The Impact of Government Response on the US Stock Market during the COVID-19 Pandemic

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Abstract

Although pandemics have occurred with some degree of frequency over the past century, the degree to which social and economic pandemic-related government responses have been used across the globe during the COVID-19 pandemic period has been unprecedented. Using the S&P 500 stock market index return over the period January 2020-June 2021as our dependent variable in a regression-based model, we measure, via a Government Response Index, the extent to which government response impacted stock market returns. We also include the VIX ("fear gauge"), Market Value, Trading Volume, and Price-to-Earnings Ratios to control for other factors that may have impacted the market during the pandemic. Although we found that the VIX was highly negatively correlated with stock market returns during this period, we found very limited evidence of a significant relationship between stock market returns and government response over this time period. Thus, we believe it would be prudent for governments to be more strategic in their approach regarding initiatives if or when a future pandemic should arise, as not all government-related policy initiatives have the intended effect.

1. Introduction

Pandemics, such as the Spanish Flu, Ebola, SARS, and most recently, COVID-19, have occurred fairly frequently in the US since the late 19th century. Governments have always taken some degree of government response or precautionary measures as it pertains to protecting its citizens in the wake of such pandemics in the form of "lockdowns" (i.e. business and school closures, public health measures, restrictions on public gatherings, etc.) or other government-related initiatives. However, the degree to which social and economic pandemic-related government response has been used across the globe since early 2020 has been unprecedented. A majority of country governments across the globe quickly implemented some degree of public restrictions as well as economic stimulus to households, etc., some of which are still in place several years later.

This study measures the impact, if any, that COVID-19 related government response initiatives have had on the stock market of the US during the primary time period surrounding the pandemic. It will build off the existing literature related to both international as well as the US stock markets, but will also use a "Stringency Index" from the Oxford School of Government. This is a very detailed database which delves into the nuances of the countries' government response policies and initiatives across the globe from the beginning of 2020 to the present. The study will also make use of the CBOE Volatility "VIX" index (otherwise known as the "fear index") that US investors use to gauge general fear and apprehension in the markets.

Given the above, our research question is the following:

What quantifiable effect, if any, did US government initiatives and response have on the nation's stock market during the time period surrounding the COVID-19 pandemic?

We based our model primarily on that of Ashraf (2020) and use the Oxford School of Government's Stringency Index (also known as the "Government Response Index", or GRI) first used by Raifu et al. (2021). The S&P 500 stock market index return (from January 2020 to June 2021) is used as our dependent variable. Additionally, the Chicago Board of Exchange's Volatility Index (otherwise known as the VIX, or "fear index") is used to measure investors' fear during the pandemic period, while the GRI is used to measure government response activities across a wide array of initiatives. The sign of the GRI is not predicted beforehand. Moreover, we also follow the model of Zaremba et al. (2020), and include Market Value, Trading Volume, Price-to-Earnings Ratios to control for other factors that may have impacted the market during the pandemic.

Our findings may be summarized as follows. First, as was to be expected, the VIX was highly negatively correlated (at the 1% level) with stock market returns during this period. Additionally, part of our results shows that the interaction of government response and the VIX was not significant, indicating that government response was not able to diminish investors' fears related to the market. We also did not find any evidence of a significant relationship between stock market returns and the Stringency Index (SI) nor the Containment and Health Index (CHI). However, we did find marginal significance for economic support as it relates to stock market returns. Additionally, the only facet of government action that potentially had any impact on the VIX was economic support. In sum, while economic stimulus seemed to have helped assuage investors' fears (which in turn, seemed to boost the equity market), health policies and stringency policies seemed to have very little effect.

In terms of contribution, to our knowledge, ours is the only paper that examines the interaction between market fear (as measured by the VIX) and government response (both on an aggregate scale as well as on a subcategory basis) on the US stock market during the primary time frame surrounding this very recent global pandemic.

This paper will proceed in the following order. We begin by examining the current literature as it relates to the COVID-19 pandemic and stock market returns and volatility across the globe, with a focus on the US equity market. We then present the Research Design and Data followed by a discussion of findings. We end the manuscript with a Conclusion.

