

STOCK MARKET AND MACROECONOMIC VARIABLES: EVIDENCE FOR BRAZIL

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ABSTRACT

This article analyzes the influence of macroeconomic variables on the stock market. The analysis of this theme is crucial in the current economic context given the severe crisis and the continued growth of the stock market. This article covers an existing research gap about current stock market movements. The Generalized Least Squares Method with Prais-Winsten transformation was applied to correct the first-order autoregressive problem. The results show that the macroeconomic variables continue to influence Ibovespa, as stated in the literature. However, the central government's financial stability variable has no explanatory power over the Brazilian stock market index, corroborating the literature and converging with the empirical observations from 2016 to 2019 of fiscal imbalance and growth of the Ibovespa.

Keywords: Macroeconomics. Financial market. Performance. Stock market.

1 INTRODUCTION

Capital market development is essential for the occurrence of economic development. In particular, the stock market plays a key role in raising funds for companies and, consequently, in increasing investment, productivity and employment levels. Throughout history, it is clear that countless countries have benefited from the increased efficiency of savings intermediation provided by the sophistication of the financial capital market (Grôppo, 2004).

In times of strong economic change, stock markets become volatile and respond quickly to macroeconomic changes. In Brazil, the Ibovespa index is the most important indicator of stock market performance (Pimenta & Scherma, 2010), however, this indicator has changed significantly in recent years. Data from the Central Bank of Brazil (Bacen) 2019¹ show that the average value of the Ibovespa went from 40,405 points in January 2016 to 100,967 in June 2019, representing an increase of approximately 149%.

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¹ Time Series Manager (SGS) System Series No. 7,845.

It is not possible to accurately predict the behavior of the stock market, however, several empirical studies point to the importance of economic variables such as exchange rate, gross domestic product (GDP), basic interest rate and inflation (Bernardelli & Bernardelli, 2016; Bernardelli, Bernardelli & Castro, 2017; Grôppo, 2005; Oliveira, 2006; Oliveira & Frascaroli, 2014). Linked to that theoretical framework, this research provides new features when compared to other studies that investigated the stock market in Brazil and its relationship with macroeconomic variables, since it advances in the analysis with the introduction of new variables, following those who have been suggested in studies by Grôppo (2005), Pimenta Junior and Higuchi (2008), Silva and Coronel (2012), Silva, Barbosa and Ribeiro (2016) and Machado, Gartner and Machado (2018). In addition, analyzes have been introduced for the fiscal stability of the federal government, the behavior of the Ibovespa index in the previous period and its trend, not to mention the current single economic context, which combines economic recession with optimal stock market performance², and requires careful analysis of this relationship.

Thus, this paper aims to analyze the impact of macroeconomic variables in the current context of appreciation of the Brazilian stock market. The justification for the elaboration of this study comes from the practical contribution generated from the results found that serve investors, *policymakers*, entrepreneurs and other economic agents who are interested in understanding how the economy and the capital market related, which may affect the strategy, and the performance of companies or the performance of the economy itself. This is because capital market development fosters economic development, stimulates the production of goods and services, and raises the level of well-being of all society.

Thus, the hypotheses established are (i) macroeconomic variables are correlated with the stock market; (ii) the international stock market is positively correlated with the Ibovespa; (iii) the Brazilian stock market is positively related to time; and (iv) fiscal stability of the central government relates to the Ibovespa. This covers a gap in empirical research that has not empirically evaluated these variables in the Brazilian stock market over a recent period.

To meet the established objectives, this paper is divided into: literature review on the relationship of macroeconomics and capital markets; methodology used for analysis; results presentation; discussion of results in light of current literature; and, eventually, final considerations.

2 MACROECONOMY AND CAPITAL MARKET

Several authors have investigated the impact of macroeconomic variables on the world stock market, such as Chen (1991), Clare and Thomas (1994), Wu and Su (1998), Kwon and Shin (1999), Maysami and Koh (2000), Maysami, Howe and Rahmat (2004), Islam and Watanapalachaikul (2003), Boucher (2006) and Kumar (2008).

