was selected considering the increase in the volume of financial information disclosed, and the performance was evaluated by the variable stock price return. Data were analyzed by regression with panel data. The variables that affected financial performance were: multiplicative dummy of the first period, stock price, company size, risk, composition of permanent assets/indebtedness, and permanent assets. This article contributes to understanding the financial context of Brazilian companies, in the face of political and economic instability and corruption. Fluctuations in stock prices in the period studied, given the news released about corruption in Brazil, become a warning for companies to understand the importance of disclosing their financial information to obtain company credibility. Thus, facing the financial market, companies could protect themselves by presenting an emphasis based on financial efficiency, transparency, productivity and the professionalization of their practices.

Keywords: Lava-Jato Operation. Company Performance. B3.

RESUMO

Esta pesquisa tem como objetivo investigar o impacto da operação da Polícia Federal brasileira denominada Lava-Jato no desempenho financeiro de empresas listadas na Bolsa de Valores, Mercadorias e Futuros de São Paulo (B3), período de 2014 a 2017. A operação da Polícia Federal brasileira revelou o maior escândalo de corrupção política que abrangia o país, com grande volume de dinheiro público desviado a cartéis, políticos e grandes corporações brasileiras em esquemas de corrupção ao longo dos anos. Foram coletados dados de 106 empresas brasileiras de capital aberto, relacionadas a dez diferentes setores econômicos. Foi realizada pesquisa documental em relatórios financeiros, além de extraídas informações de onze diferentes variáveis financeiras na plataforma Bloomberg. A variável que mensurou o impacto da operação Lava-Jato foi selecionada considerando o aumento no volume de informações financeiras divulgadas e o desempenho foi avaliado por meio da variável retorno do preço das ações. Os dados foram analisados por meio da Regressão com Dados em Painel. As variáveis que impactam o desempenho financeiro foram: *dummy* multiplicativa do primeiro período, preço das ações, tamanho das empresas, risco, composição de ativo permanente/endividamento e o ativo permanente. Este artigo contribui para a compreensão do contexto financeiro das empresas brasileiras, diante da instabilidade política e econômica e da corrupção. As

oscilações nas cotações das ações no período estudado, diante das notícias divulgadas sobre a corrupção no Brasil, tornam-se um alerta para que as empresas entendam a importância de divulgar suas informações financeiras para obter a credibilidade da empresa. Assim, frente ao mercado financeiro, as empresas poderiam se proteger apresentando uma ênfase baseada na eficiência financeira, na transparência, na produtividade e na profissionalização de suas práticas.

Palavras-chave: Operação Lava-Jato. Performance das Empresas. B3.

1 INTRODUCTION

In recent years, the Brazilian political and economic context has presented an unstable configuration, which is a result of decades of passive and active corruption and of the awareness of society about malfeasance on the part of public officials in favor of large Brazilian corporations. Corruption is the use of public office for private gain, and is achieved by embezzlement of assets, tax frauds, personal favoritism, bid rigging, and influence peddling (SOUZA, ARAUJO, 2015; MEDEIROS; CODIGNOTO, 2022).

In this context, Operation Lava-Jato, carried out by the Federal Police of Brazil from a Task Force formed by federal police, legal prosecutors and judges, stands out for its investigations, which revealed the biggest case of corruption in the country. This operation also revealed the divergence of opinion in the legal environment on plea bargains and preventive arrests to politicians and businessmen linked to the scandals (PAULA; NICOLATO, 2016; (KERCHE, F.; VIEGAS, 2023).

In this political context of corruption, billions of Brazilian reais (BRL) were embezzled by politicians, political parties, and businessmen, often transferred to current accounts abroad that belong to a straw man. This finding made it clear that the negative economic growth (recession) was also occurring because of these frauds, in addition to the inefficient public administration. The study reinforces the theoretical assertions that the combination of exogenous and endogenous factors facilitates institutional changes. However, there is an institutional model that can allow greater autonomy and discretion, which, in a given context, can be used, for example, against the political as verified in Lava Jato (KERCHE, F.; VIEGAS, 2023).

