Abdala, André; Guido, Silvia B. D.

Article

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Journal of
Economics and Political Economy
www.kspjournals.org
Volume 5 September 2018 Issue 3

The recent dynamics of the stock exchange in Brazil

By André ABDALA [a†] & Silvia B.D. GUIDO [b]

Abstract. This study is a literary analysis with the purpose of verifying the dynamic relation of the São Paulo stock exchange index with some macroeconomic variables, between January 2014 and August 2017, when Brazil was going through a serious political crisis, in which the economic activity was affected and therefore the stock market. Thus, these relationships are evaluated by the Johansen Cointegration Test to precisely verify the long-term relationship between the Brazilian stock market and the other variables. And the results indicate a negative weight of inflation expectations, interest rates and public debt, while the exchange rate and economic activity positively affect the stock market index.
Keywords. Stock price, Index of the São Paulo Stock Exchange, Johansen Cointegration Test.
JEL. C13, E44, G12.

1. Introduction

This study comprises a literary revision with the purpose of verifying the dynamics of the São Paulo Stock Exchange Index (IBOVESPA), mainly due to the exchange rate, inflation, inflation expectations, interest rates and public debt, between January 2014 and February 2018, when Brazil was going through a serious political crisis, in which economic activity is affected and, therefore, the stock market.

Since 2013, when the effects of the financial crisis of 2008-2009 are already on the horizon, a political crisis is brewing in the Brazilian economy and breaks out in the following year. The dominant political group is able to remain in power until the end of August 2016. However, with the impeachment of President Dilma Rousseff, Vice Michel Temer takes over the government.

In March 2016, faced with the expectation of the President's impediment, the IBOVESPA had the highest level in the analyzed period.

During the political crisis, in addition to the stock market, the exchange rate serves as a guide to the level of confidence in the economy. And it is observed that until the beginning of 2016, the exchange rate takes on depreciation trajectory, and then the trend is reversed.

In a similar period to the exchange rate depreciation, inflation up to the beginning of 2016 shows an upward trend and, from this, the trajectory reverses the direction. Likewise, inflationary expectations point to a downward trend, starting in in that same year. However, throughout the period of analysis, the net internal debt of the public sector (% GDP) is on the rise and the economic activity still shows one aspect of recession, with a reversal trend starting in 2017.

[a†] Federal University of Espírito Santo. Av. Fernando Ferrari, 514, Goiabeiras, Vitória - ES - CEP 29075-910, Brazil.
. andre_abdala@hotmail.com
[b] Federal University of Espírito Santo. Av. Fernando Ferrari, 514, Goiabeiras, Vitória - ES - CEP 29075-910, Brazil.
. silviabdguido@gmail.com

Therefore, this study estimates the long-term relationship between the IBOVESPA and the macroeconomic variables pointed out by the Johansen Cointegration Test. And according on the results, there is a negative shock of inflation expectations, interest rates and public debt, while the exchange rate and economic activity positively affect the stock market index.

Hence, in the first and second sections there is, respectively, a review of the literature and an empirical review. In the third section, the data and the methodology are presented. In the fourth section, the results are shown. And in the fifth section the conclusion is presented.

2. Literary review

According to Akdogu & Birkan (2016), the exchange rate and the stock price play a significant performance in the development of the financial sector, and therefore can lead to a worsening of financial crises. And international or systemic financial crises have been happening since the 1980s, when most emerging economies opened their market to foreign capital.

In the last decade the world experienced two major financial crises: The Subprime crisis in mid-2008 and the Eurozone sovereign debt crisis the following year. During these crises, the exchange rate and the stock price index were seen as barometers of the financial system (Akdogu & Birkan, 2016).

The exchange rate and the stock price are very sensitive to changes in market conditions. The main risk from high volatility is the lack of predictability of the cost of capital, which weakens the efficient allocation of funds.

