Interaction between the Financial Market and Economic Policies: An Approach Based on the Crisis Caused by the COVID-19 in Brazil

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ABSTRACT: The COVID-19 has social and economic impacts, especially in emerging countries like Brazil. The Brazilian's context was different from the rest of the world, because while the other countries have to manage social and economic crises, Brazil also had to manage a political crisis caused by the president Jair Bolsonaro. The study aimed to analyze the importance of the fiscal, monetary and foreign exchange policies adopted by the Brazilian government and its effect on the stock exchange. To analyze the impacts of the COVID-19 in Brazilian economy, a time series analyses was conducted with the Vector Autoregressive Model. The variables analyzed by the study were: government spending, basic interest rate, Ibo Vespa index and exchange rate. The result highlights the relevance of expansive fiscal policy as a positive driver for investment intentions in the financial market. Although this behavior is not easy to understand, an example that can support this result is the indirect purchase of government bonds through the Central Bank.

KEYWORDS: COVID-19; economics; Brazil; Fiscal Policy; Stock Market.

INTRODUCTION

The world experienced an historic event in 2020. The COVID-19 emerged in China and quickly spread to other countries. The first confirmed case of this new disease happened in Wuhan, Hubei, China, and was officially reported to the World Health Organization on December 31, 2020, which was reported as a "pneumonia of unknown etiology" (Huang et al., 2020, WHO, 2020).

The WHO declared COVID-19 a global pandemic on March 11, 2020, after the disease spread to 114 countries (Sarkodie & Owusu, 2020). The former Minister of Health in Brazil, Luiz Henrique Mandetta, criticized the delay of the WHO to declare COVID-19 a pandemic on his book; in February 26, Mandetta said that was crucial for the global health security that WHO declared the disease as a pandemic, which was not well accepted by Tedros Adhanom, the Director-General of the organization (MANDETTA, 2020 p.68). The virus changed the global everyday life, including public health and global economic development (Ataguba & Ataguba, 2020, Sarkodie & Owusu, 2020).

The COVID-19 outbreak affected the global economy directly, resulting in monetary policies, fiscal measures and the sharing of economic burden on the private sector among countries (Sarkodie & Owusu, 2020). Although the impact to the global economic is not clear yet, financial markets have already suffered the consequences (Zhang; Hu; & Ji, 2020). In March 2020, the US stock market hit the circuit breaker four times in ten days; previously, the circuit breaker was only tripped once, in 1997, since its creation in 1988 (Akhtaruzzaman; Boubaker; & Sensoy, 2020).

As an answer to the crises, the United States Federal Reserve realized 14 swap agreements to supported the dollar system; as a result, the investors run away from emerging markets and developing economies to the security of Dollar, which struggled to defend their currencies, support economic activity and invest in the necessary social and health infrastructure (Stubbs et al., 2021). A huge financial uncertainty took all over the world. The United Kingdom was the country with the high uncertain index related to COVID-19 among 143 countries with 128.35 points; other countries include Switzerland (91.73), Mexico (67.56), Brazil (66.83), Nigeria (64.27), Canada (61.30), Peru (49.83), Kenya (45.06), Germany (44.91) and the US (43.57) (Knoema, 2020). Studies about the impacts of COVID-19 have been produced to report the economic and financial situation in Canada (Lawley, 2020), in United Kingdom (Heald & Hodges, 2020), in Australia (Debelle, 2020), in Eurozone (Briceño & Perote, 2020) and in Germany (Gebhardt & Siemers, 2020), just to mention a few of them.

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In Brazil, in addition to the economic and social crises, the country also had a political crisis. The president Jair Bolsonaro fired two health ministers during the pandemic due their different positions about the health crisis: the first one was the popular Luiz Henrique Mandeta, and the second was Nelson Teich, both of them are physicians. To substitute two physicians, Bolsonaro named Eduardo Pazzuelo, a parachutist general, which did not have any kind of previous experience in healthcare organizations or in Brazilian healthcare system.

With the previous background, the study aimed to analyze the importance of the fiscal, monetary and foreign exchange policies adopted by the Brazilian government and its effect on the stock exchange.