The efficiency in public procurement requires “qualification” from the institutions, since not all public bodies have the necessary experience to perform public procurement. Characteristics of the organization, such as technical knowledge, previous experience in terms of quantity and size of acquisition procedures, and implementation of preventive measures, help to reduce the risk of corruption (CAVALIERI et al., 2017; MEDEIROS; CODIGNOTO, 2022).

The legitimacy theory is used to provide the basics of how and why officers use reports to benefit the organization, i.e., legitimacy as the state and process in which the company is (GARCIA, PELEIAS, PETERS, 2014; INAGAKI, C.; BESEN, 2023). There is not a single theory to explain the causes and consequences of social disclosure by organizations (GRAY; KOUHY; LAVERS, 1995a, 1995b). However, one can state that social theories such as the legitimacy theory were mainly imposed on social and environmental accounting research (TROTMAN; BRADLEY, 1981; CHO, 2009).

Before this situation of economic instability, it is important to verify the financial performance of Brazilian companies, since such entities are relevant to the economic growth of the country, as they offer employment and possibility of foreign investment (SILVEIRA, 2023). One of the ways to verify the performance of the companies is by their stock price in the stock market. In the efficient capital market, the share price is set at the exact moment in which relevant information (that affect the company's future cash flow) become publicly available (FAMA, 1991). Thus, when directors communicate their investment decisions to the market, the share price is immediately adjusted, capitalizing the value associated with the content of the new information.

For the Brazilian Securities Market, investor confidence in a negotiation can be increased when there are organized, maintained and controlled environments with favorable systems for matching offers and carrying out business with efficient price formation, transparency and disclosure of information as the case of the Impact of Lava-Jato Operation and security in compensation and liquidation of business. (CVM, 2019).

In the Brazilian financial market, the acquisition of a share grants investors a stake in the future cash flow of the company, in exchange for the investor's resources. However, as they are subjected to a maximum loss equivalent to the cost of share acquisition, in case of bankruptcy, investors (who own common shares) have the right to choose the members of the board of directors (COPELAND; WESTON; 1988; SHARPE, et al. 1995). Following the trend of more developed financial markets, stock investment has become a good alternative of diversification for investors who seek to improve the profitability of their investment portfolio in the long run (ROTELA JUNIOR; PAMPLONA; SALOMON, 2014).

Given the context of political and economic instability in Brazil, studies evaluating the impact of Lava-Jato Operation on the financial performance of companies are scarce, especially event studies. (PAULA; NICOLATO, 2016; SILVEIRA, 2023)

This article aims to analyze the impact of Lava-Jato Operation on the financial performance of companies listed on B3 from 2014 to 2017. The guiding question of this article is: **What is the impact on the performance of companies listed on B3, considering Lava-Jato Operation , in the period from 2011 to 2017? To answer this question, some financial variables of the companies were selected.** By an event study, this study analyzes the financial performance of 106 companies before and after the creation of Lava-Jato Operation by the Federal Police of Brazil. Such analysis is supported by the application of the analysis technique of panel data.

The results found in this research can contribute to better understand the financial context of Brazilian companies in the current scenario of political and economic instability, and they may suggest short- and long-term measures that allow leverage in companies listed on B3, by risk management. Salles Júnior (2006, p. 28) says that risk management comprises “the process of identification, analysis, response development, and risk monitoring in projects, aiming to decrease the likelihood and the impact of negative events and to increase the likelihood of positive events.”

The study is divided into the following sections: theoretical framework to base the article; methodological procedures to access and analyze data; analysis and discussion of the results of the event study; and conclusion and recommendations for further research.

2 THEORETICAL FRAMEWORK

In this section, we will address the context of the theoretical framework, properly defining the stages that guide this study: financial performance, financial performance measures, and Lava-Jato Operation.

2.1 FINANCIAL PERFORMANCE

There is an agreement in the finance literature that the main goal of a company is maximizing the wealth of its owners, suggesting that directors must (or at least should) guide their decisions by performance measures that reveal the true value added to the owners (COPELAND; KOLLER; MURRIN, 2002; ROSS, WESTERFIELD; JAFFE, 2002; DAMODARAN, 2004; MALTA; CAMARGOS, 2016).

