

**FUNDAÇÃO GETULIO VARGAS**  
**ESCOLA DE ADMINISTRAÇÃO DE EMPRESAS DE SÃO PAULO**

**BRUNO ANDRADE SCHIAVO**

**COVID-19 IN THE BRAZILIAN STOCK MARKET**

**São Paulo**

**2021**

**BRUNO ANDRADE SCHIAVO**

**COVID-19 IN THE BRAZILIAN STOCK MARKET**

Thesis presented to Escola de Administração de Empresas de São Paulo of Fundação Getulio Vargas, as a requirement to obtain the title of Master in International Management (MPGI).

Knowledge Field: International Economics and Finance

Advisor: Prof. Dr. Claudia Emiko Yoshinaga

SÃO PAULO

2021

Schiavo, Bruno Andrade.

Covid-19 in the Brazilian stock market / Bruno Andrade Schiavo. - 2021.  
32 f.

Orientador: Claudia Emiko Yoshinaga.

Dissertação (mestrado profissional MPGI) – Fundação Getulio Vargas,  
Escola de Administração de Empresas de São Paulo.

1. Mercado financeiro. 2. Ações (Finanças) - Brasil. 3. COVID-19 (Doença). I.  
Yoshinaga, Claudia Emiko. II. Dissertação (mestrado profissional MPGI) – Escola  
de Administração de Empresas de São Paulo. III. Fundação Getulio Vargas. IV.  
Título.

CDU 336.76(81)

BRUNO ANDRADE SCHIAVO

**COVID-19 IN THE BRAZILIAN STOCK MARKET**

Thesis presented to Escola de Administração de Empresas de São Paulo of Fundação Getulio Vargas, as a requirement to obtain the title of Master in International Management (MPGI).

Knowledge Field: International Economics and Finance

Approval Date 15 / 03 / 2021

Committee members:

---

Prof. Dr. Claudia Emiko Yoshinaga  
FGV-EAESP

---

Prof. Dr. Rafael Felipe Schiozer  
FGV-EAESP

---

Prof. Dr. Rodrigo Takashi Okimura  
Insper

## **Acknowledgements**

This work is dedicated for all those sworn to Apollo Physician and Asclepius and Hygeia and Panacea and all the gods and goddesses, who, this and last year, marched against death, many to be ferried away.

## **Abstract**

As Covid-19 ravages through, several researchers have attempted to describe its impact in the share price of listed companies. I investigate the Brazilian stock market through a regression analysis of how three firm characteristics (foreign revenues, cash holdings and leverage) impact share returns across three events of the pandemic in the country. As a result, I show that after the first case of Covid-19 was detected in Brazil, both foreign revenues and leverage had a negative impact on stocks – an increase of one percentage point in foreign revenues is associated with 0.09 decrease in stock returns; an increase of 1 unit of leverage is associated with 13.12 decrease in stocks returns. This negative impact of leverage lingered even after confirmation of community transmission of the virus - an increase of 1 unit of leverage is associated with 17.39 decrease in stocks returns. Interestingly, however, cash holdings did not affect stock returns during the pandemic.

Keywords: Market Reaction, COVID-19, Brazil

## Resumo

Enquanto a pandemia de Covid-19 segue seu curso, diversos pesquisadores tentaram descrever o impacto da doença no preço da ação de companhias listadas. Eu investigo o mercado de ações brasileiro por meio de uma análise de regressão do impacto de três características de firma (receitas estrangeiras, quantidade de caixa e alavancagem) nos retornos de ações em três períodos da pandemia no país. Como resultado, eu demonstro que, após a detecção do primeiro caso de Covid-19 no Brasil, ambas as variáveis de receitas estrangeiras e alavancagem tiveram um impacto negativo em ações – um aumento de um ponto percentual em receitas estrangeiras foi associado com uma redução de 0,09 em retornos de ações; um aumento de um ponto percentual em alavancagem foi associado com redução de 13,12 em retornos de ações. Este impacto negativo de alavancagem perdurou mesmo depois da confirmação da transmissão comunitária do vírus: um aumento de uma unidade de alavancagem foi associado com uma redução de 17,39 de retornos de ações. Interessantemente, contudo, quantidade de caixa não afetou retornos de ação na pandemia.

Palavras-chave: Reação de Mercado, COVID-19, Brasil

## SUMMARY

1. Introduction.....	9
2. Literature Review .....	10
3. Methodology.....	14
3.1 Event definition.....	14
3.2 Sample and source .....	15
3.3. Regression model.....	15
3.4 Regression variables .....	15
3.4.1 Regressors: firm characteristics .....	15
3.4.2 Regressors: control variables .....	16
4. Results.....	19
4.1 Event validation .....	19
4.2 Regression analysis.....	21
5. Discussion.....	28
References.....	29
Appendix.....	32

## 1. Introduction

If something could define 2020, that would be the virus that emerged in the year before. The reaction in the capital markets was profound, with US stock prices falling as much in 30 days as they did in one year during the financial crisis of 2007–2009. First, the burden of social distancing reduced demand for services and supply of labor. Also, barriers to the circulation of people restricted allocations of human capital. In this scenario, firm profits plunged, while (undiversifiable) risk hiked (Investment Company Institute, 2020).

Nevertheless, while the pandemic entailed a macroeconomic crisis, not all firms have been impacted in the same way. This idea has been discussed in the literature by studies on the influence of firm characteristics on the stock market's response to COVID 19, which described the role played by international trade, cash holdings and corporate debt on market reaction (Ding et al., 2020; Fahlenbrach, Rageth & Stulz, 2020; Mazumder, 2020; Rahman, Amin & Al Mamun, 2021; Ramelli & Wagner, 2020; Xiong et al., 2020)

Still, while the evidence of these studies is robust, they have either employed North American or global samples. For Latin America and emerging markets, one may ask whether these results are the same. In this context, the goal of this research is to study the impact of Covid-19 on stock prices according to firm characteristics in Brazilian listed firms.

I examine the stock price reaction of a sample of 160 Brazilian listed companies in three events, namely, (1) Anticipation (January 1<sup>st</sup> to February 25<sup>th</sup>) - from the onset of the pandemic in the world to the first case in Brazil; (2) Incubation (February 26<sup>th</sup> to March 12<sup>th</sup>) - from the first case in Brazil to the confirmation of community transmission<sup>1</sup> in the country; and (3) Fever (March 13<sup>th</sup> to March 23<sup>rd</sup>), - from the confirmation of community transmission in Brazil to the monetary stimulus from the Brazilian Central Bank. In sequence, I investigate the relation between the following firm characteristics and stock price reaction. Similarly, to the study of Ramelli and Wagner (2020), this set of characteristics comprises three elements: Foreign revenues, cash holdings and leverage. Foreign revenues reveal the impact of global trade in the

---

<sup>1</sup> Community transmission of Covid-19 is evidenced by the inability to relate confirmed cases through chains of transmission for a large number of cases, or by increasing positive tests through sentinel samples (routine systematic testing of respiratory samples from established laboratories).

firm's revenues. Cash holdings and leverage, on the other hand, measure the importance of financial health in macroeconomic crises.