Full allocation of funds no longer occurs, even in the best of times, due to psychological effects, market imperfections, the variety of innovative and complex financial products, etc. And under high volatility, inefficiency in resource allocation increases, making it harder for these funds to be a more efficient channel for productive investment and, in effect, for the promotion of economic growth (Akdogu & Birkan, 2016).

Akdogu & Birkan (2016), as well as Kutty (2010), Suriani *et al.* (2015), and Haughton & Iglesias (2017), point out two approaches on the question of direction or causality between the exchange rate and the stock price index, one refers to the capitalflow-oriented model and the other to the model driven by the dynamics of the stock market. The first model is the traditional approach.

In the traditional approach, the stock market responds to the dynamics of the foreign exchange market. Since the stock price represents the present value of the future cash flow of the firms, the stock market is affected by the competitiveness of the companies, when observed the exchange market, since the exchange rate positively affects the export revenue of the firms.

The alternative approachpresents the financial account as the main determinant of the currency level. That is, the stock price index or portfolio balance (portfolio) causes the exchange rate. This channel can be understood by the demand and money supply, or in terms of portfolio diversification, since when the stock price is reduced, there is a wealth effect that declines the demand for money and, consequently, the interest rate, the which causes the outflow of capital. This is equivalent to the replacement of domestic assets by foreign assets.

In the traditional approach, there is a positive relationship between the exchange rate and the stock price, with a causal direction from the foreign exchange market to the stock market. And in the other approach, the correspondence is negative, with a unidirectional relationship from the financial market to the exchange rate.

Nevertheless, the empirical literature does not show a consensus on the causal relationship between the exchange rate and the stock price.

In contrast, Kumudumi & Jameel (2016) provide a focus for the impact of inflation on stock prices. According to the authors, there is a tendency to consider that the performance of the stock market is an indicator for the economic performance of the country. And among the commonly used macroeconomic variables, such as interest rates, exchange rates and money supply, which the

authors study, inflation can be considered the most important variable to analyze the effects on the national economy, as well as on the stock market, when observing emerging economies.

According to Fisher's Theory, the stocks serve as a hedge or insurance for inflation because their nominal returns accompany the variation in market prices. Alternatively, there are other approaches that evaluate a corrosive effect of inflation on stock price due to the shock in purchasing power, investor expectation, uncertainty about the expected return on stocks and the cost of capital (Tripathi & Kumar, 2014; Khan *et al.*, 2016; Kumudumi & Jameel, 2016).

The negative relationship between inflation and the stock price index is evidenced because when there is higher inflation, consumption spending increases, and as a consequence, the level of saving and investment declines. This decrease in demand for stocks lowers its prices.

In addition, inflation raises the discount rate, based on the asset valuation model, and thus affects the profit because there are higher input costs and increasing interest payments. Also, when there is demand pressure, which causes inflation, the monetary authority reduces the money supply to raise the interest rate with the intention of, exactly, to cool the price level, which, by effect affects economic growth and thus the stock price level (Fama, 1981 *apud* Tripathi & Kumar, 2014).

Regarding public debt, fiscal policy is considered by the financial literature as the most important instrument to be considered by investors and the central government when it decides to make changes in economic policy, because higher public spending causes a higher interest rate and, in effect, decreases the performance of the stock market (Jakova, 2016).

Saleem *et al.,* (2012) evaluate that the larger public deficit reduces savings and, thus, investment. There is also a deleterious effect on net exports, since the lower savings contain the supply of funds for borrowing, which raises the interest rate, which is the price of the loan, and thus allows the exchange appreciation with the largest capital.

And according to the capital flow-oriented approach, foreign exchange is a competitive factor for firms in the international market. Therefore, the exchange appreciation represses the stock price.

So close, Joshi & Giri (2015) argue that high public deficits imply loss of investor confidence such as government solvency capacity or asset return. As a result, there is a substitution of domestic assets by foreigners and, consequently, causes greater exposure of the country to exchange rate fluctuations.

Also, Saleem *et al.,* (2012) carry out a weighting from the perspective of Sargent & Wallace (1981), so that thelarger public deficit generates inflation and more taxation.