2. Literature Review

To begin, we did find several studies which examined the current pandemic through the lens of similar historical events in terms of stock market returns. As illustrative of these, Ashraf (2020) compared the reaction of the US stock market to several similar pandemics and found that COVID-19 has brought about unprecedented volatility not seen via infectious diseases since the Spanish Flu of 1918. This conclusion is shared by Erdem (2020), who finds evidence that the 1918–20 Great Influenza Pandemic (Spanish Flu) led to a worldwide decrease in stock prices along with a large increase in volatility.

There were also several studies that seemed to show some relationship between COVID cases and global stock market returns. For example, in a separate study, Ashraf (2020) uses COVID-19 confirmed cases and stock market returns from 64 countries over a several month period in early 2020 and found that stock markets responded negatively to the growth in COVID-19 confirmed cases. Additionally, Hung et al. (2021) examine the impacts of COVID-19 on the Vietnamese Stock Market. The authors'

results show that the number of confirmed COVID-19 cases is negatively correlated with stock returns. Moreover, the results show a heterogeneous response of stock returns to the pandemic across sectors, with the financial sector being the most affected. Mbatha et al. (2021) investigate the South African stock market from the perspective of pre, during, and post-lockdown during 2020 and according to the authors, was the first to cover the aspect of "hard" lockdowns in the South African Stock Market during a global pandemic. Furthermore, using data from 12 heavily affected countries, Zhang et al. (2020), examine the correlation between countries` equity markets before and after the onset of the COVID-19 crisis. Lastly, Liu et al. (2020), using an event study methodology, evaluate the short-term impact of the COVID-19 outbreak on stock markets in major affected countries and demonstrate evidence of these equity markets declining quickly after the pandemic outbreak.

There were also several studies that dealt with government intervention on a global scale during COVID and their respective stock market returns. Some studies found evidence of a somewhat negative impact (or no impact) on the equity markets from government intervention, others found evidence of a positive impact to some degree, and some studies actually pointed to mixed results. In terms of a somewhat negative impact, Zaremba et al. (2020) examine volatility as one important feature related to international equity markets. Furthermore, to the best of these authors' knowledge, their study is the first to investigate to what extent the social restrictions imposed during pandemics by governments around the world affect stock market volatility. Their conclusion is that severe policy responses can lead to a significant increase in such volatility. Similarly, Raifu et al. (2021) investigate stock market returns in the country of Nigeria as they relate to the COVID-19 pandemic and lockdown policy, in which they used the "Stringency Index", computed by the University of Oxford. This index is comprised of COVID-19 prevention measures which include variables such as social distancing, school and work closures, stay-at-home orders, restriction of internal movement, and restrictions on international travel. The correlation between confirmed cases and lockdown policy on stock returns seemed to oscillate between negative and positive before returning to more of equilibrium, thus demonstrating little evidence of pandemic cases and lockdown policy having any lasting effect on stock market returns.

In terms of a somewhat positive impact of government intervention, Narayan et al. (2021) examine the effect of G7 countries' government responses to the pandemic and stock market returns. Using time-series data, the authors show that lockdowns, travel bans, and economic stimulus packages all had a positive effect on these countries' stock markets, perhaps in part by helping to mitigate the spread of the virus. This hypothesis is rooted in the belief that investor sentiment is a strong driver of stock market returns. Moreover, Chang et al. (2021) investigate governments' responses to the COVID-19 pandemic as they relate to stock market returns of 20 countries during the first half of 2020. The authors employ stringency measures from Hale et al. (2020).

The results seemed to point to these measures having a significantly positive effect on stock market returns in these countries.

We then examine studies which tended to point to somewhat mixed results, such as Trang & Gan (2020), who explore the effects of the pandemic and subsequent lockdown on stock market returns in Vietnam, and to the best of these authors' knowledge, is the first of this type focusing on that country. The authors conclude that although the pre-lockdown had a significant, negative impact on Vietnam's stock returns, the actual lockdown period had a significant, positive influence on that country's equity market. Additionally, Mazur et al. (2020) investigate the US stock market during early 2020 and find that certain sectors such as natural gas, food, healthcare, and software stocks earned high positive returns, whereas equity values in petroleum, real estate, entertainment, and hospitality sectors all declined dramatically. In other words, although some sectors suffered, others may have benefited from the pandemic and the resulting lockdown. Lastly, Erden (2020) uses a panel regression analysis to demonstrate how investors reacted to COVID-19 data announcements, while considering the level of freedom in each of over 75 countries. The author concluded that the adverse effects of the pandemic on the stock markets appeared to be less in freer countries.