For each of the events defined in this study, one could argue that Covid-19 does not substantially explain abnormal stock returns. For this reason, I examine such events considering Google Trends data, industry notifications and return data itself.

As a result, I found statistically significant effects in Incubation and Fever events. In the analysis of firm vulnerabilities, I showed that foreign revenues and leverage influenced stock returns in these periods. Firms with mainly domestic revenue streams and low levels of leverage performed better in the sample.

This paper, thus, provides insights of the unfolding of Covid-19 in the Brazilian stock market. From my research, I offer three main contributions to investors: i) the understanding of the impact of news about the pandemic on stock prices; ii) the understanding of how local trade and leverage aggravate or attenuate this impact; iii) the understanding of the periods in which this impact was more severe. The research is divided in four sections. The first presents the current literature on stock return vulnerabilities to Covid-19. The second defines the events, examines them, and describes the methodological procedures of the regression analysis. The third presents the model output. I conclude the study in the fourth section, outlining the research's contributions and limitations, and suggesting future research lines.

## **2. Literature Review**

I search the literature on stock price reactions to Covid-19 in Scopus using the following keywords: "market reaction" and "covid". I found 25 articles, which narrowed down to 19 when I limited the search 1) to the subjects "Economics, Econometrics and Finance" and "Business, Management and Accounting", and 2) to published articles.

I classified studies pertaining to this set in two groups: 1) articles about the general impact of Covid-19 on the stock markets (Al-Qudah & Houcine, 2021; Alam, Alam & Chavali, 2020; Ambros et al., 2020; Ashraf, 2020a; Ashraf, 2020b; Baker et al., 2020; Goodell & Huynh, 2020; Harjoto, et al., 2020; Harjoto, Rossi & Paglia, 2020; Heyden & Heyden 2021; Khanthavit, 2020; Machmuddah et al., 2020; Shen & Zhang, 2020) and 2) articles about firm characteristics

as mediators of the Covid-19 impact on stock returns (Mazumder, 2020; Rahman, Amin & Al Mamun, 2021; Ramelli & Wagner, 2020; Xiong et al., 2020). The focus of this literature review is on this second subset of articles, as they are similar to the work I conduct on this study. These articles are summarized in Table 1.

From this group of studies, a central article is Ramelli and Wagner (2020)'s analysis of cross-sectional stock price responses to Covid-19 in the U.S. market. The authors explained stock returns with variables of (1) international trade and (2) financial strength. As measures of international trade, the following variables were chosen: foreign revenues and China (#), a measure of trade with China. For financial strength, the authors employed cash holdings and leverage.

Ramelli and Wagner's regressands were stock prices from three events: Incubation (January 2 through January 20), Outbreak (January 20 through February 23) and Fever (February 24 through March 23). The study found significance for all variables, albeit at different periods. Variables related to international trade had initial negative effects in Outbreak, reflecting the peak of the pandemic in China. When China's economy recovered, in Fever, the variable China (#) changed sign. Cash holdings and leverage, on the other hand, had, respectively, positive, and negative coefficients on Fever, matching the worsening of the crisis in the United States.

Other studies also employed the variables Cash Holdings and Leverage as measures of financial strength. First, Fahlenbrach et al (2020), found significance for both variables in a regression of U.S. stock returns in the Covid-19 collapse period of February 2 to March 23, 2020. Likewise, Ding et al (2020) found evidence for these variables in international samples, with their panel data study of 56 economies in the first quarter of 2020.

With respect to the rationale behind these three variables, foreign revenues capture the impact of global trade on a firm's performance: an exporter company is vulnerable to the macroeconomic conditions of their clients' countries (Ding et al., 2020). Cash holdings, on the other hand, shows the importance of financial sustainability during crises: the amount of cash held by a firm buffers against short-term financial constraints, particularly during the pandemic, when some firms face restrictions in production and sales. Finally, leverage measures the firm's odds of incurring in financial distress (Fahlenbrach et al., 2020; Ramelli & Wagner, 2020).

The evidence from these three studies, however, is not enough to assert foreign revenues, cash holdings and leverage influenced Brazilian firms in the pandemic. First, the impacts of foreign revenue depend on the origin of this revenue, and Brazil's trade partners are not the same as those of the US. Second, as explained by Fahlenbrach et al. (2020), the value of financial strength comes from frictions in financial markets, that is, the difficulty of firms to raise outside finance. These frictions are not necessarily the same in all countries: we cannot assume the Brazilian financial market is equally imperfect as that of United States.

Table 1

**Literature on cross-sectional Covid-19 returns**

<b>Authors</b>	<b>Location of firms</b>	<b>of Variables</b>	<b>Results</b>
<b>Mazumder (2020)</b>	US	Social trust	Significant (+)
<b>Rahman, Amin and Al Mamun (2021)</b>	Australia	Size	Significant (-)
		P/E	Significant (-)
		ROE	Significant (-)
<b>Ramelli and Wagner (2020)</b>	North America	Trade with China	Significant (-) (Earlier) Significant (+) (Later)
		Foreign Revenues	Significant (-)
		Cash Holdings	Significant (+)
		Leverage	Significant (-)
<b>Xiong et al. (2020)</b>	China	Vulnerable industry	Significant (-)
		Firm size	Significant (+)
		Return on assets	Significant (+)
		Growth opportunity	Significant (+)
		Operating capacity	Significant (-)
		Degree of combined leverage	Significant (+)
		Cash flow	Not significant
		Fixed assets	Significant (-)
		Big-4 external auditor	Significant (-)
Proportion of independent directors	Significant (-)		

Note: All articles employed the event study methodology

### 3. Methodology

In this section I describe the methodology of this study, namely, the definition of events, the definition of the sample, the data sources and regression variables.

#### 3.1 Event definition

For this event study, I adjusted Ramelli and Wagner's three event division (Incubation, Outbreak and Fever) to the timeline of Covid-19 on the Brazilian market. Thus, I initially consider three periods, which I label Anticipation (January 2 to February 25), Incubation (February 26 to March 12), and Fever (March 13 to March 23). January 2 is the first trading day after the virus was detected in China. While this shut down China, Brazil's major trade partner, Covid-19 was only detected in Brazil on February 26, with community transmission confirmed on March 13. I choose to end the Fever period on March 23 due to announced stimulus from the Brazilian Central Bank on that date, which is expected to have helped firms with low cash and high leverage.