POLITICAL CONTEXT
The first confirmed case of COVID-19 in Brazil happened in February 26 in São Paulo, and the first death was confirmed in March 12. Since the first case, Brazil already had more than 6 million cases and more than 170,000 deaths. These results put the country in the third position of total cases, behind the USA and India, and in the second position in total deaths, behind the USA.

Brazil just reach this position because the president is Jair Bolsonaro, a politician from the global alt-right. According to The Lancet, Bolsonaro was the biggest threat to Brazil's COVID-19 response (Lancet, 2020). In April 28, when the country had 5,007 deaths, Bolsonaro was asked by the journalist about the situation, he responded: "So what? What do you want me to do? I am Messias, but I do not make miracles." Bolsonaro's middle name is Messias, "messias" means messiah in Portuguese.

Since the beginning of the pandemic, Bolsonaro believed that the situation was a conspiracy from states governors to make his government unfeasible (Mandetta, 2020 p. 136). According to Ugo Braga, the former leader of the communication sector of the Ministry of Health, Carlos Bolsonaro, the second son of Bolsonaro and city councilor of Rio de Janeiro, was the responsible to develop the political strategy of the presidency; Carlos spend hours to think about possible conspiracy to affect his father and in ways to answer to then (Braga, 2020 p. 139). To Bolsonaro, the social restrictions were ideas to stop the economic development in the country, which would difficult his possibilities to be reelected in the next election in 2022.

The election of 2022 was the greatest fear of Bolsonaro. The president never led the country with the WHO recommendations. Instead, he promoted Cloroquine and Hydroxychloroquine, two drugs with no evidence of clinical benefits, as a treatment to COVID-19 (Molina et al., 2020, Mehra; Desai; Ruschitzka; & Patel, 2020). Bolsonaro pressed Luiz Henrique Mandetta and Nelson Teich, his first and second ministers of Health, to accept methods without scientific evidence, like the treatment with Cloroquine and Hydroxychloroquine; both ministers are physicians and decided to quit their governmental positions. At that time, the country was facing the socials restrictions, and, according to Mandetta, Bolsonaro believed that the population would go back to work if they had a Cloroquine box in their hands (Mandetta, 2020 p. 145), which would reduce the damages of a probable economic crisis. In April 2, the federal government announced a financial aid to support the most vulnerable part of Brazil's population. At the beginning, Bolsonaro's idea was a monthly support of R$ 200 (US$ 50 at that time); after pressure of the Congress, he decided to improve the payment. The financial support initially was a payment of R$ 600 (around US$120 at that time), which had been reduced to R$ 300 (around US$ 60 at that time). The financial aid was predicted to over in the end of December.

ECONOMICAL CONTEXT IN BRAZIL
The financial aid was an important initiative from the government to support the poorest during the COVID-19 outbreak, and to reduce the social and the economic impacts of the pandemic. Brazil was very social affected by the virus. Before the first confirmed case in February 26, 2020, the unemployment rate was 11.6%; in the end of September, the unemployment rate rose to 14.6% (IBGE, 2020), which represents more than 14 million people.

Although the financial aid had helped people, it had impacts to the public financials. In February, before the first confirmed COVID-19 case, the internal debt represented 65.17% of the Brazilian GPD; in October, affected by the extras expenses and costs, including the financial aid, the rate rose to 77.33% of the Brazilian GPD (IPEA, 2020).

The pressure on the Brazilian's economic and social indicators made the investors run away from the country to the security of a more solid economy, like USA; these movement put a lot of pressure to emerging markets (Stubbs et al., 2021), and Brazil was one of them. In December 31, the day of the first confirmed and reported case of COVID-19, the exchange rate in Brazil was US$ 1.00 to R$ 4.03; in February 26, 2020, the exchange rate in Brazil rose to US$ 1.00 to R$ 4.45; and in December 13, 2020, the rate was US$ 1.00 to R$ 5.10, but the rate reached R$ 5.86 in March (BACENa, 2020).

The currency oscillation impacted the Bovespa Index (Ibovespa), the major Brazilian's benchmark index. In December 31, 2019, the index had around 115,000 points, the highest high in three years; in February 26, 2020, the index had around 105,000; and in December 13, 2020, the index had around the same 115,000 points that it had in the day of the first reported COVID-19 case,

however the index reached around 63,000 points in March 23, 2020, in a direct consequences by the COVID-19 outbreak (Investing, 2020).