This relationship is being strongly researched in Brazil, such as the studies by Grôppo (2005), Oliveira (2006), Oliveira and Frascaroli (2014), Bernardelli and Bernardelli (2016), Bernardelli *et al.* (2017), Machado *et al.* (2018) and Santana, Lima and Ferreira (2018).

However, none of the studies applied in Brazil included the central government stability, the Ibovespa trend and the impact of the international stock market as a variable, generating a gap in the literature to be explored, since these variables are of great importance in explaining one of the first variables taken into account when considering the stock market is the exchange rate, so that several empirical studies sought to identify this relationship (Table 1).

² Between April 2015 and April 2019 Ibovespa increased substantially, while GDP stagnated (Bacen 2019a).

Table 1
Comparison of results between the exchange rate and the stock market

Authors	Period	Scope	Relationship
Aggarwal (1981)	1974 – 1978	United States (USA)	Positively correlated
Solnik (1987)	1973 – 1983	Eight major Western countries.	Non-significant causality
Soenen and Hennigar (1988)	1980 – 1986	United States (USA)	Negatively correlated
Soenen and Aggarwal (1989)	1980 – 1987	Eight major Western countries.	Positive correlation for three countries and negative for five.
Issam, Abdalla and Victor (1997)	1985 – 1994	India, Korea, Pakistan and the Philippines	Unidirectional happenstance
Chamberlain, Howe and Popper (1997)	1986 – 1992	American and Japanese banks	Significant for American banks and not significant for Japanese banks.
Nieh and Lee (2001)	1993 – 1996	G-7 countries	Non-significant relationship.
Phylaktis and Ravazzolo (2005)	1980 – 1998	Group of countries based on the pacific ocean	Positive relationship between the stock price and exchange rates
Oliveira (2006)	1972 – 2003	Brazil	Positive relationship
Santana <i>et al.</i> (2018)	1994 – 2014	Brazil	Negative relationship
Machado, Gartner and Machado (2018)	1999 – 2017	Brazil	Positive relationship

Source: adapted from Bernardelli and Bernardelli (2016).

As the authors themselves reported, there is no clear empirical relationship between the impact of exchange rates and financial market indicators. In fact, this relationship may differ, depending on the country, or even on the time period analyzed.

Also a much-investigated but less controversial issue is the risk-free interest rate normally attributed to government bonds. Internationally, many studies have investigated this relationship and found negative results, such as Maysami and Koh (2000) and Islam and Watanapalachaikul (2003). In the case of Brazil, this relationship has been investigated by different authors, such as Oliveira (2006), Grôppo (2005), Oliveira and Frascaroli (2014), Bernardelli and Bernardelli (2016), Bernardelli *et al.* (2017), Machado, Gartner and Machado (2018) and Santana, Lima and Ferreira (2018).

All results, except for the studies by Chen (2009) and Machado *et al.* (2018)³, have shown a negative relation between the Selic rate and the stock market. Such a result can be explained from a theoretical point of view, as the public security would be a substitute product of the stock market, since the surplus agent can select which product to invest in. Although the expected result is consensus in the literature, it is of fundamental importance to include this variable in the model in order to avoid problems of omitting important variables.

In relation to economic growth, the increase in the level of economic activity contributes positively to the performance of companies, which, as a result, is captured by stock prices (Bernardelli & Bernardelli, 2016). Thus, the impact of this variable is expected to be positive.

Another issue that has been hotly debated in recent years in Brazil is the state's financial stability (Arantes & Lopreato, 2017; Durigan Júnior, Saito, Bergmann, & Fouto, 2018; Silva & Gamboa, 2011). The level of financial stability of the government and its ability to collect affects the credit risk of the country and companies and, consequently, this is passed on to investment decisions and, ultimately, has a reflection on stock prices, as pointed out by the study from Franzen, Meurer, Gonçalves and Seabra (2009). The importance of a country's fiscal stability in investigating financial investment flows lies in the fact that capitals are not only governed by the rates of return but also by the risk attributed to the operation (Santos & Coelho, 2010; Sanvicente, 2015; Vieira, 2004).

³ The studies found a positive short- and long-term relationship between interest rate variation and stock market returns.