Table 2

#### Events initially considered for this study

Period	Anticipation	Incubation	Fever	End of Series
Date	January 2	February 26 <sup>th</sup>	March 13 <sup>th</sup>	March 23 <sup>rd</sup>
Event	Pandemic onset in the world	Confirmation of first case in Brazil	Confirmation of community transmission in Brazil	Intervention from the Brazilian Central Bank

Note: This table shows the three events defined for Covid-19: Anticipation, Incubation and Fever. The series ends with monetary stimulus from the Central Bank, which can be expected to help firms with financial problems.

Defining events in 2020, however, is not enough to assert Covid-19 influence on stock prices: one could argue that Covid-19 does not substantially explain abnormal stock returns, as the reaction could also be attributed to factors unrelated to the pandemic. Thus, I investigate Covid-19 influence on stock returns on each event with three kinds of data: (1) Google Trends, (2) Firm Notification to Investors and (3) Stock Returns.

Considering evidence from these three sources, I evaluate the event Incubation and Fever to have had Covid-19 influence on stock returns. I, thus, study only these two periods (and not Anticipation) in my regression analysis, which I detail in the next section.

### 3.2 Sample and source

As a sample, I take the listed firms in São Paulo's stock exchange - B3. Then, I remove firms with missing values in any variables (both regressors and regressands), and firms from the RBICS industrial sector "Finance" (as leverage is a variable of interest in this study). My sample, thus, remained with 160 companies. With respect to data on firm characteristics, these were obtained from the database of FactSet.

### 3.3. Regression model

As explained, I run two regression models, one for Incubation and one for Fever. As a fitting criterion, I use Ordinary Least Squares with HC3 standard errors estimator, to provide robustness to heteroskedasticity (Greene, 2018; Hayes & Cai, 2007). The regression equation is:

$$\text{Returns} = \beta_0 + \beta_1 \cdot \text{Foreign Revenues} + \beta_2 \cdot \text{Cash Holding} + \beta_3 \cdot \text{Leverage} + \beta_4 \cdot \text{CAPMBeta} + \sum_{i=5}^3 \beta_n \text{ Standard Controls} + \sum_{i=8}^{12} \beta_n \text{ RBICS}$$

### 3.4 Regression variables

In each of the regression models, the independent variable is the corresponding event's cumulative returns in the event. That is, for Incubation, I use stock returns from February 26 to March 12, and, for Fever, stock returns from March 13 to March 23.

#### 3.4.1 Regressors: firm characteristics

*Foreign Revenues* measures how much (%) of the firm's revenues came from overseas in 2019. As found by Ding et al (2020), international firms' returns are influenced by the impact

of the pandemic in their clients' countries, which may lead them to perform better or worse than firms with only local sales. In one hand, an exporting company may be protected against decrease in local demand due to geographic diversification of its revenues. On the other hand, it is exposed to the macroeconomic conditions in clients' countries.

*Cash Holdings* is the firm's cash account divided by its assets (with both values from 2019). The amount of cash held by a firm is a buffer against short-term financial constraints. These constraints are expected to be tightened by the macroeconomic crisis of Covid-19 by (1) decreasing firm revenues and (2) by increasing firm costs. Thus, companies with more cash holdings are expected to have performed better in the pandemic (Fahlenbrach et al., 2020; Ramelli & Wagner, 2020).

*Leverage* is the total firm debt divided by its assets (with both values from 2019). The more debt a firm has, the greater the odds it will incur in financial distress: costly legal processes with its debtholders (Brealey et al, 2020). Thus, with the decreasing free cash flows from the Covid-19 macroeconomic crisis, firms with less leverage are expected to have performed better.

To avoid endogeneity problems, I calculated cash holdings and leverage with accounting variables (Cash, assets and total debt) from 2019. This ensures these variables would not be influenced by 2020 firm returns, which would violate the Gauss-Markov Theorem.

### ***3.4.2 Regressors: control variables***

I include three sets of controls, (1) Beta, (2) standard control variables and (3) RBICS fixed effects, similarly to those employed by Ramelli and Wagner (2020) in their study of the North American Market.

*Beta* is the angular coefficient of the Capital Asset Pricing Model (Bodie et al, 2015). It represents the amount of undiversifiable risk in a firm's returns. With the assumption that investors are risk-averse, firms with a higher Beta are required to yield higher returns by the market. Beta has been obtained from FactSet as a regression of three years of daily excess returns (January 24, 2018 to January 24, 2021) on a constant and a daily market factor.

*Standard control variables* are Book-to-market, Log market value and Profitability. Book-to-market is the book value of equity divided by market valuation. Log market value is

the logarithm of the equity market value. Profitability is the return on assets computed as the yearly income before extraordinary items over total assets. All variables date from 2019.

*FactSet Revere Business Industry Standard* (RBICS) is a six-tiered, hierarchical industry classification system by FactSet. Herein, I use the system's first tier (Economies), which is comprised by the following sectors: Finance; Non-Energy Materials, Industrials, Technology, Consumer non-cyclicals, Healthcare, Consumer cyclicals, Energy, Consumer services, Business services, Utilities and Telecommunications. To avoid the dummy variable trap (rank deficiency of the regressor matrix) while employing RBICS variables, I exclude "Telecommunications" from the set of regressors.

Table 3

**Variables of the Research**

<b>Variable</b>	<b>Definition</b>	<b>Data source</b>
<b>Dependent variables</b>		
Incubation Returns	Stock returns from January 2nd to February 25 <sup>th</sup>	FactSet
Fever Returns	Stock returns from February 26th to March 13 <sup>th</sup>	FactSet
<b>Independent variables</b>		
Foreign Revenue (%)	Revenues from outside Brazil/Total revenues	FactSet
Cash Holdings	Cash/Assets	FactSet
Leverage	Total debt/Assets	FactSet
<b>Control variables</b>		
Book-to-Market	Book value of equity/Market value of equity	FactSet
Profitability	Income before extraordinary items/Assets	FactSet
Log Market Value	Natural logarithm of the market value of equity	FactSet
RBICS dummies	FacSet Revere Business Industry Classifications System (RBICS) dummies	FactSet