Malta and Camargos (2016) mention that several studies address financial performance from different aspects. Collins and Kothari (1989), Easton and Harris (1991), and Charitou, Clubb, and Andreou (2000) analyzed the existing relationship between stock return and profit margins. Penman (1989a, 1989b) identified useful economic-financial indexes in the prediction of profits and stock return. Ertirmur, Livnat, and Martikainen (2003), Liu, Nissim, and Thomaz (2002), and Rees and Sivaramakrishnan (2007) examined the relationship between stock return and sales revenue.

These studies show the importance of financial performance for companies. Stock return is related to changes assigned in the company after examination of the financial performance of profits and cash flow of the operations. The market anticipates many information in the disclosure of profits, but has an inaccurate response regarding companies with extraordinary profits (NICHOLS; WAHLEN, 2004).

In publicly traded companies, the financial performance presents a high social value. It can be evaluated by the return of their common shares, which is one of the main elements to be considered by investors in the Brazilian context when analyzing the possible investment. In addition to the use of the return of their common shares to evaluate financial performance, accounting variables, such as liquidity index, activity index, indebtedness index, and profitability index, are traditionally used as a complement (SILVA, et al. 2015; GODOI et al., 2016).

From this point of view, Godoi et al. (2016) verified that the return of the common shares of the main Brazilian banks – Banco do Brasil, Bradesco, and Itaú-Unibanco – are affected by macroeconomic variables, such as country risk and inflation. It is worth mentioning that such banks act strongly on loans linked to Brazilian federal government programs, which, in a way, makes them act as mediators of the relations between company performance and investments from the Brazilian government.

A favorable economic environment creates a tendency for Brazilian companies to present a higher level of activity. This means that they perform more investments and seek resources from financial institutions, such as working capital and noncurrent assets (GODOI et al., 2016). Given this, the performance of the Brazilian federal government as regulator and supervisor of procurements determines, by its structural actions, the economic and financial scenario of companies (SILVA, et al. 2015; CVM, 2019).

The performance of Brazilian companies in the sectors of construction, transportation, and operation of highways was evaluated by Silva et al. (2015) from the creation of a financial performance index with variables such as liquidity index, profitability index, indebtedness index, and by other insolvency measures proposed by Kanitz. The analysis of publicly traded companies linked to the studied sectors suggests that their financial performance presented positive measures, with positive values regarding variables such as liquidity and net worth.

2.2 FINANCIAL PERFORMANCE MEASURES

Corporate Governance discloses financial performance measures aimed at transparency, which means that current and past financial information is presented to shareholders (B3, 2017). According to the Securities and Exchange Commission (CVM) (2019), a body linked to the disclosure of information of publicly-held companies, governance encompasses a set of practices aimed at optimizing the performance of a company, protecting all stakeholders, such as investors, employees and creditors, facilitating access to capital.

Based on the above, corporate governance acts as a guiding mechanism for investors to have access to information on performance measures. In this sense, the main measures used to assess financial performance are attributed to the return on shares, mainly accounting indices such as liquidity, activity, debt, profitability, among others (SILVA, et al. 2015; GODOI et al., 2016). In addition to these variables, the literature also shows that the age and size of the company and organizational leverage are also variables that affect financial performance (DEGENHART et al., 2016).

Additionally, Frost (1999) points out that most organizations use financial and non-financial aspects as performance indicators. Performance indicator models are needed to: a) motivate employees, reflecting on changes and improvements in the company; b) assist in making decisions about changes in the business; c) verify the company's position in the market at a given time (NEELY, 1998). Performance indicators are necessary for continuous improvement of operation control, cost reduction and customer satisfaction and this can be done through Corporate Governance (FONSECA; ROZENFELD, 2012).

Governance is nothing more than a system of administration and exercise of power in organizations, (CVM, 2019). Corporate governance is the set of practices aimed at optimizing a

company's performance and favoring its longevity by protecting all interested parties, such as investors, employees and creditors. In this sense, investigating the impact of the operation of the Brazilian Federal Police called Lava-Jato on the financial performance of companies listed on the Brasil Bolsa Balcão (B3) became fundamental in this study. Because the financial performance can be measured by indicators of a fundamentalist analysis, when investors use historical financial information to elaborate profitable investment strategies as in the Operation Lava Jato (PIOTROSKI, 2005).