However, studies on the relationship between fiscal stability and the stock market are still incipient in Brazil. Thus, in order to verify the relationship between fiscal stability and the Ibovespa, the central government's financial stability variable (NFSP) has been used as a proxy for central government financial stability, which, according to Bacen (2019b), is used as a parameter for assessing the probability of solvency of the public sector and for international comparisons. The variable total revenue of the federal government has also been used.

Finally, the international stock market fluctuation may be a sign of a global crisis, and the so-called contagion effect is reflected in all stock markets, as portrayed by Vartanian (2012). Thus, the financial market of emerging countries, such as Brazil, Russia and China, is influenced by the American financial market, represented largely by the Dow Jones index (Farias & Sáfiadi, 2009). This corroborates the research by Oliveira and Medeiros (2009), in which the authors tested the lead lag hypothesis between the US and the Brazilian stock market and concluded that it is possible to make some prediction about the Ibovespa based on the trajectory information of the Dow Jones index, that is, the results reveal that the Ibovespa return is largely explained by the Dow Jones movement. Thus, we used the Dow Jones index, which is considered by Gaio, Ambrozini, Bonacim and Junior (2014), Angelico and Oliveira (2016) and Silva Ribeiro, Leite and Justo (2016) as the most representative index of the international market, such a benchmark for Ibovespa.

3 METHODOLOGICAL PROCEDURES

3.1 Econometric tools

As pointed out in the introductory section, this paper seeks to analyze the impact of macroeconomic variables on the Brazilian stock market. Before defining the best method to be estimated, some econometric tests have been performed in order to identify possible problems that would result in biased and inconsistent parameter estimates. Tests were performed to detect multicollinearity, heteroscedasticity and autocorrelation problems. In order to detect multicollinearity, the variance inflation factor (VIF) has been utilized. To test the null hypothesis of homoscedasticity of the residues, the Breusch-Pagan test has been employed. To detect autocorrelation, the test used was the one proposed by Durbin-Watson.

In time series, a usual problem encountered in the data is serial autocorrelation. According to Gujarati and Porter (2011), autocorrelation can be defined as a correlation between members of time-ordered series of observations. To solve this problem, the regression has been performed by the Prais-Winsten method. The treatment by this method has been selected because there was no data loss in the series and the results generated were very similar to those of conventional multiple regression. It is an interactive process that ends after a satisfactory convergence of the autocorrelation coefficient (Greene, 2012). Thus, as Greene (2012) notes, the Prais-Winsten transformation removes the autocorrelation and heteroscedasticity present in the data.

Because it is a time series, it is necessary to analyze the stationarity of the variables. According to Bueno (2011), time series may be stationary or not. The non-stationary series has a tendency, which may be deterministic or stochastic in nature. The deterministic non stationary series, plus a random component, fluctuates around a time trend. Thus, Gujarati and Porter (2011) point out that it is necessary to verify that the mean and variance of the samples do not change systematically over time. To confirm the non-stationarity of the variables, unit root tests – Dickey-Fuller Augmented (ADF) and Phillips-Perron (PP) have been performed.

3.2 Database and empirical model

As shown earlier, the proposed empirical model is inspired by variables already analyzed in empirical studies for Brazil, according to Grôppo (2005), Oliveira (2006), Oliveira and Frascaroli (2014), Bernardelli and Bernardelli (2016) and Bernardelli *et al.* (2017). However, in addition to the variables commonly used, important variables (not analyzed in other empirical studies for Brazil) have been included; Such as, for example, government revenue, an international stock market index and the need for government funding.

The database used is a monthly time series covering the period from January 2003 to March 2019, totaling 195 observations. The dependent variable selected to evidence stock market fluctuations was the Ibovespa, available from Bacen (2019a). The variables used are described in Table 2.