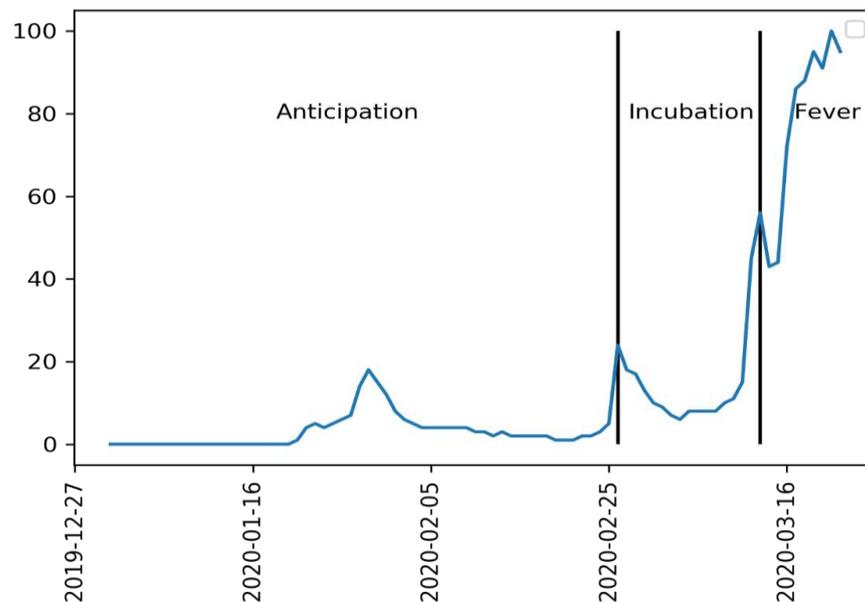
## 4. Results

### 4.1 Event validation

Google Trends data may be used to measure the interest of retail investors in the topic (Da, Engelberg & Gao, 2015). For Brazil, Google searches for the “term” coronavirus waxed and waned in small amounts in Anticipation and Incubation. In Fever, however, searches upsurged. This indicates investor attention after confirmation of community transmission was high.

Graph 1

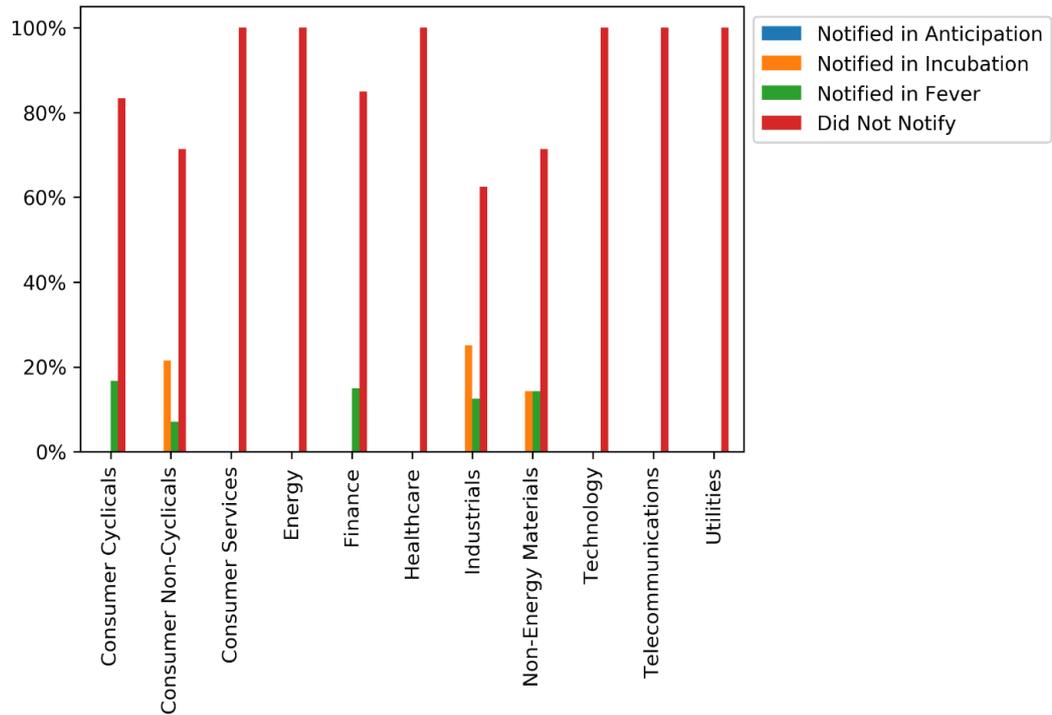
#### Google search volume in Covid-19 events



This chart shows Google Trends search value index for the term “coronavirus” in Brazil in Anticipation, Incubation and Fever. The index varies from 0 to 100 and represents search index relative to the highest point in the period.

The impact of the virus on firms can be further appraised in firm notifications to investors in relevant fact reports (called “fato relevante” in Portuguese). In these documents, I investigate the periods in which Ibovespa firms first mentioned the term “coronavirus”. As clear from the graph, notably, no firm discussed Coronavirus in Anticipation. For Incubation and Fever, however, a small number of firms reported Covid-19 for the first time in the sectors of Consumer cyclicals, Consumer non-cyclicals, Finance, Industrials and Non-energy materials.

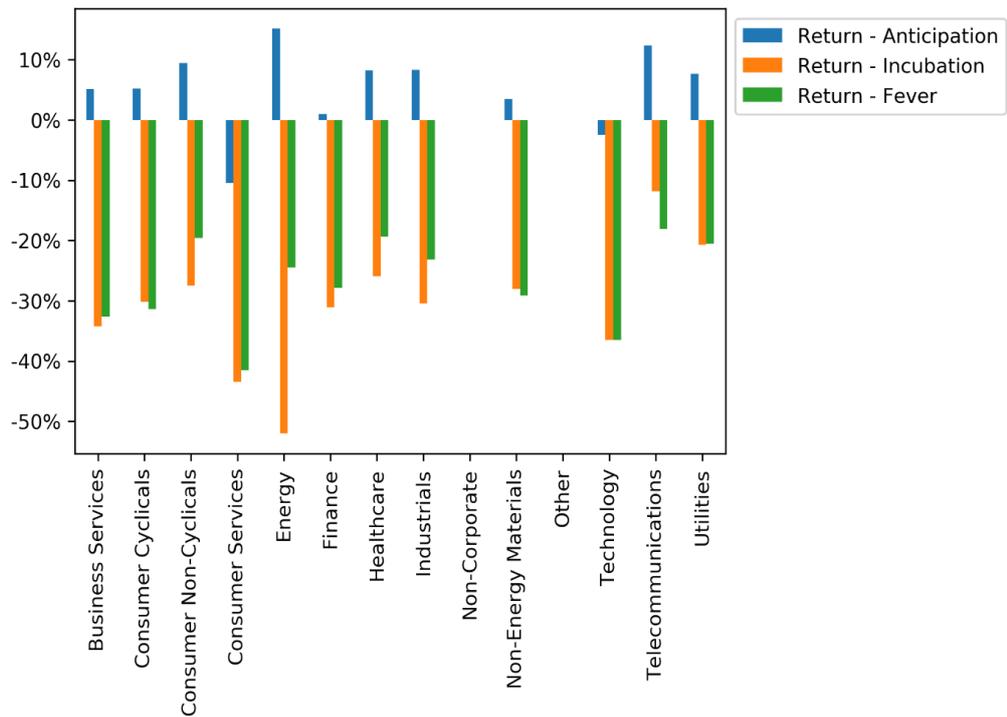
Graph 2

**Industry sector Covid-19 notification by event**

This chart shows the percentage of firms of each sector that first mentioned the term “coronavirus” in relevant fact reports in each event: Anticipation, Incubation and Fever.