Other studies examined investor mood, sentiment, or risk tolerance during COVID (or other pandemics) and stock returns. Sharif et al. (2020) indicate that COVID-19was a source of systemic risk. The authors hypothesize that due to differences in risk tolerances and perceptions of risk, US investors tend to react differently in terms of their investment decisions, with some seeing negative news as a sell signal, while others seeing it as a buying opportunity. To measure the correlation of perceived risk to COVID-19 data, Albulescu (2020) examines the Chicago Board of Exchange's VIX ("Volatility Index") as it pertains to pandemic-related data. In Subramaniam & Chakraborty (2021), the authors attempt to capture investor mood (using a unique, self-constructed COVID-19 "fear index") related to the pandemic and analyze its impact on US stock market returns. The study finds a strong negative association between pandemic-era fear and equity returns. They then extend the analysis to other COVID-19 affected countries such as India and Brazil and find that the results are similar to those in the US market.

Thus, given the previously mentioned research question and literature review, our hypothesis is the following:

H1- there was no impact on US stock market returns during the COVID-19 pandemic from overall government response policies.

3. Research Design

To test our hypothesis, we revise the model from Ashraf (2020) and run the following regression:

$$Return_t = \alpha_0 + \beta_1 \Delta VIX_t + \beta2 GRI_t + MV_t + TV_t + PE_t + \text{Daily Fixed Effect} + \varepsilon_t$$
$$(1)$$

As stated previously, our dependent variable is the S&P 500 stock market index return over the period January 2020- June 2021. The return is calculated as $(P_t - P_{t-1})/P_{t-1}$. We use the VIX "fear index" (which itself is a measurement of the price of put to call options) to measure investors' fear during the pandemic period. Based on prior research, we expect the coefficient of the VIX to be negative. Our main interest is government response. We use the Government Response Index (comprised of various government initiatives on a daily basis and given a score of 0 to 100) from the Oxford School of Government to measure government response activities. Since the results from prior research are mixed, we do not predict the sign of the GRI. We also follow the model of Zaremba et al. (2020), and include Market Value, Trading Volume, Price-to-Earnings Ratios to control other factors that may have impacted the market during the pandemic. We also control for other variables through "daily fixed effects" by estimating using Ordinary Least Squares.

In order to test whether or not government response was able to mediate investors' fear related to the stock market, we run the following regression model:

$$Return_t = \alpha_0 + \beta_1 \Delta VIX_t + \beta2 GRI_t + \beta3\ \Delta VIX_t \times GRI_t + MV_t + TV_t + PE_t + \text{Daily Fixed Effect} + \varepsilon_t$$
$$(2)$$

Again, our main focus is the interaction effect of the VIX and GRI. If government response is able to mediate investors' fear as it relates to the market, we would see the interaction coefficient be positive. All other variables are the same as in Model 1.

4. Data

The study period is January 1, 2020 to June 30, 2021. This 18-month period, in our estimation, encompasses the primary time frame of the COVID pandemic, during which many governments and multilateral institutions around the world (including that of the US) were first beginning to track cases, implement various forms of restrictions, and provide households with some form of economic stimulus. It was also the primary time frame in which the pandemic's effects on world stock markets, (again, including that of the US) were plagued with extreme volatility and price swings.

Daily S&P return data and VIX data were taken from MacroTrends for the period Jan. 1, 2020 through June 30, 2021. Daily market value, trading volume, and price-to-earnings ratio data were taken from Capital IQ. All government restriction data was taken from the Oxford School of Government database. The data and regression analysis were performed via SAS by the authors.

In Table 1, Descriptive Statistics are presented (see definitions of each variable below the table).