Another economic indicator of interest is the basic interest rate, as known as Selic in Brazil. In December 31, 2019, Selic was in 4.4%; in February 26, 2020, it decreased to 4.15%; and it was 1.9% in December 15, 2020, the lowest level in the history (BACENb, 2020)

METHODOLOGY
The model, the procedure and the sources

In every time series analyses, the first step is verifying the series' integration. With that information, the next step is identifying if the series has a unit root or if it is stationary at level. One test to analyze the stationarity of a time series is the Dickey-Fuller, which was proposed by Fuller (1976), and was complemented by Dickey and Fuller (1979, 1981), which is known as Augmented Dickey–Fuller test (ADF). The ADF is high used in the literature to test the presence of a unit root, which constitutes a non-stationary situation (1).

$$\Delta Y_t = \alpha + \beta T + \delta Y_{t-1} + \sum_{i=1}^{n} \Delta Y_{t-i} + \varepsilon_t \qquad (1)$$

The Δ is the first difference operator ($\Delta Y_t = Y_t - Y_{t-1}$); the α is the term of intercept; T, is tendency; the $\delta(=\rho-1)$, is the test coefficient of the presence or absence of unit root; ΔY_{t-1}, is the dependent variable itself, differentiated and outdated, whose objective is to eliminate the possibility of the presence of autocorrelation of residues; ρ is the initial unit root test process, so that: $H_0: \rho - 1, H_1: |\rho| < 1$, under H_0, the process has a stochastic tendency; and ε_t the error structure, which is assumed to have zero mean, constant variance and absence of autocorrelation.

If a series is non-stationary, the stochastic trend can be eliminated through differentiation. For the cases of Vector Autoregressive Model (VAR), with non-stationary variables, it is possible that there are stationary linear combinations for integrated variables of the same order, that is, long-term equilibrium relationships that must be included in the model to avoid specification errors (Enders, 2014).

It is important to emphasize the significance of the characteristic roots of π^1 to know the number of cointegrate vectors. The test to verify the number of characteristic roots that are significantly different from zero is performed using the statistic λ_{traco}:

$$\lambda_{\text{traco}}(r) = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \qquad (2)$$

The variable T is the number of used observations on the adjustments; the $\hat{\lambda}$ are the estimated values of the characteristic roots obtained by estimating the matrix π. To check the number of lags required in the multi-equation model, the Schwarz Criterion (SC) are used. Therefore, the determination of the cointegration number serves as a basis to define whether the model to be estimated will be a VAR or Vector Error Correction Model (VEC). The VEC was selected for the present study, considering the number of cointegrations (Table 2).

Theoretically, the attested model can be defined as:

$$Ibov_t = f(Lvale_t, Lusd_t, Lbrent_t, Lpetro_t) \qquad (3)$$

Which:

Ibov = Ibovespa indicator points in period t;

$Ldiv_t$ = public debt (government spending proxy) t;

$Lselic_t$ = basic interest rate of economy t;

$Lexchange_t$ = Quotation of the USD / Real exchange rate at time t.

The analysis time was from January 2010 to September 2020, considering a series of data with monthly information. The data collected is based on IPEADATA and, for the estimation of the model, the data were transformed into logarithms.

The basic hypothesis is considered the importance of fiscal, monetary and exchange rate policies as inductors means for investment intentions to be propitious in situations of uncertainty in the economy. The study period from 2010 to 2020, incorporates several events that highlight the policies cited on the study to explain the behavior of the Ibovespa, such as the case of the fall in interest rates (Selic) accentuated since 2016 and the great appreciation of the dollar / dollar exchange rate to historic levels in 2020. In the case of government spending, historical data says that stimuli are carried out with greater intensity when the government adopts an expansive fiscal policy.

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1 The rank of π is equal to the number of cointegrating vectors. Assuming that $\pi = 0$, there are no linear combinations of {x_it} that are stationary and, therefore, variables are not cointegrated

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Thus, the hypotheses to be tested quantitatively are based on the following expected coefficients: a positive relation of the market indicator when there is the adoption of expansive fiscal policies and the inverse situation when there is the adoption of restrictive monetary policies, as well as, until the exchange rate appreciation, the study in question uses the Dollar / Real ratio.