Finally, no analysis of the impact of Covid-19 in stock returns can be conducted without examining price data itself. For such analysis, I collect stock returns for Ibovespa firms for each period. As clear from the graph, no abnormal returns were seen in Anticipation, with positive results for most industrial sectors despite the macroeconomic crisis in Brazil’s major trade partners: US and China. For Incubation and Fever, however, Covid-19 effects were unambiguous, with returns as low as -52% in Incubation (Energy sector) and as low as -41% in Fever (Consumer Services sector).

Graph 3

**Industry sector aggregate stock returns by event**

This chart shows the cumulative aggregate stock returns for each RBICS industrial sector in each event: Anticipation, Incubation and Fever

#### 4.2 Regression analysis

In the last sub-section, we examined all three events for evidence of Covid-19 effects on stock prices. In Incubation and Fever, evidence was found in Google Trends, firm notification, stock price data. For Anticipation, however, I found no evidence whatsoever.

Thus, in the regressions of this study, thus, I examine only the events of Incubation and Fever. In the next section, I describe the premises of these regression models.

Tabela 3

**Regression Output**

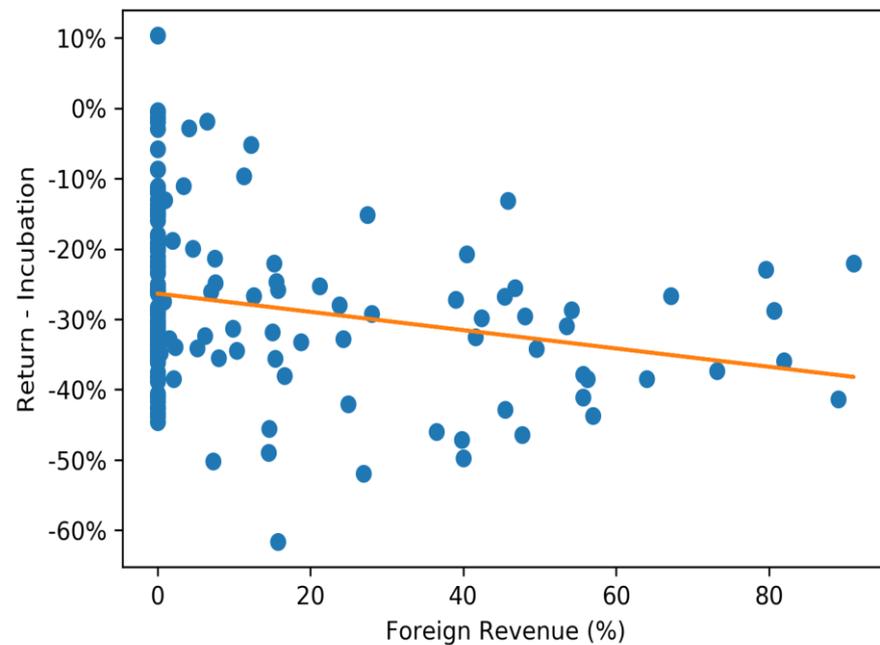
	Models	
	Incubation	Fever
Constant	-28,751**	-26,766**
Foreign Revenues (%)	-0.091**	0,052
Cash/Assets	-4,969	18,254
Leverage	-13.126**	-17.398**
Beta	-0,417	0,724
Book-to-Market	0,78	-3,097
Profitability	41.6*	1,34
Log Market Value	-0,743	0,639
Business Services	-19,779	-14,738
Consumer Cyclical	-19.247***	-17.179**
Consumer Non-Cyclical	-14.536*	-3,59
Consumer Services	-32.282***	-27.847**
Energy	-37.827***	-10,083
Healthcare	-15.332*	-4,605
Industrials	-18.036**	-6,769
Non-Energy Materials	-13,499	-11.982*
Technology	-25.227***	-25.137*
Utilities	-9,352	-3,062
f-value	> 0,001	> 0,001

Note: \* $p < 0,1$ ; \*\* $p < 0,05$ ; \*\*\* $p < 0,01$  This table shows results of the OLS regressions of the individual stock returns in the Incubation (January 2 through January 20) and Fever (February 24 through March 23) periods on foreign revenue, cash holdings and leverage. The dependent variables are cumulative (raw) returns. All models control for RBICS fixed effects and standard firm characteristics (size, profitability and log market value).

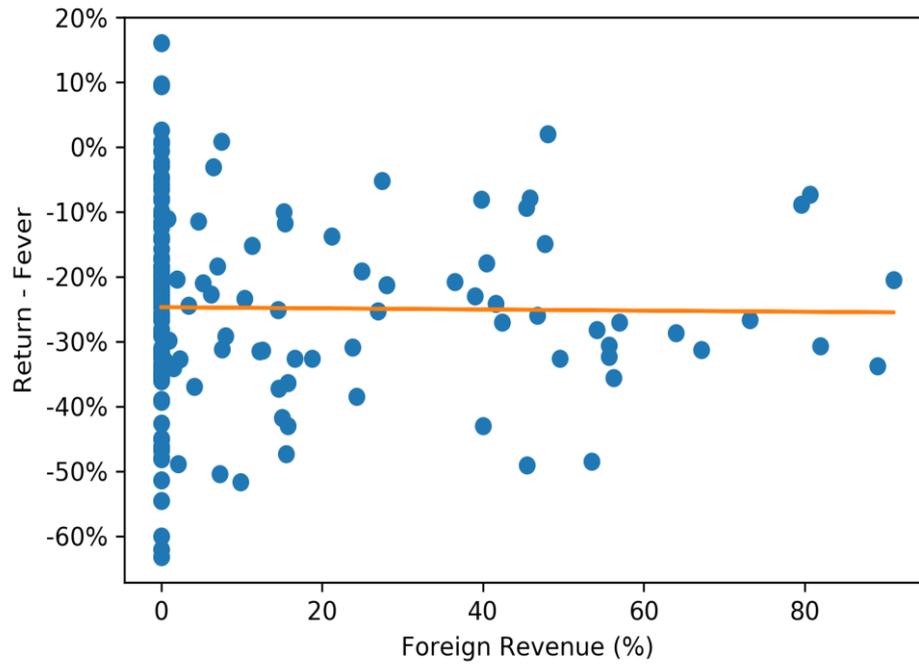
Foreign Revenues was found to have a negative effect in Incubation (-0,091), which was large considering the sample average for this variable: 89,49. As discussed before, this is explained by the progression of the pandemic in Brazil and in its major exporters. In Incubation, the pandemic began in Brazil: the country's number of cases per million was smaller than that of its two major exporters: China and the United States. This difference with China decreased in Fever, as the country had reached a plateau, while Brazil's cases kept growing.