Based on Sargent & Wallace (1981), in the Ricardian regime there is a domain of monetary policy over fiscal policy. That is, monetary policy has an active role, while passive fiscal. This is because the monetary authority controls inflation, since it controls money supply for current and future periods, by combining the issuance of public bonds and seigniorage to finance the government deficit, where supply and monetary demand determine the level of prices.

Now, before the non-Ricardian regime, there is fiscal dominance over monetary policy, since prices are endogenously determined by fiscal restraint, as Woodford (2001) also treats, since monetary policy finds a limit on the demand for government bonds for to attend the government's deficits, which imposes on the central bank the growing seigniorage.

In the case of Woodford (2001), there is an approach, in accordance with the Fiscal Theory of the Price Level, in which the tax expansion causes a wealth effect on the part of the holders of the government bonds. By raising consumption, it generates inflationary pressure. This contributes to the fall in government real liabilities($\frac{nominalpassive}{generalpricelevel}$). So, the higher the nominal liability, the higher the

price level should be to lower the level of real liabilities and satisfy the government's constraint in the medium term.

Hence, following the view of Sargent & Wallace (1981), the larger public debt raises inflationary expectations.

Though, Greenspan & Allen (1995 *apud* Saleem *et al.*, 2012) ponder that growth in inflation expectations can reduce the real value of corporate debt and thus raise the firm's equity value, which reflects positively on stock prices. On the other hand, the fall in inflation expectations allows the reduction of the interest rate and increases the stock price index because there is a higher present value of the future return flow of the firms. Consequently, the effect of inflation expectations may be neutral or indeterminate.

3. Empirical review

Kutty (2010) analyzed the relationship between stock prices and exchange rates for Mexico. To do so, the data selected comprisethe weekly closing of the Mexican stock market, with its index weighted by the market capitalization of their main shares (35 to 40 shares). For the exchange rate, the Mexican peso-to-US dollar ratio is taken from the first week of January 1989 until the last week of December 2006, defining the time delimitation.

The author applied the Augmented Dick-Fuller (ADF) and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) unit root tests to check the stationarity of the series. Given the results, he was able to conclude that the variables in the level did not present stationarity, however they are stationary in first difference, with 1% of significance, which enables the continuity to the analysis.

To examine whether stock prices imply changes in the exchange rate and vice versa, the Schwarz criterion was used to define the appropriate lags for the series, therefore applying them to a causality model. The model confirmed a one-way relationship in the direction of stock prices influencing the exchange rate, at a significance level of 1%. Nonetheless, Granger's causality tests have shown that stock prices drive exchange rates in the short run, and there was no long-run relationship between these two financial variables.

Suriani *et al.,* (2015) also analyzed the interaction between stock prices and exchange rates. Taking Pakistan as a geographical boundary. The authors took as variables the Karachi KSE-100 price index and the exchange rates of the Pakistan Rupee against the dollar, both series collected monthly from January 2004 to December 2009.

For the regression, the estimation method OLS was applied, taking the stock prices as its dependent variable and the exchange rates as independent. After confirming the stationarity of the series via the ADF test, the authors discarded the cointegration analysis and applied the Granger causality test. The results showed that there was no relationship between the variables in the chosen period.

According to the authors, one reason for this lack of interaction among these variables is due to the monopoly exercised by stockbrokers in Pakistan. "They speculate the market and get the maximum benefits while the investors gain ultimate loss" (Suriani *et al.,* 2015, p. 387), with fluctuations in demand and supply determining the price, in a way that the exchange rate may not be able to strongly impact the price.

Still analyzing emerging economies, Akdogu & Birkan (2016) applied a series of non-causality tests to determine the direction of the relationship between the stock price indexes and rates in those markets. The selected data consisted of 126 monthly observations (January 2003 to June 2013) of the price indices of each stock market and the exchange rates (dollar by local currency) of the 21 selected countries.