RESULTS

A usual approach is the use of Autoregressive models in every study with macroeconomics data analysis, such as the VAR model in this research. Firstly, it is important to analyze stationarity when using time series data, this condition guarantees an adequate forecast of the proposed model.

In many cases, it is possible to verify that the economic series show a trend; in some cases, it is possible to verify structural breaks that cause them to have a unit root, which implies the need for correction and the use of series in first difference. In the case of the variables under study, the context was not different, since they all had a unit root.

Once the series integration was known, the next step was to perform the cointegration test to test the existence of a long-term relationship between the variables (Jhansen 1988, 1995), specifically the trace-test. That procedure was chosen due to the multivariate analysis of the time series and the possibility of verifying the existence of more than one cointegration vector.

On Table 1, the results of the Johansen cointegration test are showed. By the statistical trace, it is observed that for the null hypothesis that the number r of vectors less than or equal to two (2) is rejected in favor of the alternative hypothesis r equal to three (3). For instance, a VEC model must be estimated to considerate aspects of short and long therm.

Table 1 - Maximal eigenvalue trace test for cointegration between model variables.

Null hypothesis H_O	Alternative hypothesis H_A	λ Trace	Critical values 5%
R ≤ 3	r = 4	7.7112	12.25
R ≤ 2	r = 3	18.1899*	25.32
R ≤ 1	r = 2	46.2366	42.44
R ≤ 0	r = 1	87.5594	62.99

* Significant at 5% probability - critical values in (Osterwald & Lenum, 1992).
Source: Research results

On Table 2, the estimated results are verified VEC cointegration parameters. The coefficients denote the speed of short-term adjustment of the variables towards long-term equilibrium. If there is an imbalance in the short term, a high value for each coefficient indicates that the adjustment speed will be fast towards the long term equilibrium; otherwise a small value will indicate that the speed will be low and, consequently, the adjustment of a short-term imbalance to long-term equilibrium will tend to be corrected slowly.

By the analyze of the results, it is possible to observe that due an increase in government spending (fiscal policy) and the exchange rate, the variation in Ibovespa is in the positive direction. That is, the effect of these variables indicates that an increase of 1% in LDIV and LEXCHANGE would cause a positive effect and, therefore, of appreciation in the indicator by 1.22% and 0.33%, respectively. Conversely, an increase of 1% in the LSELIC quotation would have a negative effect and therefore would devalue the indicator's score.

At this point, the coefficient of the positive and significant LEXCHANGE indicator draws attention; whenever it is expected that increases in the exchange rate would cause a decrease in the Ibovespa indicator. In this context, the common rule does not apply, that is, the Ibovespa does not go in the opposite direction to an appreciation of the exchange rate.

Table 2 – VEC, cointegration parameters

Variable	Coefficient	Standard Error	P-value
LDIV	1.2198	0.5275	0.021
LSELIC	-0.0993	0.1156	0.157
LEXCHANGE	0.3258	0.08201	0.000

Source: Research results

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According to the Table 3, the Johansen normalized restriction, a 1% increase in government spending would cause a 0.09% increase in the Ibovespa indicator in the long run, which shows that there is a significant positive effect, which reinforces the importance of this policy as a means of inducing investment intentions. A similar effect was observed through the LEXCHANGE variable, which the effect of an exchange rate appreciation positively affects the Ibovespa indicator score. Although it is not a standard[2], an inverse relationship between the exchange rate and the Ibovespa was expected in both the short-term and long-term analysis. It is understood that the appreciation of the exchange rate indicates the scarcity of the dollar, denoting the lower volume of foreign investment.

On the same hand, a notorious fact can be verified in the year 2020; the Ibovespa indicator had a great devaluation and consequently the investment was affected with the COIVD-19 outbreak. In addition to other factors, this behavior caused the loss of purchasing power of the local currency (Brazilian Real), which caused an increase in the exchange rate.

However, at the end of 2020, fiscal stimulus in the USA, as well as the distribution of vaccines against COVID-19 are one of the main reasons for the decrease in the exchange rate.

Table 3 - Johansen standardization restriction.