Table 1: Descriptive Statistics

Variable	Mean	Std Dev	Minimum	1st quartile	Median	3rd quartile	Maximum
Price	3218.660	316.479	2386.130	3036.130	3276.020	3408.630	3732.040
Returns	0.001	0.020	-0.076	-0.006	0.002	0.010	0.070
VIX	29.223	12.217	12.320	22.540	26.700	33.040	75.910
ΔVIX	0.006	0.094	-0.167	-0.046	-0.010	0.034	0.430
GRI	53.123	23.042	0.000	61.980	63.800	66.150	69.270
SI	56.464	25.599	0.000	62.500	67.130	72.690	75.460
CHI	53.867	22.859	0.000	61.900	63.990	66.670	70.240
ESI	47.925	26.482	0.000	62.500	62.500	62.500	62.500
MV	26.682	2.644	19.783	25.200	27.123	28.246	31.456
TV	4924.601	1332.414	3145.200	3926.380	4665.380	5477.040	8755.780
PE	31.389	5.262	20.559	27.815	30.333	35.770	40.111
LnMV	17.094	0.103	16.800	17.042	17.116	17.156	17.264
LnTV	22.285	0.247	21.869	22.091	22.263	22.424	22.893
LnPE	3.432	0.174	3.023	3.326	3.412	3.577	3.692

This table reports the summary statistics of main variables used in the study. Price is S&P 500 index price. Returns is S&P 500 index returns. VIX is the CBOE "fear index", which is considered a real-time market volatility index. ΔVIX is the change in this fear index. GRI is the overall Government Response Index, which encompasses a multitude of different government-related pandemic response initiatives. SI is the Stringency Index, which represents any announcements regarding government social distancing measures, such as the closure of schools, work and public places, as well as restrictions on internal and international travel. CHI is the Containment and Health Index, which represents announcements regarding government policies such as public awareness campaigns, testing policy and contact tracing. ESI is the Economic Support Index, which represents announcements regarding government income support and debt/contract relief for households programs. MV is the Total Market Value (of the S&P 500 index), while TV is the Total Trading Volume and PE is the composite Price-to-Earnings ratio of these stocks.

LnMV is the natural log of Total Market Value, while LnTV is the natural log of Total Trading Volume and LnPE is the natural log of the Price-to-Earnings ratio. Source: Macrotrends.net, Yahoo Finance, Capital IQ, and Oxford School of Government.

A few observations are worth noting from the above table. First, the S&P 500 index (defined here as "Price") had a mean of 3218 during the period of question, but experienced extremely large variations during this time, as noted via the large standard deviation and minimum/maximum levels. The same could be said for the VIX, with its mean of slightly over 29, but a standard deviation of over 12 and enormous minimum-maximum values. Additionally, a Jacque-Bera "goodness-of-fit" test was carried out to test for skewness and kurtosis and was found to be within the normal range while and a Pearson test was used to test to determine if there was high correlation within the data set, with the results falling within the "high normal" range (i.e. not significant at the 10% level).

5. Results

To begin analyzing the results, we examine Table 2, which presents the impact of overall government response on stock market returns.

Table 2: Impact of overall government response amid COVID-19 on stock market returns

Variable	Model (1)		Model (2)	
ΔVIX	-0.153	***	-0.146	***
	(-16.10)		(-8.24)	
GRI	0.000	*	0.000	*
	(1.68)		(1.72)	
ΔVIX x GRI			0.000	
			(-0.46)	
LnMV	0.147	***	0.147	***
	(3.37)		(3.37)	
LnTV	0.006		0.006	
	(1.35)		(1.34)	
LnPE	-0.080	***	-0.080	***
	(-2.94)		(-2.93)	
Intercept	-2.388	***	-2.391	***
	(-3.54)		(-3.54)	
Daily Fixed Effect	Yes		Yes	
Observations	252		252	
R-Squared	53.55%		53.40%	

This table reports the results regarding the impact of investors' fear and overall government responses to control the pandemic on stock market returns.

*** denotes significant at the 1% level.

** denotes significant at the 5% level.

* denotes significant at the 10% level.

This includes the "incremental effect" of the GRI on market returns. In other words, did the GRI help to alleviate investors' fear (as expressed by the change in VIX).

Through Table 2, Model 1, it is evident that the VIX was highly negatively correlated (at the 1% level) with stock market returns during this period. This would be expected, as fear in the market was rife during this time period and was one of the primary drivers behind the sudden, massive drop in equity prices during the spring of 2020.