Graph 4

**Foreign Revenue x Return (Incubation)**

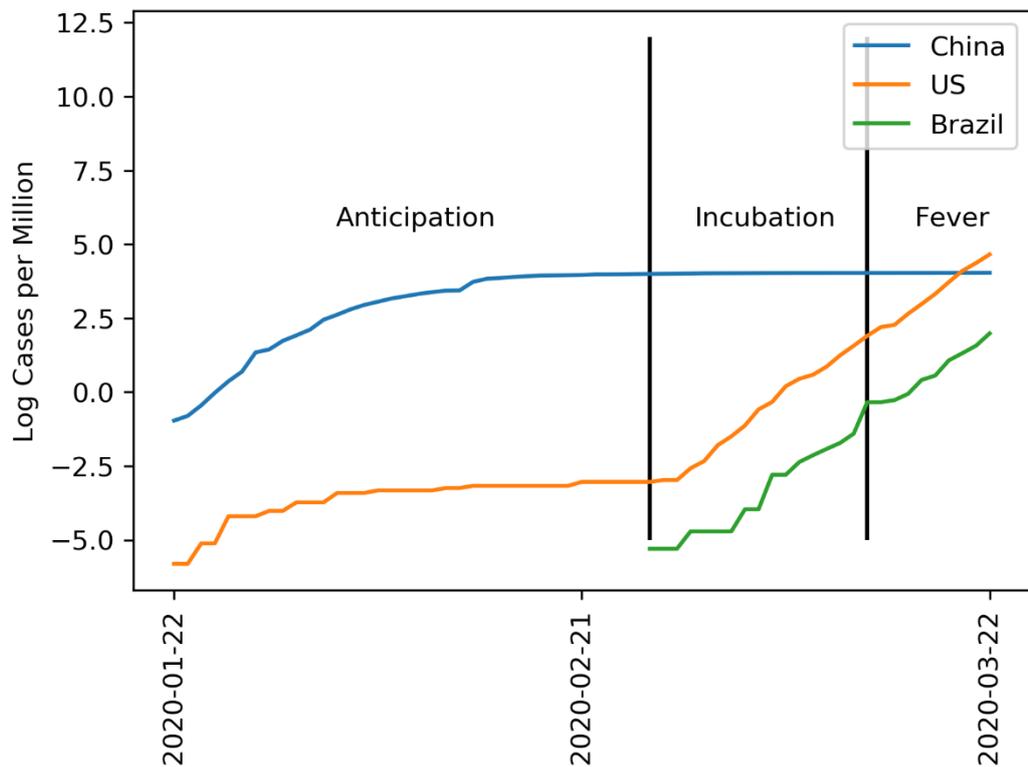


Graph 5

**Foreign Revenue x Return (Fever)**

These graphs plot the cumulative returns in the Incubation (January 2 through January 20) and Fever (February 24 through March 23) periods against the variable Foreign Revenues. The sample consists of FactSet Brazilian constituents.

Graph 6

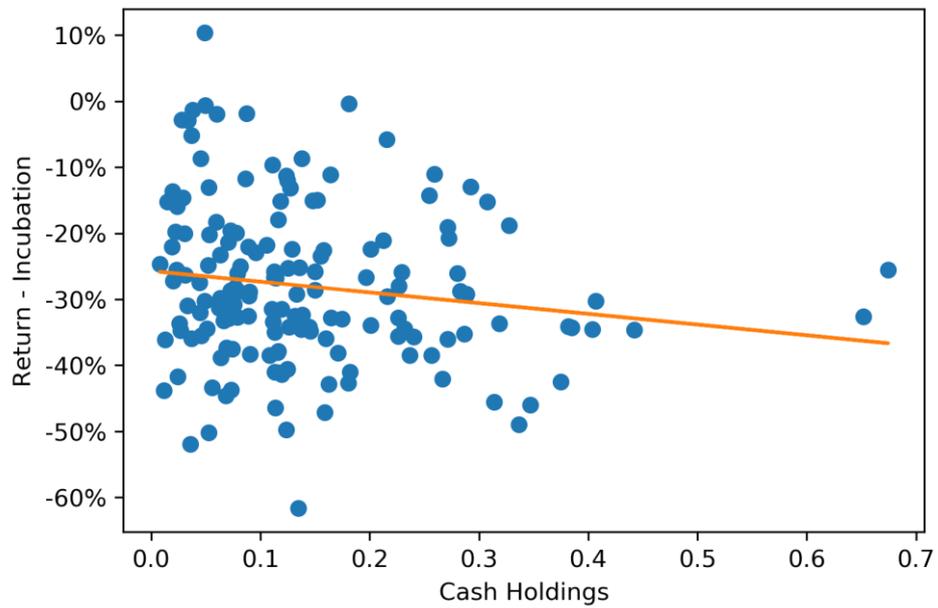
**Log cases per million: China, US and Brazil**

This chart plots the natural logarithm of the number of cases (per million) in Brazil and its two major trade partners: China and US.

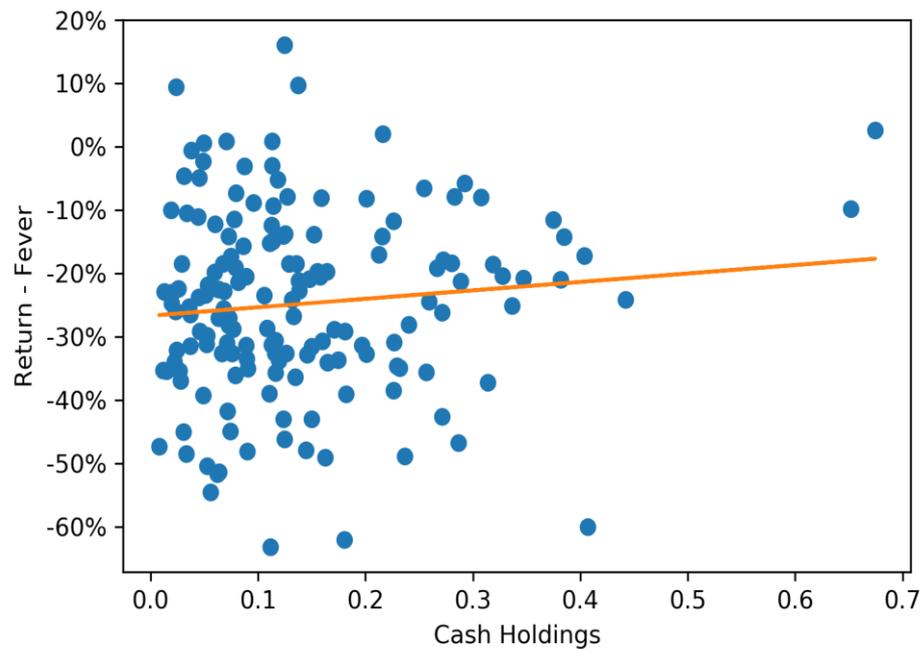
The results resemble those of Ramelli and Wagner (2020)'s study of the North American market. Nevertheless, the variable foreign revenues depend on the progression of the pandemic in the country and its exporters. As the United States and its exporters are different from Brazil and its exporters, the regression results for Foreign Revenues in the United States and Brazil are not comparable.