Variable	Coefficient	Standard Error	P-value
LIBOV	1	-	-
LDIV	0.0882	0.3808	0.092
LSELIC	-0.0501	0.0792	0.417
LEXCHANGE	0.2171	0.0424	0.000

Source: Research results

On the other hand, the successive drop in the interest rate to historic[3] minimum levels make investment in fixed income securities less attractive. However, the increase in consumption and the production of companies are the expected effect of a low interest rate, which makes investment in equity more attractive. In addition to benefiting consumption and production, corporate debts benefit from lower interest rates.

Thus, the negative value of the LSELIC coefficient supports the discussion in the previous paragraph. The increase in the interest rate results in a drop in the indicator's score. In the case in question, an increase of 1% would cause a reduction of 0.05%.

Figure 1 - Impulse response function between the Ibovespa and the model variables.

Response to Cholesky One S.D. Innovations

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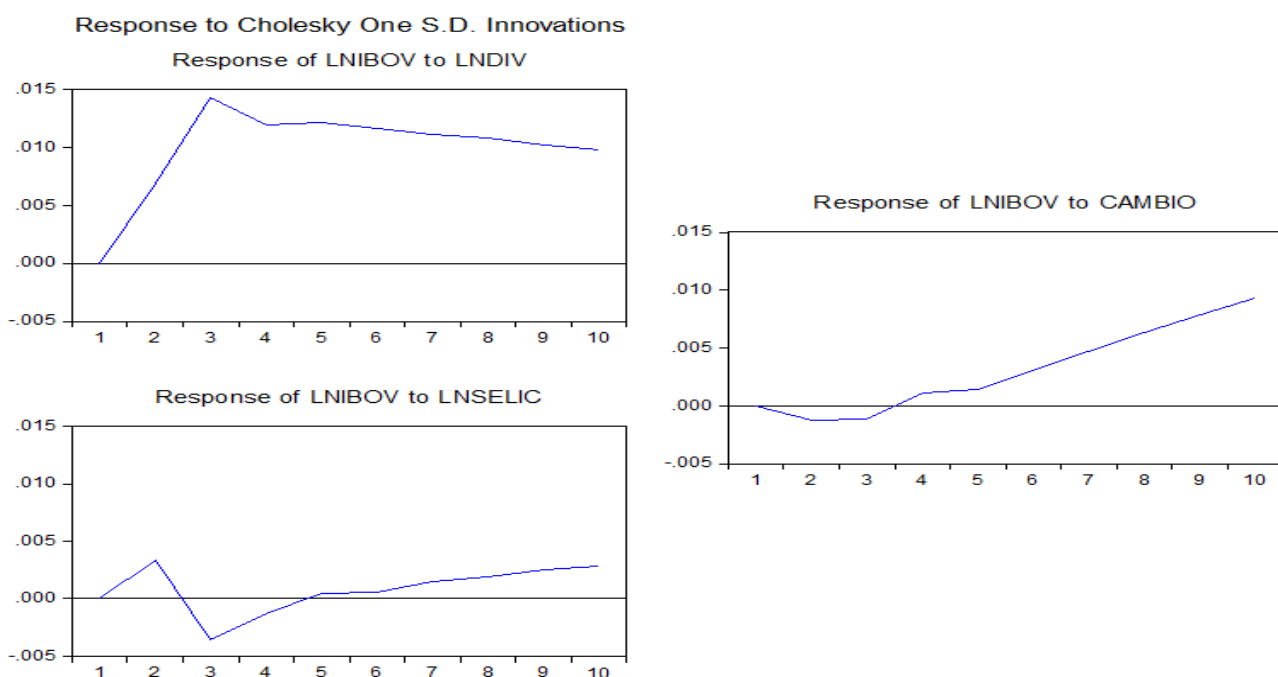
[2] The inflow of foreign capital can also be directed towards the purchase of debt securities or in the industry, in this case, the capital flow is not directed to the Ibovespa.
[3] The interest rate series (Selic) has been reduced since the end of 2016 (BACEN, 2020).

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Finally, the VAR allows to obtain the response functions given an impulse (shock) in certain variables; such functions are important to analyze the evolution of the system variables in the face of unanticipated shocks. Thus, this section seeks to identify the effects of unanticipated shocks on the system variables for k = 10 months ahead, on the Ibovespa indicator.