Table 2
Variables used in the model

Variable	Description	Source
Ibovespa	Bovespa – monthly index – Points – (Logarithmized)	Bacen (2019a) Serial No. 7,845
GDP	Monthly GDP in Dollars (US\$) – (Logarithmized)	Bacen (2019a) Serial No. 4,385
Exchange Rate	Real effective exchange rate index (IPCA) – Jun/1994=100	Bacen (2019a) Serial No. 11,752
Selic	Interest rate - Overnight/Selic rate, daily accumulated values over the month.	Bacen (2019a) Serial No. 4,390
Receita_gov	Central government primary result – total revenue – 2003 prices – (Logarithmized)	Bacen (2019a) Serial No. 7,544
Dow_Jones	Stock Index – Dow Jones – Closing – Economic Value – GM366_DOW366 (Logarithmized)	Ipeadata (2019)
Ibovespa_t-1	Ibovespa - monthly percentage change – % – 1-period lag	Bacen (2019a) Serial No. 7,832
NFSP	NFSP without exchange devaluation (% GDP) – current monthly flow – nominal result – external – federal government and central bank – %	Bacen (2019a) Serial No. 5,310
Trends	Increasing value that receives value 1 in the first period of the series and is increased by +1 over each period.	

Source: prepared by the authors (2019).

The “Ibovespa” variable is the main stock market index. It has been created in 1968 and, over 50 years, has established itself as a reference for investors around the world. It is the most important indicator of average performance of the most traded and representative assets of the Brazilian stock market (Bmf&Bovespa, 2019).

According to Brondani, Baggio, Agudo and Sanjuán (2013), Ibovespa is intended to serve as an average indicator of stock market behavior. Thus, its composition seeks to approximate as closely as possible to the actual configuration of on demand trades.

As seen in Table 2, the variables that did not represent rates have been logarithmized (natural logarithm - NL), which can be interpreted by their elasticities. Thus, Equation 1 presents the proposed empirical model.

$$\begin{aligned}
 \ln Ibovespa_t = & \beta_0 + \beta_1 \ln PIB_t + \beta_2 \text{Cambio}_t + \beta_3 \text{Selic}_t + \beta_4 \ln \text{ReceitaGov}_t \\
 & + \beta_5 \ln \text{DowJones}_t + \beta_6 \Delta Ibovespa_{t-1} + \beta_7 \text{NFSP}_t \\
 & + \beta_8 \text{Tendência}_t + \mu_{it}
 \end{aligned}
 \tag{Equation (1)}$$

$$t = 1, 2 \dots 195$$

In which Ibovespa is explained by: (1) GDP; (2) the exchange rate; (3) the Selic interest rate; (4) government revenue; (5) the Dow Jones stock index; (6) the Ibovespa percentage change lagged in one period; (7) the variation of NFSP; and (8) the trend (Table 2).

4 RESULTS

Table 3 presents a summary of the data used, informing the number of observations, mean, standard deviation and the maximum and minimum values. It is noteworthy that, as described in the methodology, the variables that did not represent rates have been logarithmized.

Table 3
Mean, standard error, minimum and maximum sample values

Variable	Average	Standard error	Minimum	Maximum
ln_Ibovespa	10.76	0.45	9.23	11.48
ln_PIB	11.79	0.45	10.67	12.33
Exchange rate	99.40	18.55	71.76	160.19
Selic	0.97	0.33	0.47	2.08
ln_Receita government	11.10	0.19	10.64	11.90
ln_Dow Jones (1)	0.005	0.03	-0.15	0.09
Δ Ibovespa _{t-1}	1.34	6.49	-24.80	16.97
NFSP	-1.00	2.98	-14.02	6.02
Trends	98	52.97	1	195

Source: prepared by the authors (2019).

Notes: (i) the value (1) means that the variables are in first difference, ie, $(X_{t-1} - X_t)$.

The data presented in Table 3 show that the Ibovespa indicator presented a high disparity in relation to its minimum and maximum value. Namely, the minimum value of the sample has been recorded at 10,280 points in February 2003 and the maximum value was of 97,393 points in January 2019. This result points toward a rising trend in the series as the minimum value is found at the beginning of the sample and the maximum value in the last month of analysis.

Regarding the real exchange rate, the maximum found value was March 2003, while the minimum value refers to July 2011. Regarding the Selic rate, the maximum value is July 2003 and the minimum value is March 2019. As far as government revenue is concerned, there were no significant changes in actual taxpaying power.

As can be seen in Figure 1, the previous behavior presented for the variables is partially in line with the theoretical framework presented in the previous sections, as a positive relationship has been identified for GDP, government revenues and the Dow Jones Index, and a negative relationship for the interest rate. The variables NFSP and Ibovespa variation, lagged in one period, do not present clear correlation.