Using a Vector Autoregressive Regression (VAR) model for analysis, the data failed in the multivariate normality tests. Once the non-stationary data were confirmed, the authors identified that the Granger causality test was not applicable

and selected the Hacker-Hatami-J non-causality test. The procedure that involves the test aims to endogenize the choice of the lags for the VAR model (p).

The results indicate that there was a statistically significant causality interaction between the two variables in 13 of the 21 studied countries. The direction of this causality, however, diverged from country to country and the authors attributed this variation to a set of multiple factors, depending on the particularities of each economy (Akdogu & Birkan, 2016).

The most recent study, presented by Haughton & Iglesias (2017), along with Kutty (2010), Suriani *et al.,* (2015) and Akdogu & Birkan (2016), investigates the interaction between the stock market and exchange rates in the Caribbean and Latin America. The authors selected for their study the only two countries in the Caribbean region that have adopted a floating exchange regime, namely Jamaica and Trinidad and Tobago and expanded their selection to Argentina, Brazil, Chile and Mexico.

The authors have investigated the interrelation between the stock index and the exchange rate, with panel data and figures collected monthly corresponding to the period from 2002 to 2012. Hence, they selected as variables the stock price index, the exchange rate related tothe US dollar, money market rates and foreign reserves minus gold, with all series being transformed into logarithms.

The differential of Haughton & Iglesias' (2017) study, over the previously others, is the inclusion of structural shocks in a fractional analysis:

"First we analyze the data across the full time period and later we split the data into two parts: (1) The first sub-sample from 2002:01 to 2008:08 (the so called tranquil period) where the asset bubble was developing. (2) The second sub-sample is taken from 2008:09 to 2012:02 (the crisis period). This will provide useful comparisons of the interrelationship between the variables before and after the announcement of the recent global financial crisis" (p. 440).

The adopted econometric procedure was cointegration, applying Granger's causality test. The results presented had shown a smooth relationship between the variables for Jamaica, Trinidad and Tobago, Argentina and Chile. However, the authors expand the model including the impact of volatility through generalized autocorrelation analysis. They have highlighted the importance of incorporating volatility explicitly in the model, since its results have changed drastically.

Throughout the selected time window, stock prices significantly impacted the exchange rate in the quiet subperiod and in the entire period for Jamaica, also in the three periods for Trinidad and Tobago. They were correspondingly relevant in the quiet period for Argentina, Mexico and Chile (Haughton & Iglesias, 2017).

Alternatively, Khan *et al.,* (2016) sought to investigate the impact of inflation on stock prices in Pakistan. The empirical study was based on the analysis of secondary data between July 2001 and June 2010. The reason for taking this period into consideration was to include important events in Pakistan's economy, including the financial crisis of 2008-09 and change political scenarios over the years.

The data was taken from the Karachi Stock Exchange's website consisting of: i) Treasury bills with 12 months of maturity; ii) Consumer price index; iii) Wholesale price index; (iv) Sensitive price index. The authors performed the regressions of these series separately. Taking the KSE-100 stock market index as a dependent variable and confronting it with the Pakistani inflation indexes and the Treasury Bills.

The authors identified that 16.8% of the variations in stock prices were explained by the consumer price index, 12.4% by the sensitive price index and another 16.8% by the treasury bills, all at the significant value of 0.000 confirming the impact of these variables on stock prices in Pakistan. Only the wholesale price index did not present statistical significance in the regression, thus concluding that there is no relation between this inflation index and prices in the Pakistani stock market (Khan *et al.,* 2016).

In another analysisof the relationship between inflation and the stock market, Tripathi & Kumar (2014) examine the long-run connection among inflation and stock returns in Brazil, Russia, India, China and South Africa (BRICS) markets. These authors used panel data and selected as variables of interest inflation rates and stock indices of the BRICS nations. The study selected period was from January 2000 to September 2013 with quarterly frequency.

For the inflation rate, the variation in the Year-to-Year Consumer Price Index was taken for Brazil, Russia, China and South Africa. While for India, the price index variation in the year was taken as a proxy for the inflation rate.