On Figure 1, are verified the accumulated responses of Ibovespa to an unanticipated shock of 1% in the independent variables. Most relevant responses are observed when the cause is government spending and the exchange rate. Thus, unanticipated shocks in government spending and the exchange rate would induce a rapid appreciation of the indicator.

The result highlights the relevance of expansive fiscal policy as a positive driver for investment intentions in the financial market. Although this behavior is not easy to understand, an example that can support this result is the indirect purchase of government bonds through the Central Bank. Given that the purchase of securities is financed by increasing the money supply and borrowed through the banking system, a large part of that capital will end up going to the stock exchange.

CONCLUSION

The proposed study aimed to analyze the importance of the fiscal, monetary and foreign exchange policies adopted by the Brazilian government and its effect on the stock exchange, which gained importance in the academic debate when considering the global crisis caused by the COVID-19.

From a theoretical point of view, it is understood that the stock market indicator has a close relationship with fiscal, monetary and exchange rate policy. The Brazilian exchange rate policy adopted since 1999 is that of "floating exchange rate", although, given situations of great devaluation of the local currency in the short term, the Central Bank adopts measures through foreign exchange swap operations to try to mitigate the volatility of the currency price foreign. It is important to highlight that the devaluation / appreciation of the foreign currency causes changes in the companies' revenues and, consequently, this effect is passed on in the stock prices, depending on the sector of operation, some will benefit to the detriment of others.

In addition to foreign currency, the study in question includes the basic interest rate of the economy (Selic) and the government debt (proxy for government spending). The result of the coefficient of these variables supports the hypotheses described in the methodology, with the indicator moving in the same direction when it is influenced by the increase in government spending and, conversely, when there is an increase in the interest rate.

Also, the study incorporates the forecast of the behavior / direction of the Ibovespa indicator in the short term given a shock (through the impulse response function) of each of the explanatory variables. Considering and the Brazilian experience regarding the Dollar exchange rate, with increasing rates in recent years, a statistically significant and positive long-term relationship was found to be a possible predictor of Ibovespa's behavior.

From a theoretical point of view, an inverse relationship with the Ibovespa Indicator was expected, going in the opposite direction to the exchange rate increase. In many cases, the loss of purchasing power of the local currency can be explained by recessionary scenarios, such as the COVID-19 pandemic, which had a strong effect on economic performance and on the market indicator. On the side of government spending, the result maintains that the expansive fiscal policy has a short-term influence on the market indicator, being a possible inducer for the investment flow to become.

Finally, through this study we tried to explain and contribute to the debate around the importance of the policies in question and the importance of these as tools for adoption in uncertainty so that investment opportunities are propitious. It is understood that policies such as the "exchange rate" should be treated with caution in crisis situations, since a stable currency brings greater confidence to investors, something that in the short term becomes difficult, especially in developing countries. In the case of fiscal policy, although this policy is not sustainable in the long term, short-term fiscal stimuli are seen as easing in uncertain situations, something seen in the Brazilian scenario in several economic cycles.

On the monetary policy side, although the fall in interest rates encourages the appreciation of the stock market indicator, a variable of interest to be discussed is the credit limit. Given the creation of money by the Central Bank, loans are enhanced by low interest rates, instigating the stimulus of the stock exchange when this money is injected into the market.

REFERENCES

1) Akhtaruzzaman, M., Boubaker, S., & Sensoy, A. (2020). Financial contagion during COVID–19 crisis. Finance Research Letters, 101604. Advance online publication.

2) Ataguba, O.A., & Ataguba, J.E. 2020. Social determinants of health: the role of effective communication in the COVID-19 pandemic in developing countries. Global Health Action. 13(1), Article number 1788263

3) Braga, U. (2020). War on Health: How the Plan alto Palace transformed the Ministry of Health into a public enemy in the midst of the greatest pandemic of the 21st century. São Paulo: LeYa.

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4) Brazilian Central Bank (BACEN)A. (2020). Quotes and newsletters. Retrieved December 17, 2020, from https://www.bcb.gov.br/estabilidadefinanceira/historicocotacoes

5) Brazilian Central Bank B. (2020). Daily Diaries. Retrieved December 17, 2020, from https://www.bcb.gov.br/estabilidadefinanceira/selicdadosdiarios

6) Briceño, H. R., & Perote, J. (2020). Determinants of the public debt in the eurozone and its sustainability amid the COVID-19 pandemic. Sustainability (Switzerland), 12(16), Article number 6456.