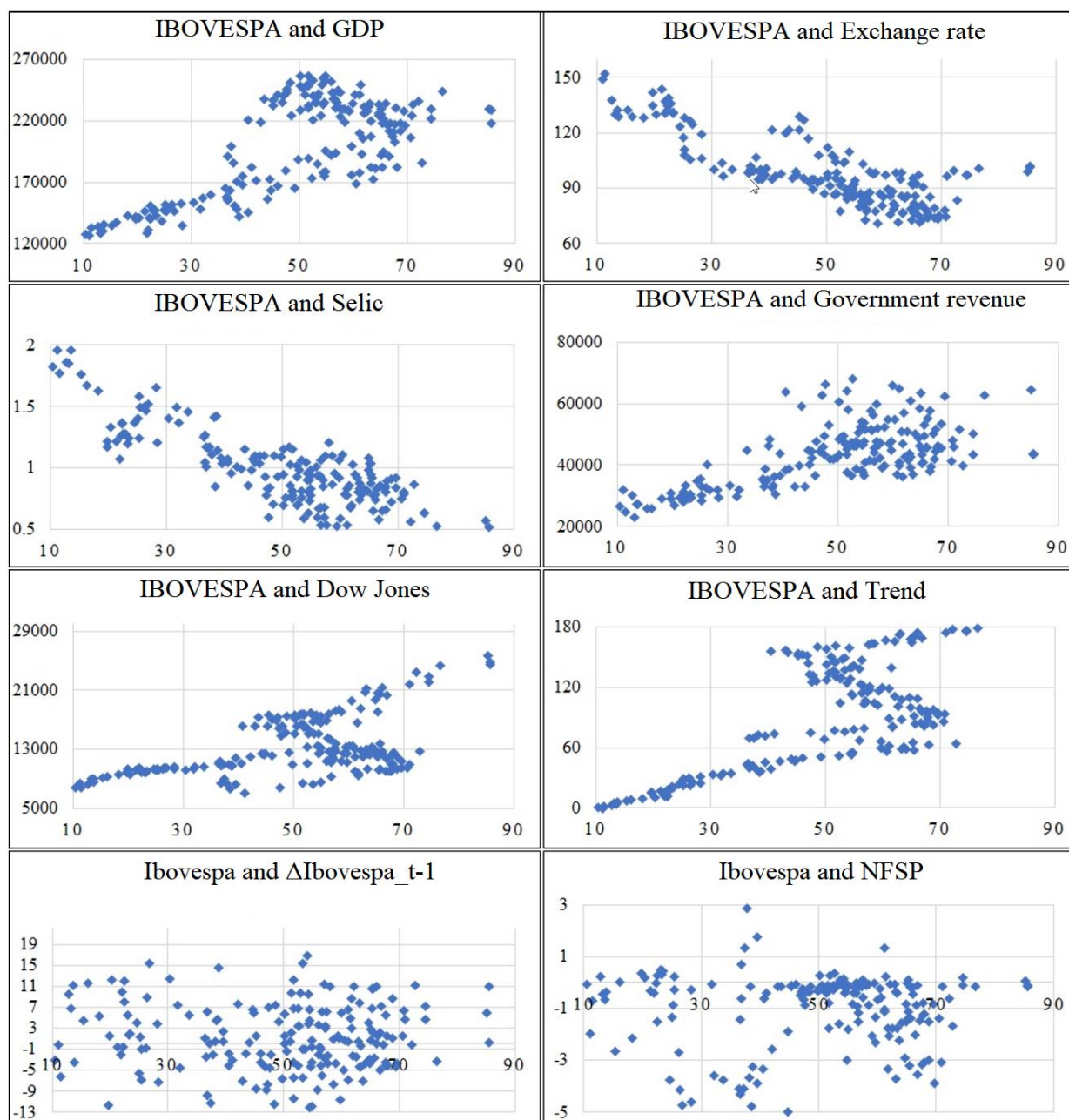


Figure 1. Correlation between variables applied in empirical analysis

Source: Prepared by the authors (2019).