Surprisingly, the variable cash holdings was not found to be significant at any period. This represents a difference from the results found in Ramelli and Wagner (2020) and Fahlenbrach, Rageth and Stulz (2020), who found companies with more cash to perform better in the North American market during the pandemic. Another divergence is the study of Ding et Al, who found cash holdings to create value in the pandemic in global samples.

Graph 7

**Cash Holdings x Return (Incubation)**

Graph 8

**Cash Holdings x Return (Fever)**

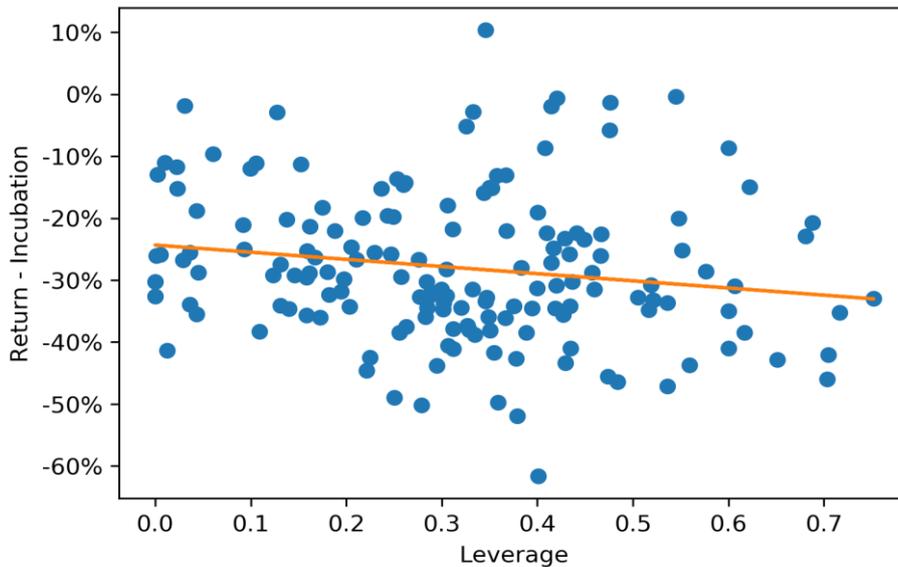
These graphs plot the cumulative returns in the Incubation (January 2 through January 20) and Fever (February 24 through March 23) periods against the variable Cash Holdings. The sample consists of FactSet Brazilian constituents.

A possible explanation may be the differences in credit markets. In other words, Brazil may be a country with easy access to corporate credit. To investigate this claim, I recommend further research on the frictions of the Brazilian credit market.

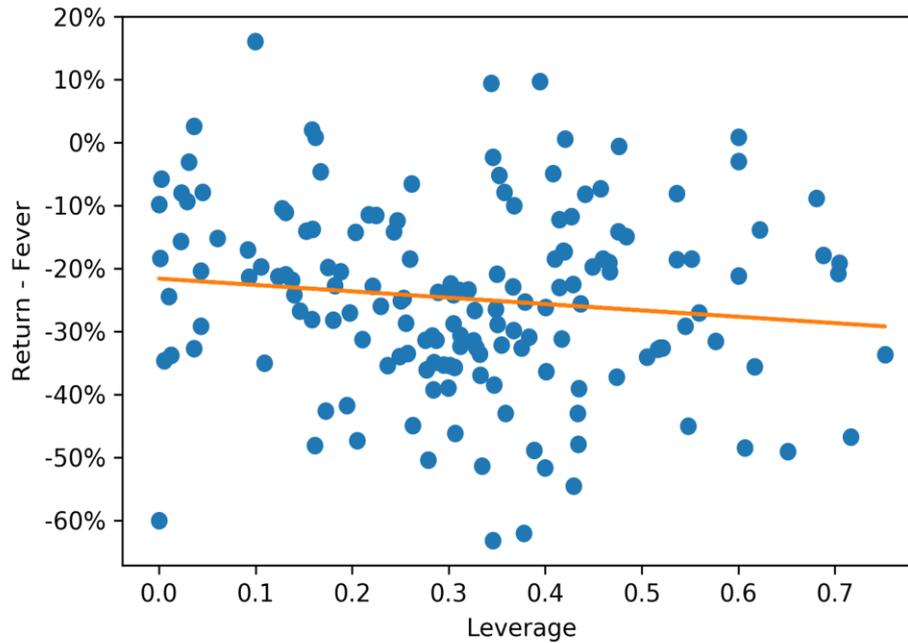
I found firms with low leverage to perform better than their peers in both periods of Incubation and Fever. These coefficients were modest (-13,05 and -17,40), particularly with consideration to the sample average of Leverage: 0,3. As detailed in the Literature Review section, the significance of Leverage in the Brazilian market was expected, and confirms the findings in the North American and global samples (Ding et al, 2021; Fahlenbrach, Rageth and Stulz , 2020; Ramelli & Wagner, 2020).

Graph 9

**Leverage x Return (Incubation)**



Graph 10

**Leverage x Return (Fever)**

These graphs plot the cumulative returns in the Incubation (January 2 through January 20) and Fever (February 24 through March 23) periods against the variable Leverage. The sample consists of FactSet Brazilian constituents.

## 5. Discussion

Considering the impact of Covid-19 on global capital markets, this study sought to evaluate how firm characteristics mediate the effect of the pandemic on Brazilian stock returns.

I show that the impact of Covid-19 in the Brazilian stock market became noticeable after the country had its first case of the disease. Such impact was reflected in (1) increasing Google searches for the term “coronavirus”, (2) mentions of the pandemic in firm reports to investors and (3) aggregate stock returns for all industrial sectors.

To analyze the impact of Covid-19 in the Brazilian stock market, three firm characteristics were studied: Foreign revenues, Cash holdings and leverage. Foreign Revenues were found to have a positive, but transient effect in Brazilian stocks, reflecting the worsening of the country’s macroeconomic situation. Leverage, on the other hand, was found to have a

negative influence in the Brazilian market, a finding that replicated studies of the North American and global markets in the literature. Finally, the amount of cash was not found to influence stock prices anyhow in Brazil. This suggests frictions in the Brazilian credit market are less significant than those in the North American and global markets.

This study, thus, contributes to the extant literature by providing evidence on market reactions to Covid-19 considering firm characteristics in the context of an emerging market such as Brazil. This evidence is of special relevance given the budget limitations of the Brazilian government in rescuing companies, providing stimulus to attenuate the crisis and financing public policy. In this context, the identification of protective firm characteristics in tail risk events is valuable for investors and firm managers.