2.3 FINANCIAL PERFORMANCE AND OPERATION LAVA JATO

Lava-Jato Operation was created due to the high costs of maintaining large business complexes, or even medium to small enterprises, which led several businessmen to prevaricate collaboration (SALVO, 2023). This operation is therefore a chance to fight against Brazilian cartels and corruption over the years. Launched on March 17, 2014, the operation initially investigated money laundering schemes linked to the state-owned Petrobras. In November of the same year, it expanded its investigation coverage to Petrobras contracts with large Brazilian contractors, such as Camargo Corrêa, Odebrecht and OAS.

In March 2015, the operation called for the opening of an investigation against politicians linked to different Brazilian parties, such as the Workers Party (PT), Brazilian Social Democracy Party (PSDB), Brazilian Democratic Movement Party (PMDB), Progressive Party (PP), Solidarity (SD) and the Brazilian Labor Party (PTB) (Fernandes, 2015).

In this context, Paulo Nicolato (2016) agrees with what is mentioned by Gaibullov and Younas (2018), when they mention that conflicts have a negative impact on the economy. The state-owned Petrobrás scandal gained visibility in the media with the investigation of a money laundering scheme that would have illegally moved about R\$ 10 billion.

It is noticeable that the impact of Operation Lava-Jato on the financial performance of Brazilian companies had negative results for the country's economy, and also revealed a major corruption scandal that consumed monetary indices that undermined the Brazilian economy. The incentive given to suspects and/or accused in criminal proceedings is an investigative tool capable of ensuring greater efficiency in investigations, especially of traditionally “invisible” crimes, such as economic crimes and those committed by criminal organizations (BRENNER, 2009; BOTTINO, 2016).

The emergence of the operation, commanded by federal judge Sérgio Moro, who was investigating cases of corruption at Petrobras and other government bodies, increased the pressure on those involved. With the reform of Law 12,850/2013, the Brazilian penal system began to provide for a new modality of cooperation in criminal proceedings, known as “rewarded collaboration”, different from the mechanisms of plea bargaining and confession. The innovations brought by the award-winning collaboration include an unprecedented criminal immunity, preventing the criminal prosecution of the suspect-collaborator (BOTTINO, 2016).

However, by their nature and purpose, these agents must compete in the market in search of consumers, who are the recipients of the goods and services provided. The misconduct of the so-called cartels affects both the Brazilian and world economies. This is exemplified by this headline from O Globo (2015): “Lava Jato developments also reach the other side of the Atlantic: more specifically, Switzerland”.

The findings mentioned regarding the Brazilian economy and the world economy are in line with Paula and Nicolato (2016) on the Brazilian political and economic context presenting an unstable configuration in recent years. This maladjustment of the Brazilian economy is the result of decades of passive and active corruption and prevarication by public officials in favor of large corporations.

3 METHODOLOGICAL PROCEDURES

To analyze the impact of Lava-Jato Operation on the financial performance of companies listed on B3, data were collected from 106 publicly traded companies related to ten different economic sectors. B3 is the main stock exchange of Brazil and the largest of Latin America, and the main financial transactions in the capital market are negotiated there.

The selected companies are linked to different sectors of the economy, namely: basic materials; consumer goods; consumer services; finance; health; industry; oil and gas; technology; telecommunications, and public services, totaling 10 sectors. Companies that did not have every information present in the temporal series analyzed were excluded from the sample, since this study used a balanced panel.

Documentary research was conducted on financial reports, and information was extracted from 11 different financial variables on the Bloomberg platform. The variable that measured the

impact of Lava-Jato Operation was selected considering the increase in the volume of financial information disclosed, identified by a documentary research to financial reports of the companies analyzed, from 2011 to 2017. The performance was evaluated by the variable “stock price return.” The other analyzed variables, collected monthly from 2014 to 2017, were: Stock price (SP), return on assets (ROA), return on equity (ROE), variation of net income (Δ NI), company size (CS), risk (R), composition of permanent assets/indebtedness (CPA), permanent assets (PA), total assets (TA), sales growth (SG), and stock price return (SPR). It should be noted that such variables were collected based on the literature. Table 1 presents the selected variables and their definitions.