Although correlations do not provide clear evidence on the relationships of variables, this is an initial step before making estimates by the econometric model. The next step is to verify stationarity, that is, if the series develops randomly over time around a constant average. The theoretical concepts evidenced in section 3 have been employed. Table 4 presents the results of the increased Dick-Fuller (ADF) and Phillips Perron (PP) tests.

Table 4

ADF and PP tests for the study variables

	VARIABLE	TERM	EST_T	1%	5%	10%	DECISION
ADF	Ibovespa	c	-3.03	-3.47	-2.88	-2.58	Stationary
	GDP	c	-2.68	-3.47	-2.88	-2.58	Stationary
	Exchange rate	c	-3.59	-3.47	-2.88	-2.58	Stationary
	Selic	c,t	-2.17	-4.01	-3.44	-3.14	Non-stationary
	Government revenue	c	-1.11	-3.47	-2.88	-2.58	Non-stationary

	Dow Jones	c,t	-1.55	-4.01	-3.43	-3.14	Non-stationary
	Dow Jones (1)	c,t	-12.85	-4.01	-3.43	-3.14	Stationary
	Δ Ibovespa_t-1	c	-11.93	-3.47	-2.88	-2.58	Stationary
	NFSP	c	-8.58	-3.47	-2.88	-2.58	Stationary
	Ibovespa	c	-2.92	-3.47	-2.88	-2.58	Stationary
	GDP	c	-2.88	-3.47	-2.88	-2.58	Stationary
	Exchange rate	c	-2.70	-3.47	-2.88	-2.58	Stationary
	Selic	c,t	-3.41	-3.47	-2.88	-2.58	Stationary
PP	Government revenue	c	-9.15	-4.00	-3.43	-3.14	Stationary
	Dow Jones	c,t	-1.87	-4.01	-3.43	-3.14	Non-stationary
	Dow Jones (1)	c,t	-12.93	-4.01	-3.43	-3.14	Stationary
	Δ Ibovespa_t-1	c	-11.91	-3.47	-2.88	-2.58	Stationary
	NFSP	c	-8.69	-3.47	-2.88	-2.58	Stationary

Source: prepared by the authors (2019).

Note: (i) variables with the term “(1)” indicate that they were lagged at first difference; (ii) the trend variable is stationary in level; (iii) the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test was also applied to the Selic and Revenue variable, confirming that it has a stationary behavior.

Based on *t*-statistic and its respective critical value in the ADF test, it can be verified that at a level of 1% of significance, the variables exchange, NFSP and Ibovespa_t-1 are stationary in level, that is, the null hypothesis is rejected: H0 (there is a unit root, whether the time series is not stationary, or it has a stochastic tendency), as are the assumptions made in the methodological section, while Ibovespa variables and government revenue are stationary at a significance level of 5%. However, the Dow Jones variable required the first difference lag to become stationary at significance levels of 1% and 5%. Since this variable has been logarithmized, the first difference indicates the rate of change from one period to another, ie, the series' growth rate. It is noteworthy that the Selic and Government variables were not stationary in the ADF test, so, as a decision criterion, the KPSS test has been performed, which indicates that the series were stationary. Thus, Table 5 presents the regression results.

Table 5

Regression result

Variable	Coefficient	Standard error	T-test
GDP (1)	0.143*	(0.082)	1.74
Exchange rate	-0.007***	(0,001)	-6.29
Selic	-0.117***	(0,039)	-3.03
Government revenue	0.051**	(0,023)	2.20
Dow Jones (1)	0.495***	(0,077)	6.41
Trends	0.006***	(0,002)	4.02
Δ Ibovespa_t-1	0.002***	(0,000)	3.82
NFSP	0,002	(0,001)	1.63
Constant	8.666***	(0,985)	8.79
Notes	195	Original Durbin-Watson: 0.70	
R-squared	0.885	Durbin-Watson transformed: 1.93	

Source: Prepared by the authors (2019).