7) Debelle, G. (2020). The reserve bank of Australia's policy actions and balance sheet. Economic Analysis and Policy, 68, 285-295.

8) Dickey, D.A., & Fuller, W.A. (1979). Distribution of the estimator for auto-regressive time series with a unit root. Journal of the American Statistical Association, 74, 427-431.

9) Dickey, D.A., & Fuller, W.A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. Econometrics, 49(4), 1057-1072.

10) Enders, W. (2014). Applied Econometric Time Series. Wiley, 4th Edition.

11) Gebhardt, H., & Siemers, L. (2020). The german public finances in the COVID-19 pandemic. Wirtschaftsdienst, 100(7), 501-506.

12) Heald, D., & Hodges, R. (2020). The accounting, budgeting and fiscal impact of COVID-19 on the United Kingdom. Journal of Public Budgeting, Accounting and Financial Management, 32(5), 785-795.

13) Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., Cao, B. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, china. The Lancet, 395(10223), 497-506.

14) IBGE - Brazilian Institute of Geography and Statistic. (2020). Continuous National Household Sample Survey. Retrieved December 17, 2020, from https://www.ibge.gov.br/estatisticas/sociais/trabalho/9171-pesquisa-nacional-por-amostra-de-domicilios-continua-mensal.html?edicao=29513&t=destaques

15) Investing. (2020). Ibo Vespa (BVSP). Retrieved December 17, 2020, from https://br.investing.com/indices/bovespa-chart

16) IPEA - Instituto de Pesquisa Econômica Aplicada. (2020). IPEADATA. Retrieved December 17, 2020, from http://www.ipeadata.gov.br/Default.aspx

17) Johansen, S. (1988). Statistical analysis of counteraction vectors. Journal of Economics Dynamics and Control, 12, 231-254.

18) Johansen, S. (1995). Likelihood-base inference in co integrated vector auto-regressive models. Oxford: Oxford University Press.

19) Knoema. (2020). World pandemic uncertainty index. Retrieved December 17, 2020 from https://knoema.com/WPAUIN2020/world-pandemic-uncertainty-index.

20) Lawley, C. (2020). Potential impacts of COVID-19 on Canadian farmland markets. Canadian Journal of Agricultural Economics, 68(2), 245-250.

21) Mandetta, L. H. (2020). A patient named Brazil: Behind the scenes of the fight against the coronavirus. Rio de Janeiro: Objetiva.

22) Mehra, M. R., Desai, S. S., Ruschitzka, F., & Patel, A. N. (2020). RETRACTED: Hydroxychloroquine or chloroquine with or without a macrolide for treatment of COVID-19: A multinational registry analysis. The Lancet, doi:10.1016/S0140-6736(20)31180-6

23) Molina, J. M., Delaugerre, C., Le Goff, J., Mela-Lima, B., Ponscarme, D., Goldwirt, L., & de Castro, N. (2020). No evidence of rapid antiviral clearance or clinical benefit with the combination of hydroxychloroquine and azithromycin in patients with severe COVID-19 infection. Medecine ET Maladies Infectiousness, 50(4), 384.

24) Sarkodie, S. A., & Owusu, P. A. (2020). Global assessment of environment, health and economic impact of the novel coronavirus (COVID-19. Environment, Development and Sustainability, 1–11. Advance online publication.

25) Stubbs, T., Kring, W., Laskaridis, C., Kentikelenis, A., & Gallagher, K. (2021). Whatever it takes? The global financial safety net, COVID-19, and developing countries. World Development, 137, Article number 105171. Advance online publication.

26) The Lancet. (2020). COVID-19 in Brazil: "So what?". The Lancet, 395(10235), 1461.

27) World Health Organization. (2020). Novel Coronavirus (2019-nCoV)—Situation Report—1. SITUATION REPORT—1. Retrieved December 17, 2020, from https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf?sfvrsn=20a99c10_4.

28) Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. Finance Research Letters, 36, 101528.