Table 1 – Theoretical definition of the variables analyzed

Variable	Theoretical definition
Stock price	Stock price of each company on the last working day of each month from 2014 to 2017.
ROA	The higher the ROA (indicative of a higher cash flow), the higher the availability for distribution and, therefore, the higher the volume of share repurchases (JOHN, KNYAZEVA, 2006).
ROE	Return on equity. Authors argue that when the ROE (...) is high, the profitability of the companies decreases. Thus, the lack of correlation between profitability and the variation of dividends indicates that the latter indeed informs about future profitability (NISSIN; ZIV, 2001).
Variation of net income	The variation of net income suggests that the companies intend to signal that their current and future prospects of return are positive the higher payment and vice versa (BENSIMON, 2012).
Company size	Company size (CS) suggests that a reduction in dividends coincides with a decrease in market value, because of the loss of investment opportunities and vice versa (BENSIMON, 2012). Company size is positively related to dividends and repurchases (FAMA; FRENCH, 2001).
Risk	Results indicate that systematic risk and dividend yield can clarify the profitability of the stock market (CORREIA; AMARAL, 2002).
Composition of permanent assets/Indebtedness	The composition of permanent assets (CPA) corresponds to the ratio between permanent assets and total assets. Regarding the ratio of permanent assets (composition of assets), this factor presented positive relationship with long-term indebtedness and negative with short-term indebtedness, confirming the research hypotheses. However, the negative relationship between permanent assets and total debts was contrary to what was expected. Thus, companies with higher proportion of permanent assets have a lower level of indebtedness, but are more indebted in the long run than in the short term (BRITO; CORRAR; BATISTELLA, 2007).
Permanent assets	Goods and rights that are unlikely to be transformed into money. They have lasting permanence, and are divided into investment, fixed, intangible, and deferred. Permanent assets are intended for the normal operation of a company (GITMAN, 2006).
Total assets	They cover the total assets of the corporation, being considered the sum of all assets of a company expressed in local currency. Total assets are divided into three categories according to their liquidity and duration: current assets, noncurrent receivables, and permanent assets (COSTA; FREITAS, 2014)
Sales growth	The sales growth (SG) indicates that companies with good growth opportunities tend to pay less dividends. It depends on sales at (t) divided by sales at (t-1) (HO, 2003; AIVAZIAN et al. 2003; OMRAN and POINTON, 2004).
* Stock price return	Barlev et al. (2007) adopted the hypothesis that companies with high return on assets tend to reevaluate their fixed assets to reduce political costs or by the imminence of union negotiations. Usually, the returns in the stock market are compared with the most commonly used index in the local economy. This comparison results in the so-called systemic risk, which corresponds to the variability of the return of a share in relation to the return of the index that represents the system in which the share is inserted (BALZANA FILHO; BORDEAUX-RÊGO, 2014).

***Dependent variable**

Source: Prepared by the authors (2022)

The variables were inserted in one Excel worksheet for each company during 40 (forty) months. The study was carried out from January 2014 to May 14, 2017. The equation that represents the panel data regression model is presented as follows:

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(Equation 1)

$$* \text{SPR} = C + \beta_1 \text{SP} + \beta_2 \text{ROA} + \beta_3 \text{ROE} + \beta_4 \Delta\text{NI} + \beta_5 \text{CS} + \beta_6 \text{RISK} + \beta_7 \text{CPA} + \beta_8 \text{PA} + \beta_9 \text{TA} + \beta_{10} \text{SG} + \varepsilon$$

Where:

β = estimators

C = constant

The regression with panel data was estimated using gretl/2015d. For the analysis of the period being studied, it is important to collect data from 3 (three) years before and 3 (three) years after the period of Operation Lava-Jato. This motivated the choice of the year of 2011 to begin data collection, aiming to assign greater credibility and safety to the results to be found in this study (GULATI, NOHRIA; WOHLGEZOGEN, 2010). The data analyzed in this study will be characterized as secondary data, since they are extracted from the database of the Bloomberg platform.