Notes: (ii) variables with the term “(1)” indicate that they were lagged in the first difference; (ii) Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

From within the data in Table 5, it is noted that the variables are significant and the model seems to be well adjusted. Regarding R^2 , the value found within the regression indicates that the independent variables selected for the model have medium explanatory power (Gujarati & Porter, 2011), since the value found infers that the oscillations of the dependent variables represent 88.5 % of Ibovespa variation. According to Gujarati and Porter (2011), this indicator aims to measure the quality of the regression equation adjustment, ie, it provides the percentage proportion of the total variation of the dependent variable, which is explained by the independent variables. In this case, there may be other variables which, added to these, may improve the

quality of the fit in the model, however, in order to test the variables utilized based on the literature presented in the previous section, we decided to keep the proposed model, in order to empirically verify their relationship with the Ibovespa. The test value of Durbin-Watson transform indicates that the autocorrelation problem was solved by using the regression method Prais-Winsten.

5 DISCUSSION

The results presented in the previous section provide important background for evaluating the assumptions set out in the introductory section. Initially, we noted that the found coefficients of the macroeconomic variables, presented in Table 5, present a behavior similar to what the literature predicts. For example, in relation to economic activity, represented by the GDP variable, the activity is positively related to the Ibovespa index (Aga & Kocaman, 2006), as it acts as a source of funds for private investments. Similar result to the one obtained by Oliveira (2006), which also shows the positive relationship between GDP and the stock market index for Brazil, Germany, Singapore, Spain, Italy and the United Kingdom. The results are justified by the fact that if economic activity increases, as a consequence companies tend to earn higher profits, pay higher dividends and, consequently, increase demand in the stock market (Bernardelli *et al.*, 2017). It should be noted that the research by Machado *et al.* (2018) pointed to a negative relationship between GDP and stock market returns.

In relation with the exchange rate, the application of the proposed methodology found a negative result for the exchange variation, that is, if an increase in the real exchange rate occurs, a reduction in the stock market index is expected. Similar result was found by Bernardelli and Bernardelli (2016), Bernardelli *et al.* (2017), and Santana *et al.* (2018). It is important to mention that most studies show a negative relationship between the exchange rate and the stock market, except for the study by Machado *et al.* (2018), which found a long-term positive relationship between the exchange rate and the stock market return. One explanation for this result (negative relationship) is provided by Bernardelli *et al.* (2017), who attribute the negative impact of the exchange rate to the fact that much of the investments come from the international market and an increase in the exchange rate may inhibit such action.

Regarding the interest rate, the results suggest a negative relationship. Similar to what was substantiated by Oliveira (2006), Geske and Roll (1983), Bernardelli and Bernardelli (2016), Bernardelli *et al.* (2017) and Santana *et al.* (2018), indicate a direct negative relationship between the interest rate and the stock exchange. This result is understandable from an economic point of view as the interest rate is taken as an opportunity cost to the investor, ie the surplus agent may choose to allocate its resources to stock market securities or fixed income securities that are pegged to it. Directly or indirectly at the interest rate; as interest rates rise, the opportunity cost increases, leading to an expected reduction in stock market demand. However, studies by Chen (2009) for the United States and Machado *et al.* (2018) for Brazil pointed to a long-term positive relationship between interest rate and stock market return, both in the upward and downward regimes.

The government revenue variable was statistically significant, so it has explanatory power over the Ibovespa variations, as presented in the research by Franzen *et al.* (2009). This analysis found that an increase in government revenues positively impacts the Ibovespa. This variable proved to be a *proxy* for measuring the level of economic activity and its relationship with the Ibovespa.

As for the variable introduced to capture the relationship between the international and the Brazilian stock market (the Dow Jones index), the result presented shows that there is a negative relationship, as advocated by Farias and Sáfiadi (2009) and Vartanian (2012). In this study the relationship was positive, thus, the increase in the Dow Jones index tends to positively affect the Ibovespa. The justification for this is due to the reaction of domestic investors to

certain behaviors of international investors. However, some local events affect only the national market, as already pointed out by Oliveira and Medeiros (2009), Angelico and Oliveira (2016) and Silva Ribeiro, Leite and Justo (2016). Thus, it is not possible to reject the initially established hypothesis that the international stock market is positively correlated with the Ibovespa. Similar results were found in the studies by Gaio *et al.* (2014) for Brazil.