The correlation analysis revealed a substantial negative relationship between stock index and inflation rate for Russia and a significantly positive relationship for India and China. Nor did they identified a long-term cointegration between stock index values and inflation rates using the Engle-Granger and Johansen panel integration test.

Their results showed the existence of a positive and significant association between inflation and stock returns in India and China. While, Russia and Brazil presented a negative relationship between these variables. In on hand, the results of cointegration for individual markets did not reveal long-term equilibrium relationships in the case of Russia, India and South Africa. On the other hand, long-term equilibrium associations are obtained for Brazil and China.

From another point of view Saleem *et al.,* (2012), Joshi & Giri (2015) and Jakova (2016) investigated the stock market nexus to the public deficit. Their research is briefed in the table below:

Table 1. *Summary of empirical research: public deficit and stock market*

	Saleem *et al.,* (2012)	Joshi & Giri (2015)	Jakova (2016)
Geographic Delimitation	India e Pakistan	India	Bulgaria, Czech Republic, Slovakia, Poland e Romania
Selected Variables	Stock exchange indexes of each country Government Budget deficit (% GDP)	Mumbai's Stock Exchange Sensitivity Index (SENSEX) MonetaryOffer Governmentdeficit (% GDP) Real Interest Rates	Stock exchange indexes of each country. GovernmentIncome (% GDP) GovernmentExpenditure (% GDP)
Time Delimitation / Data Frequency	1990-2010 /Annual	1988-2012 / Annual	2004-2015 / Quarterly
Applied Econometric Method	Cointegration - Engle-Granger e Johansen	Auto Regressive Distributed Lag (ARDL) Vector ErrorCorrectionModel (VECM) VarianceDecompositionCorrection (VDC)	Vector Autoregressive Regression (VAR)
Outcomes	Pakistan - evidence of a positive long-term relationship between the deficit and the capital market. India - evidence of long-term negative relationship between deficit and stock market performance.	Negative long-term relationship between the government deficit and the capital market.	Direct relationship between government spending and market performance, and inverse ratio of government revenue to Bulgaria and Slovakia Negative relationship between the capital market and government spending. And there is no relationship between government income and the capital markets of Romania, Poland and the Czech Republic.

Source: Elaborated by the authors. Saleem *et al.,* (2012), Joshi & Giri (2015) Jakova (2016).

In Brazil, Ribeiro *et al.,* (2016) empirically investigated the degree of causality and cointegration between macroeconomic variables plus the Dow Jones index on the variations of IBOVESPA. The periodicity of the data is monthly and comprises the period from January 1995 to December 2012, for the following variables: SELIC rate, exchange rate, industrial production index, in addition to the Dow Jones index and the IBOVESPA. Dummies were also generated representing the election of the Workers' Party and the Asian Crisis.

For the econometric analysis they adopted the Vector Auto-Regression with Error Correction (VEC) method.

The results were consistent and showed a positive relationship between industrial production and the Dow Jones industrial over the Brazilian stock prices. However, the exchange rate presented a negative relation.

Regarding the long-term causal relation, the authors identified that the IBOVESPA is responsive to imbalances in the long term. Regarding the long-term causal relationship between variables, since the dummies of the Workers' Party election and the Asian crisis implied a decrease in Brazilian stock prices.

In addition, the results also showed a significant reaction of IBOVESPA to the innovations in the national and international stock market. On the other hand, the variance decomposition showed that the Brazilian stock exchange index is mainly responsible for explaining the variance itself.

Based on the theoretical and empirical literature analyzed, this study built an econometric model whose data and methodology are elucidated in the following session.