Hausman test was used to identify whether the appropriate model would be of fixed effects (FE) or random effects (RE). Statistical tests were carried out in gretl/2015d. The significance level of the coefficient analysis was 5% (p-value < 0.05).

In panel data regression models, it is important to determine the presence of multicollinearity between the independent variables. It can be diagnosed by the Variance Inflation Factor (VIF), which shows how much of the variance of the coefficients is inflated by their collinearity. According to Malta and Camargos (2016), a VIF > 10 in the models indicates multicollinearity problems. The initial analysis, in which the VIF of the models was way lower than 10, has shown that, in this study, the models do not present multicollinearity between the variables, and thus it is not a problem.

To estimate the regression with panel data, the stock price return (SPR) was used as dependent variable, and the stock price (SP), return on assets (ROA), return on equity (ROE), variation of net income (ΔNI), company size (CS), risk (R), composition of permanent assets/indebtedness (CAP), permanent assets (PA), total assets (TA), and sales growth (SG), as independent variables. The estimation was performed considering the possibility of analysis of the three panel models: Ordinary Least Squares (OLS), Fixed Effects (FE), and Random Effects (RE). From the results found, the measures most adjusted to the proposed model were analyzed, which

allowed the choice of the ideal model that evaluated the impact of Lava-Jato Operation on the financial performance of companies listed on B3.

The methodology of panel data provides higher amount of information, higher data variability, higher number of degrees of freedom, higher efficiency in the estimation, and lower collinearity between the variables (FIELD, 2009; GUJARATI, 2011). It also has an advantage regarding the models for cross-section or time series: it controls the heterogeneity present in the individuals. This means this method controls the effects of unobserved variables, i.e., specific features of each individual that affect the explained variable and that cannot be measured (WOOLDRIDGE, 2006). Models that omit these variables can generate biased results (Hsiao, 1986).

To estimate this function, Gujarati (2006) mentions that several methods can be used, and the most common is the Ordinary Least Squares (OLS), which is used in this study. To estimate the panel data regression model, the first performed regression was by the OLS method, followed by fixed and random effect estimator test (Hausman test). If the model confirmed fixed effects, Akaike Information Criterion (AIC) and Durbin-Watson statistic were used to select and choose the models. By the Akaike criterion, a value is obtained from each model, and the one with the lowest value among the models is regarded as the “best” model. This criterion was used to select the best models in the study (GUJARATI, 2011).

4 PRESENTATION AND ANALYSIS OF RESULTS

According to the descriptive analysis of the variables in Table 1 presents the selected variables and their definitions.

Where: SPR (Stock price return); SP (Stock price); ROA (ROA); ROE (ROE); NI (Variation of net income); CS (Company size); RISK (RISK); CPA (Composition of permanent assets/Indebtedness); PA (Permanent assets); TA (Total assets); SG(Sales growth).

The analysis of the period of Lava-Jato Operation must be carried out 3 (three) years before and 3 (three) years after the main period of the operation to be studied (GULATI, NOHRIA; WOHLGEZOGEN, 2010).

In the regression with panel data, one intends to determine the influence of one or more variables (independent), which impact or are likely to predict the behavior of another variable

(dependent). In general, according to Corrar et al. (2014), this regression basically consists in determining a function that explains the behavior of the dependent variable based on the values of a simple regression or multiple regression (independent variables), thus confirming what was mentioned by Field (2009). A multiple regression requires a large sample size, since with small samples the results cannot be generalized (repeated in other samples). Thus, the sample size must be larger than 50 and the number of independent variables must be larger than 8. The relation between the variables is called multicollinearity, and the existence of this relation is confirmed when independent variables are highly correlated (with “r” above 0.90). The outliers negatively affect the multiple regressions (FIELD, 2009). Therefore, when outliers were found, they were eliminated.

In this study, we tested additive dummies and multiplicative dummies, and we found that multiplicative dummies improve R^2 (GUJARATI; PORTER, 2011). When R^2 and adjusted R^2 are close or equal to 1.0, this indicates a strong possibility of finding relevant estimates for the dependent variable “stock price return” to explain the independent variables (stock price (SP); return on assets (ROA); return on equity (ROE); variation of net income (Δ NI), company size (CS), risk (R), composition of permanent assets/indebtedness (CPA), permanent assets (PA), total assets (TA), sales growth (SG) in the studied period. When the stock price return cannot be associated with the independent variables, it should be immediately recognized in another way, showing the lack of association between the variables.