The trend variable included in the regression aims to capture an upward or downward trend in the Ibovespa index. The result shows an increasing trend in the period analyzed, so that, regardless of the other variables, the Ibovespa index tends to grow. While testing the variable $\Delta\text{Ibovespa}_{t-1}$, a positive relationship has been found, showing that the previous performance of the variable in question is taken into account in the decision making of the investment, characterizing the backward-looking process (Bouvatier & Lepetit, 2008; Dantas, Micheletto, Cardoso, & Sá, 2017). However, this relationship is not significant between the variation of the Ibovespa of the previous period and the current Ibovespa, since the coefficient presented is of low scale. Again, it is not possible to reject the hypothesis that there is a growing trend of the Brazilian stock market over the analyzed period.

Finally, the results of the variable representing the government's financial stability level, NFSP, were not statistically significant, unlike the expected result and supported by Vieira (2004), Franzen *et al.* (2009), Santos and Coelho (2010) and Sanvicente (2015). However, it may have an indirect relationship, since for the government to finance itself, it is necessary to sell securities with a higher rate of return than the market, which leads investors to migrate from the stock market (Ibovespa) to the securities market (Souza, 2006). Finally, the initially established hypothesis that central government fiscal stability is related to the Ibovespa is rejected.

6 FINAL CONSIDERATIONS

The good development of the financial market is fundamental for nations and contributes significantly to companies, especially with regard to financing for productive investment. In this sense, this work is relevant because it performs a theoretical analysis of the main studies related to the interconnection between the stock market and the macroeconomic variables. Altogether with the theoretical survey, we proposed an empirical study covering Brazil from 2003 to 2019, which made possible to correlate the results found with the literature on this subject.

Although the theme has been analyzed by several studies in Brazil, there was a gap in empirical applications by not testing variables related to government stability, the performance of international markets, as well as by testing the own inertia of this indicator. Thus, this paper fills a gap in the literature by considering the importance of macroeconomic variables such as GDP, interest rate and exchange rate, as well as contemplating other less studied variables, but which are relevant to the decision making of agents, such as economic factors, such as the Dow Jones Index, the central government financial stability indicator, and Ibovespa behavioral variables, such as the trend and past performance.

The found results were relevant, given that, for the GDP, interest rate and exchange rate variables, the estimates pointed to a behavior according to the literature, being the first positively and the second and third negatively correlated, even in a recessive economic context. Thus, it is not possible to reject the hypothesis that macroeconomic variables are correlated with the stock market. Regarding the Dow Jones index, the result shows a strong lagged positive relationship between the indicator and the Ibovespa, which does not allow for rejecting the hypothesis that the international market is positively correlated with the Ibovespa. This result is especially important for investors, as a variation in the international stock market is expected to change in the same direction over the subsequent period in the Brazilian stock market. With respect to the trend variable, estimates indicate a positive trend in the Brazilian stock market, which makes it impossible to reject the hypothesis that there is a growing trend in the stock market in Brazil.

Finally, in relation to the government revenue and public sector borrowing (NFSP) variables, the results show that while government revenues are positively related to the Ibovespa, there is no statistically significant relationship between the NFSP variable and the index. This allows us to reject the hypothesis that central government fiscal stability is related to the Ibovespa. For future studies, a plausible management to identify the relationship between the federal government's fiscal stability and the Ibovespa is to test other state financial stability variables (net debt and gross debt), or even country risk variables (Emerging Markets Bond Index Plus, Credit Default Swap and Rating).

In addition to the macroeconomic scenario, the good performance of the stock market depends to a large extent on the performance of listed companies. In this sense, one of the limitations found in this paper is the non-use of accounting variables of the companies that make up the Brazilian stock market.

Thus, it is evident that stock markets are of fundamental importance to the world's economies and their operation is complex and intriguing. In this context, the understanding of the mechanisms that affect stock market performance is of great interest to investors, companies, managers, public policy makers, among other economic agents. In Brazil, special interest is given to the understanding of such factors, given the appreciation of the stock market in Brazil that has occurred in recent years. In this sense, this study provides important evidence on the impact of macroeconomic variables on stock market valuation, generating significant contributions to the literature in question. Thus, the suggestion for the continuation of this work is to analyze, together, macroeconomic and accounting variables via the panel data technique, which will allow us to estimate the influence of the company's accounting variables on its market value.

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