4. Data and methodology

This academic effort includes the use of time series between March 2014 and February2018, using the following variables extracted from a secondary source in IPEADATA database:

• the São Paulo Stock Exchange Index (IBOVESPA), which is the response variable;
• the net internal debt of the public sector (DLSP);
• the average selling exchange rate (R $ / US $) (CHANGE);
• the overnight interest rate (SELIC);
• the seasonally adjusted Central Bank Economic Activity Index (2002 = 100) (IBC);
• the inflation represented by the Extended National Consumer Price Index (IPCA) accumulated in twelve months; and
• the expectation of IPCA for the next twelve months (EXPIPCA)

Therefore, in principle, the model drifts from the general estimation equation:

$$IBOVESPA = \beta_0 + \beta_1 IBC + \beta_2 IPCA + \beta_3 EXPIPCA + \beta_4 DLSP + \beta_5 CAMBIO + \beta_6 SELIC + u$$

Though, the model is estimated by the Johansen Cointegration method (1988), whose sequence of variables are represented in equation (1), chosen discretionary in the respective order, without the representation of the trend of the intercept, before the VAR configuration, in correspondence to the maximum likelihood method, to estimate the parameters in a normal distribution.

The choice of method aims to clarify the long-term or equilibrium relationship between the IBOVESPA and the other variables, as well as verifying the weight of each variable in the Brazilian stock market.

In the first order, the unit root is estimated by the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Dickey-Fuller (DF-GLS) tests, since the series have stationarity in the same integration order to present equilibrium relation. If this does not happen, we will have a spurious relationship between the series. In

effect, there will be no cointegration, that is, the series cannot have a long-term equilibrium relation, in which the vector x presents this equilibrium on a linear constraint $\alpha' x_t = 0$ (Engle & Granger, 1987).

Once the order of integration has been verified, the series can be regressed at level, I (0), by Johansen's Cointegration method (1988), under a deterministic trend, in which the Trace and Maximum Eigenvalue tests are analyzed to verify the presence of cointegration vector in the equations.

5. Results analysis

The stationarity tests ADF, PP and DF-GLS initiate the results' analyses, considering the need to demonstrate that all series do not have a unit root in the same order of integration.

The ADF and GLS tests were estimated by the Schwarz Information Criterion, with 10 lags, and the PP Test by the default method (Bartlett Kernel).

Table 2. *Stationarity tests at level*

	ADF	PP	DF-GLS
IBOVESPA	-6,4762*	-6,4635*	-5,7787*
IBC	-1,6830***	-0,3635	-0,5801
DLSP	-3,1233	-3,1466	-1,7387
CAMBIO	-1,4563	-1,1129	-1,4814
EXPIPCA	-1,9189	-2,0535	-1,5021
IPCA	-1,5871	-1,2736	-1,2387
SELIC	0,514	-0,8413	-0,5064

Source: Elaborated by the authors.
*Statistical significance in1%. *** Statistical significance in10%.

In the stationarity tests at level, only the IBOVESPA and the IBC are statistically significant, and the first variable is significant at the 1% level without the trend and the constant in the ADF and PP tests. And the second variable is significant at 10% without the trend and constant in the ADF Test.

Table 3. *Stationarity tests in 1st difference*

	ADF	PP	DF-GLS
IBOVESPA	-7,7932*	-28,5910*	-7,7394*
IBC	-6,9459*	-6,9512*	-7,0553*
DLSP	-7,3928*	-7,3651*	-1,6183***
CAMBIO	-4,5330*	-4,4491*	-4,6645*
EXPIPCA	-5,8476*	-5,8776*	-6,0724*
IPCA	-3,1508*	-3,1229*	-3,5847**
SELIC	-9,5733*	-16,6904*	-12,9895*

Source: Elaborated by the authors.
*Statistical significance in1%. ** Statistical significance in5%. *** Statistical significance in10%.

In the stationarity tests in 1st difference, the IBOVESPA, the CHANGE, the IPCA and the EXPIPCA are significant in 1% without the trend and the constant in the ADF and PP Tests. And the DLSP is significant in 1% without the tendency in the ADF and PP Tests and in the Test DF-GLS presents a significance in 10% without the tendency.

For both level analysis and 1st difference, the other statistical significances are complete, with the trend and the constant in the stationarity tests.

As the model shows evidence of absence of unit root in a single order of integration (1st difference), in all series, the assumption of cointegration between the series with the variable of IBOVESPA is assumed. Therefore, the Johansen Cointegration Test can be estimated in level.