The variables were inserted in one Excel worksheet for each company during 40 (forty) months, from January 2014 to May 14, 2017. Then, they were exported to gretl/2015d for a descriptive statistical analysis, considering the hypothesis to be tested.

H₀ – The Lava-Jato Operation affected the performance of companies listed on B3 from 2014 to 2017.

Table 2 presents the results of the panel data regression analysis for the Ordinary Least Squares (OLS), Fixed Effects (EF), and Random Effects (RE) models.

Table 2 – Regression with panel data of the OLS, FE, and RE models.

VARIABLES	OLS	FE	RE
DL1 (additive) or DLM1 (multiplicative)	-	-	-
Const	-0.0679269***	-0.0446179**	-0.0673437***
DLM1	0.00000***	0.00000***	0.00000***
DLM2	0.00000	0.00000	0.00000

DLM3	0.00000	0.00000	0.00000
DLM4	0.00000	0.00000	0.00000
DLM5	0.00000	0.00000	0.00000
DLM6	0.00000	0.00000	0.00000
DLM7	0.00000	0.00000	0.00000
SP	0.000122561***	0.000138307***	0.00000650***
ROA	0.000129609	0.000219537	0.000150090
ROE	0.000130827	5.89232e-05	0.000113814
ΔNI	4.91343e-06	4.26986e-06	4.88149e-06
CS	5.2944e-08	0.000000130692***	1.11385e-07
RISK	0.0501713***	0.0503294***	0.0502416***
CPA	0.00206735	-0.0561303*	0.000898425
PA	-4.30717e-07**	-0.000000135919***	-0.0000000517635**
TA	-1.78003e-08	-9.63797e-08	-2.51577e-08
SG	4.56505e-09	2.30389e-07	3.39814e-08
AIC: The < the better VIF < 10 DW best close to 2 R ² = 1 Normality must be below 5991	p-value (F): 0.000 R ² : 0.089154 AIC: (3967.575) VIF: (17.7924) Normality Test: 90165.237 - p-value 0.0000 T > = Risk 25.15 T < = PA (2.3068)	p-value (F): 0.000 R ² : 0.099 AIC: (3844.80) VIF: 46.778 DW: 1.39 Normality Test: 89170.473 - p-value 0.000 T > = Risk 24.96 T < = PA (3.038)	p-value (F): 0.000 R ² : 0.0890758 AIC: (3966.839) Normality Test: 90064.588 - p-value 0.000 T > = Risk 25.16 T < = PA (2.341)

***99% significance **95% significance * 90% significance

We found significance for the three models from the estimation of the regression with panel data. The FE model presented the best results for the analyzed variables. The variables that significantly affected the stock price return were: multiplicative dummy variable 1 (DLM1), stock price (SP), company size (CS), risk (R), composition of permanent assets/indebtedness (CPA), and permanent assets (PA). The presence of multiplicative dummy 1 (DLM1) positively affects the return of the companies analyzed, and this means that the information made available from January 2011 to December 2011 presented positive effect on return.

We found the stock price affects company return, such that, for every variation of 1 unit in stock price (SP), there is an increase of 0.000138307 in the return price. It is noticeable that stock prices tend to fluctuate depending on the information concerning the economics and politics of a country. This is what happened in the studied period, which was covered by the media with constant information about corruption in Brazil. Thus, when directors communicate their investment decisions to the market, the share price is immediately adjusted, capitalizing the value associated with the content of the new information.

Fluctuations in stock prices become a warning for companies to understand the importance of disclosing their financial information to obtain company credibility. Thus, in the face of the

financial market, companies could protect themselves by presenting an emphasis based on financial efficiency, transparency and the professionalization of their practices.

According to Piotroski (2005), the financial performance can be measured by indicators of a fundamentalist analysis, when investors use historical financial information to prepare profitable investment strategies. There is a positive impact of company size (CS) on their returns, indicating that, for a variation of 1 unit in company size, the return increases 0.000000130692 units. A peculiar result relates to the effect of the variation of 1 unit in risk, suggesting that changes in the risk of companies contribute to the increase of 0.0503294 in return.