### References

- Al-Qudah, A. A., & Houcine, A. (2021). Stock markets' reaction to COVID-19: Evidence from the six Who regions. *Journal of Economic Studies, Ahead-of-print*(Ahead-of-print). doi:10.1108/jes-09-2020-0477
- Alam, M. N., Alam, M. S., & Chavali, K. (2020). Stock market response During COVID-19 lockdown period in INDIA: An Event Study. *The Journal of Asian Finance, Economics and Business*, 7(7), 131-137. doi:10.13106/jafeb.2020.vol7.no7.131
- Ambros, M., Frenkel, M., Huynh, T. L., & Kilinc, M. (2020). COVID-19 pandemic news and stock market reaction during the onset of the CRISIS: Evidence from high-frequency data. *Applied Economics Letters*, 1-4. doi:10.1080/13504851.2020.1851643
- Ashraf, B. N. (2020). Stock markets' reaction to covid-19: Cases or fatalities? *Research in International Business and Finance*, 54, 101249. doi:10.1016/j.ribaf.2020.101249
- Ashraf, B. N. (2020). Stock MARKETS' reaction to COVID-19: MODERATING role of national culture. *SSRN Electronic Journal*. doi:10.2139/ssrn.3608323
- Baker, S., Bloom, N., Davis, S., Kost, K., Sammon, M., & Viratyosin, T. (2020). The unprecedented stock market impact of covid-19. doi:10.3386/w26945
- Bodie, Z., Kane, A., Marcus, A. J., Perrakis, S., Ryan, P. J., & Switzer, L. (2015). *Investments*. Whitby, Ontario: McGraw-Hill Ryerson.
- Coronavirus Disease (COVID-19) Situation Reports. (n.d.). Retrieved January 06, 2021, from <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>
- Da, Z., Engelberg, J., & Gao, P. (2011). The sum of all fears: Investor sentiment and asset prices. *SSRN Electronic Journal*. doi:10.2139/ssrn.1509162

- Ding, W., Levine, R., Chen, L., Wensi Xie (2020). Corporate Immunity to the COVID-19 Pandemic (NBER Working Paper No. 27055). National Bureau of Economic Research. <https://www.nber.org/papers/w27055>
- Fahlenbrach, R., Rageth, K., Stulz, R. (2020). How valuable is financial flexibility when revenue stops? Evidence from the COVID-19 Crisis (NBER Working Paper No. 27106). National Bureau of Economic Research. <https://www.nber.org/papers/w27016>
- Fama, E. F., Fisher, L., Jensen, M. C., & Roll, R. (1969). The Adjustment of Stock Prices to New Information. *International Economic Review*, 10(1), 1. doi:10.2307/2525569
- Goodell, J. W., & Huynh, T. L. (2020). Did Congress trade Ahead? Considering the reaction of US industries To covid-19. *Finance Research Letters*, 36, 101578. doi:10.1016/j.frl.2020.101578
- Greene, W. H. (2020). *Econometric analysis*. Harlow, England: Pearson.
- Harjoto, M. A., Rossi, F., & Paglia, J. (2020). Covid-19: Stock market reactions to the shock and the stimulus. *SSRN Electronic Journal*. doi:10.2139/ssrn.3622899
- Harjoto, M. A., Rossi, F., Lee, R., & Sergi, B. S. (2020). How do equity markets react to COVID-19? Evidence from emerging and developed countries. *Journal of Economics and Business*, 105966. doi:10.1016/j.jeconbus.2020.105966
- Hayes, A. F., & Cai, L. (2007). Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation. *Behavior Research Methods*.
- Heyden, K. J., & Heyden, T. (2020). Market reactions to the arrival and containment of covid-19: An event study. *SSRN Electronic Journal*. doi:10.2139/ssrn.3587497
- Investment Company Institute. (2020). *The impact of Covid-19 on Economies and Financial Markets*. Retrived from: [https://www.ici.org/pdf/20\\_rpt\\_covid1.pdf](https://www.ici.org/pdf/20_rpt_covid1.pdf)
- Khanthavit, A. (2020). World and national stock market reactions to COVID-19. *ABAC Journal*.
- Martello, A. (2020, March 23). BC anuncia nova liberação de recursos para os bancos; impacto total pode chegar a R\$ 1,2 trilhão.
- Machmuddah, Z., Utomo, S. D., Suhartono, E., Ali, S., & Ali Ghulam, W. (2020). Stock market reaction to covid-19: Evidence in customer goods sector with the implication for open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 99. doi:10.3390/joitmc6040099
- Mazumder, S. (2020). How important is social Trust during the Covid-19 CRISIS period? Evidence from the Fed announcements. *SSRN Electronic Journal*. doi:10.2139/ssrn.3686746

- Ramelli, S., & Wagner, A. F. (2020). Feverish Stock Price Reactions to COVID-19\*. *The Review of Corporate Finance Studies*, 9(3), 622-655. doi:10.1093/rcfs/cfaa012
- Rahman, M. L., Amin, A. S., & Al Mamun, M. A. (2021). The COVID-19 outbreak and stock Market reactions: Evidence from Australia. *SSRN Electronic Journal*. doi:10.2139/ssrn.3773839
- Shen, D., & Zhang, W. (2020). Stay-at-home stocks versus go-outside stocks: The impacts of covid-19 on the chinese stock market. *Asia-Pacific Financial Markets*. doi:10.1007/s10690-020-09322-4
- The World Bank (2020). Brazil Trade. Retrieved January 04, 2021, from:
- Qin, A., & Hernández, J. (2020, January 10). China Reports First Death From New Virus. *The New York Times*.
- Wuhan lockdown 'unprecedented', shows commitment to contain virus: WHO representative in China. (2020, January 23). *Thomson Reuters*.
- Xiong, H., Wu, Z., Hou, F., & Zhang, J. (2020). Which firm-specific Characteristics affect the market reaction of CHINESE listed companies to the COVID-19 PANDEMIC? *Emerging Markets Finance and Trade*, 56(10), 2231-2242. doi:10.1080/1540496x.2020.1787151

## Appendix

Table 7

### Descriptive statistics

Cumulative returns	Mean	Standard deviation
Return – Anticipation	5.61	15.87
Return - Incubation	-28.55	11.41
Return - Fever	-25.36	14.89
Standard firm controls		
Foreign Revenue (%)	10.51	20.50
Cash Holdings	0.15	0.12
Leverage	0.30	0.18
Beta	0.36	0.75
Standard firm controls		
Log Market Value	8.33	1.86
Profitability	0.06	0.06
Book-to-Market	0.61	0.56
RBICS dummies		
Business Services	0.01	0.07
Consumer Cyclicals	0.14	0.35
Consumer Non-Cyclicals	0.14	0.35
Consumer Services	0.03	0.16
Energy	0.02	0.12
Finance	0.18	0.38
Healthcare	0.06	0.23
Industrials	0.14	0.35
Non-Corporate	0.00	0.00
Non-Energy Materials	0.12	0.32
Other	0.00	0.00
Technology	0.01	0.10
Telecommunications	0.02	0.12
Utilities	0.15	0.36