When investor sentiment began to improve and fear began to abate, the equity market began its dramatic turnaround. Additionally, although government intervention was marginally statistically significant, its impact was minimal (as shown by the small t-values).

Through Model 2, we are able to examine any incremental effect of government response on market returns. The results show that the interaction of government response and the VIX was not significant, which indicates that government response was not able to ameliorate investors' fears related to the market, which supports our null hypothesis. The massive, multi-faceted government intervention seems to have had very little effect (either positive or negative).

In terms of the control variables, both Market Value and Total Volume are highly significant and positively correlated to market returns, which seem to be in line with Zaremba et al. (2020). This also could be expected, as many investors fled the equity markets during the first half of 2020 and subsequently gradually began to return during the latter part of that year and into 2021.

As Table 2 suggests, however, there was very little effect from overall government intervention. However, we would like to further examine to perhaps determine if particular government initiatives (i.e. subcategories of the GRI) had any impact on equity returns. This is examined in the following table.

Table 3: Impact of specific government responses amid COVID-19 on stock market returns

Variable	Model (1)		Model (2)	
ΔVIX	-0.152	***	-0.074	**
	(-6.03)		(-2.17)	
SI	0.000		0.000	
	(-0.75)		(-0.67)	
CHI	0.001		0.001	
	(1.26)		(1.18)	
ESI	0.000	*	0.000	*
	(1.81)		(1.85)	
ΔVIX x SI			0.008	
			(1.67)	
ΔVIX x CHI			-0.011	**
			(-1.97)	
ΔVIX x ESI			0.001	**
			(2.37)	
LnMV	0.179	***	0.163	***
	(3.88)		(3.54)	
LnTV	0.002		0.002	
	(0.43)		(0.35)	
LnPE	-0.100	***	-0.092	***
	(-3.38)		(-3.13)	
Intercept	-2.778	***	-2.518	***
	(-3.98)		(-3.62)	
Daily Fixed Effect	Yes		Yes	
Observations	252		252	
R-Squared	53.99%		55.09%	

This table reports the results regarding the impact of investors' fear and specific government responses to control pandemic on stock market returns. The specific government responses measures include the Stringency Index, the Containment and Health Index (CHI), and the Economic Support Index (ESI).
*** denotes significant at the 1% level.
** denotes significant at the 5% level.
* denotes significant at the 10% level.

Again, as shown previously, in Model 1, there is a statistically significant negative correlation between investor fear (i.e. the VIX index) and market returns. However, we did not find any evidence of a significant relationship between stock market returns and the Stringency Index (SI) nor the Containment and Health Index (CHI). However, marginal significance was found for economic support as it relates to stock market returns.

In Model 2, in terms of the interaction of the specific government responses with the VIX, the only facet of government action that potentially had any impact was economic support. The interaction coefficient of the Economic Support Index (ESI) is positive and significant, which indicates that economic support policies were able to

help moderate investors' fear. The interaction coefficient of the Containment and Health Index (CHI) is negative and significant, which indicates that health policies did not have any impact of lessening investor's fear.

In terms of the interaction of the Stringency Index, we did not find any significant relationship. Thus, overall, while economic stimulus seemed to have helped alleviate investors' fears (which in turn, seemed to help market returns), health policies and stringency policies seemed to have very little effect.

In terms of limitations, this study attempted to identify the primary variables that would impact stock market returns during that time period and control for them. However, the authors do recognize and acknowledge that there could potentially be other variables that indeed had an impact on US stock market returns during that time period that were either unidentifiable or unable to be quantified.

6. Conclusion

This manuscript began by examining the current literature as it relates to the COVID-19 pandemic and equity market returns and volatility across the globe, with a focus on the US equity market. It was then followed by the Research Design and Data and ended with a discussion of findings.

Our study sought to add to the body of pandemic-related literature by measuring the impact, if any, that COVID-19 related government response initiatives have had on the US stock market. We utilized a pandemic-specific database (from the Oxford School of Government) which delved into the nuances of countries' government response policies and initiatives across the globe in the period surrounding the pandemic. Our study also used the CBOE VIX index that helps to gauge general fear and apprehension in the US markets.