This disclosure found in the variable risk is similar to what was mentioned by Balzana Filho and Bordeaux-Rêgo (2014), because the variability of a share return represents the system in which it is inserted. Júnior (2006) also shows in his studies that risk management tends to reduce the likelihood and the impact of negative events and to increase the likelihood of positive events. A negative effect on the return of the companies was found for the variables composition of permanent assets (CPA) and permanent assets (PA). For every variation of 1 unit in the variables CPA and PA, there is a reduction of -0.0561303 and -0.000000135919 in the return of the companies, respectively. This occurs because permanent assets are intended for the normal operation of a company (GITMAN, 2006). Regarding CAP, companies with higher proportion of permanent assets have a lower level of indebtedness, but are more indebted in the long run than in the short term (BRITO; CORRAR; BATISTELLA, 2007).

5 CONCLUSION

This article aimed to analyze the impact of Operation Lava-Jato, promoted by the Federal Police of Brazil, on the financial performance of companies listed on the São Paulo Stock Exchange (B3) from 2014 to 2017. Because of the political context of corruption and before the context of Brazilian political and economic instability, few studies have evaluated the impact of the operation, as noted in the findings of Paula and Nicolato (2016), especially by an event study such as this, which aimed to analyze the impact of this operation on the financial performance of companies listed on B3 from 2014 to 2017.

The results show an impact, related to Operation Lava-Jato, on the performance of companies listed on B3 from 2011 to 2017. Thus, the hypothesis H_0 was accepted. The variables

that significantly affected the stock price return were: dummy multiplicative variable 1 (DLM1), stock price (SP), and company size (CS). It is suggested that a reduction in dividends coincides with a decrease in market value, because of the loss of investment opportunities and vice versa (BENSIMON, 2012). Company size is positively related to dividends and repurchases (FAMA; FRENCH, 2001). Risks show a significant impact on the performance of the listed companies.

The presence of multiplicative dummy 1 (DLM1) positively affects the return of the companies analyzed, and this means that the information made available from January 2011 to December 2011 presented positive effect on return. An observation that we can make in this context is that DLM1 was very significant when the operation had not yet started, since it only started in the middle of 2014. Thus, it is possible that this significance may come from the period of crisis in which the country was and still is until today, which began in the middle of 2008, originating in 2007 in the United States. Because of it, the world economy has collapsed, and many countries stagnated in recession (SILBER, 2010; MARCELO, 2013).

The results found contribute to understanding the financial context of Brazilian companies, given the scenario of political and economic instability and corruption. The survey found a greater concern on the part of companies to disclose their information, which in fact raised the understanding that this could be an important factor linked to the company's credibility. Thus, in the face of the financial market, the emphasis based on financial efficiency and transparency would be a way for companies to protect themselves.

Given this, some implications of this research highlight the importance of adopting short, medium and long-term measures that would contribute to the development of companies. Thus, maintaining transparency in its accounts, striving for professionalism, efficiency and productivity of its resources, the consequence of which is the company's growth, as well as the economic development of Brazil.

Although society is formed by interest groups, institutions become relatively weak as political and economic power is concentrated in the hands of a few, and when this role is surrounded by politicians with influence in the government. Thus, companies whose performance is focused on professionalization and efficiency in fiscal management, without interference from other actors, tend to be better seen by investors, which in fact can contribute to the increase in the share price in the market.

The next studies may advance, as some events were legally reassessed and are now considered not significant in the operation. Going to meet Kerche studies; Viegas, (2023) when mentioning that the rules little shape behavior, leaving room for priorities to be defined by the body itself, far from the accountability normatively indicated in democracies.

New studies can still be carried out to continue the investigation in this context, since Operation Lava Jato was maintained until the beginning of 2021, therefore there will be more information after the end of the time period of this research. Also, other variables can be used in new analyses. Meanwhile, the negative economic growth (recession) of Brazil is clear, which is also a result of corruption. In addition, as evidenced during the operation, the government has shown a clearly inefficient public administration.

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