Table 4. *Johansen cointegration test*

Number of Vectors	Eigenvalue	Trace Statistic	Critical value at 5%	Maximum Eigenvalue Statistic	Critical value at 5%
0	0,6629	179,1637*	125,6154	52,1907*	46,2314
Up to 1	0,6567	126,9730*	95,7537	51,3208*	40,0776
Up to 2	0,4782	75,6523*	69,8189	31,22	33,8769
Up to 3	0,3331	44,4323	47,8561	19,4448	27,5843
Up to 4	0,2199	24,9875	29,7971	11,9229	21,1316
Up to 5	0,2018	13,0645	15,4947	10,8161	14,2646
Up to 6	0,0458	2,2484	3,8415	2,2484	3,8415

Source: Elaborated by the authors.
*Rejection of the null hypothesis of non-cointegration

Under an analysis with up to 6 vectors, the Trace Test points to 3 cointegrated equations at the 1% level and the Maximum Eigenvalue Test shows 2 cointegrated equations, also at the 1% level. Therefore, the results indicate a long-term relationship between the variables. Thus, a long-term relationship can be treated between the IBOVESPA and the other variables.

Table 5. *Cointegration coefficient normalized*

	Coefficients	Standard Error
IBOVESPA	1	
IBC	-1,2022	1,0913
IPCA	-3,1254	1,3244
EXPIPCA	8,1601	2,3543
DLSP	0,6991	0,6893
CAMBIO	-5,2638	4,5559
SELIC	37,6448	12,8283

Source: Elaborated by the authors.

It is observed in table 5, before the coefficients under a single equation with cointegration, in which the response variable (IBOVESPA) is in 1,000, that the exchange rate and the interest rate present the highest volatilities, with standard error of 4, 55 for the exchange rate and 12.82 for the SELIC rate. The other variables have a more stable behavior, highlighting the public debt under a standard error of 0.68.

Regarding the coefficients, in this case, the negative signal represents a positive impact and the positive signal, a negative shock. Therefore, the interest rate has the greatest negative impact (37.64), followed by the expected inflation (8.16) and the public debt (0.69).

This goes accordingly to the theory, which points out the negative weight of the interest rate on the exchange rate and on the economic activity, affecting stock prices. Concerning the expectation of inflation, precisely because it influences the general level of prices, impacts stock prices because when inflation increases, consumer spending increases and, in effect, reduces the level of saving and investment, besides influencing an increase of the SELIC Rate, as a form of demand inflation control.

Concerning public debt, Sargent & Wallace's (1981) fiscal dominance principle and Woodford's (2001) tax theory of price levels, the largest public deficits cause inflationary pressures, as well as, according to Joshi & Giri (2015), impact the loss of credibility of the economic policy due to debt solvency issues, which makes investors opt for foreign assets and, as a result, a greater exchange rate fluctuation. in relation to the coefficients with positive impact on the IBOVESPA, the exchange rate shows the greatest shock (5.26), while the index of economic activity, 1.20. And according to theory, the devaluation has a positive relation with the stock price because the companies start to profit more from the export.

On the other hand, in contradiction to the theory, inflation presents a positive shock in the response variable, possibly due to a matter of lag, since the increase of the product tends to raise the price level.

6. Conclusion

The results of the Johansen test point to the existence of cointegration between the series, which evidences that the series has a long-term relationship with the series of Brazilian stock market index.

The exchange rate makes the firm more competitive. Therefore, the exchange rate devaluation positively affects the stock price index. In turn, economic activity also favors the valuation of shares. And the results converge with the theory, given the importance of the impact of the exchange rate, which demonstrates the relevance of exchange rate policy in the competitiveness of companies and in the dynamics of the stock exchange. However, inflation positively impacts the IBOVESPA, in contrast to the theory, perhaps, as a matter of lag.

Regarding the negative shocks, the results point to the high weight of monetary policy in the dynamics of the stock market, which can influence inflationary expectations, and a lower weight, of fiscal policy.

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