As described in the Results section above, our findings were that the VIX was highly negatively correlated (at the 1% level) with stock market returns during this period. Moreover, the interaction of government response and the VIX was not found to be significant, which seems to point to government response not being capable of lessening investors' fears related to the market during that time period.

Moreover, there was no evidence of a significant relationship between stock market returns and the Stringency Index nor the Containment and Health Index, which was an important subcomponent of this index. Additionally, the only facet of government action that potentially had any impact on the VIX or stock market returns was that of economic support.

In terms of policy implementation and future research, we believe it would be prudent for governments to be more strategic in their approach regarding initiatives if or when a future pandemic should arise, as not all government-related policy initiatives have the intended effect, especially when targeting the complex US economy and/or financial markets. For example, if supporting the economy during the next pandemic were identified as a government priority, perhaps the possibility of more economic stimulus issued to households could be examined.

In terms of future research, one thought would be to examine other aspects of the US financial markets (beyond equity markets), such as the bond, housing, and/or commodities markets, as these are many times considered to behave somewhat differently than the traditional equity markets.

References

Albulescu, C.T. (2020). Coronavirus and financial volatility: 40 days of fasting and fear. Available at10.2139/ssrn.3550630.

Ashraf, B.N. (2020). Economic impact of government interventions during the COVID-19 pandemic: International evidence from financial markets. *Journal of Behavioral and Experimental Finance*. Vol. 27, pp. 1-9.

Ashraf, B.N. (2020). Stock markets' reaction to COVID-19: Cases or fatalities? *Research in International Business and Finance*. Vol. 54, pp. 1-7

Capital IQ. The data presented in this study are openly available at https://capitaliq.com.

Chang, C., Fengb, G., & Zheng, M. (2021). Government fighting pandemic, stock market return, and COVID-19 virus outbreak. *Emerging Markets Finance and Trade*, Vol. 57(8), pp. 2389–2406.

Erdem, O. (2020). Freedom and stock market performance during Covid-19 outbreak. *Finance Research Letters*. Forthcoming.

Hung, D.V., Hue, N.T., & Duong, V.T. (2021). The impact of COVID-19 on stock market returns in Vietnam. *Journal of Risk and Financial Management*. Vol. 14(441).

Lui, H., Manzoor, A., Wang, C., Zhang, L., & Manzoor, Z. (2020). The COVID-19 outbreak and affected countries' stock markets' response. *International Journal of Environmental Research and Public Health*. Vol. 17, pp. 1-17.

MacroTrends. The data presented in this study are openly available at https://www.macrotrends.net/stocks/research

Mazur, M., Dang, M., & Vega, M. (2020). COVID-19 and the March 2020 stock market crash. Evidence from S&P 500". *Finance Research Letters*. Forthcoming.

Mbatha, V.M. & Alovokpinhou, S.A. (2022). The structure of the South African stock market network during COVID-19 hard lockdown. *Physica A*, Vol. 590.

Narayan, P.K., Phan, D.H., & Liu, G. (2021). COVID-19 lockdowns, stimulus packages, travel bans, and stock returns. *Finance Research Letters*. Vol. 38.

Raifu, I.A., Kumeka, T., & Aminu, A. (2021). Reaction of stock market returns to COVID-19 pandemic and lockdown policy: evidence from Nigerian firms' stock returns. *Future Business Journal*. Vol. 7(35).

Sharif, A., Aloui, C., & Yarovaya, L. (2020). COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach. *International Review of Financial Analysis*. Vol. 70, pp. 1-9.

Subramaniam, S. & Chakraborty, M. (2021). COVID-19 fear index: does it matter for stock market returns? *Review of Behavioral Finance*. Vol. 13(1), pp. 40-50.

Trang Anh, D.L. & Gan, C. (2020). The impact of the COVID-19 lockdown on stock market performance: evidence from Vietnam. *Journal of Economic Studies*. Vol. 48(4), pp. 836-851.

University of Oxford. Blavatnik School of Government. Data presented in this study are openly available from https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker.

Yahoo Finance. Data presented in this study are openly available from https://finance.yahoo.com.

Zaremba, A., Kizys, R., Aharon, D. & Demir, E. (2020). Infected markets: Novel Coronavirus, government interventions, and stock return volatility around the globe. *Finance Research Letter*. Vol. 35, pp. 1-7.