

# THE IMPACT OF GOVERNMENT RESPONSE TO COVID-19 ON STOCK RETURN PREDICTABILITY

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## ABSTRACT

Recession is known to cause an increase in stock return predictability. The COVID-19 pandemic had not only resulted in sickness and loss of life but also plunged global economy into recession prompting governments to come up with measures to combat the disease. This paper finds the return predictability during the spread of COVID-19 using data from 41 countries on variations of 4 popular predictors. Then, it shows that government responses to COVID-19 alleviated the pandemic, the recession and reduced the return predictability with varying impact for different government measures. However, cases and deaths from COVID-19 which should have intensified the recession was found to have insignificant impact on return predictability.

**Keywords:** Stock return predictability, COVID-19, Recession, Government response.

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## INTRODUCTION

COVID-19 is known to cause significant decline in economic activities. Corporations saw decline in their financial performance (Shen et al., 2020). People experienced lower income and poverty while countries had the rising unemployment rate (Han et al., 2020; Bauer & Weber, 2021). On the consumption side, household consumption had dropped and global trade were weakened as well (Liu et al., 2020; Vidya & Prabheesh, 2020). All these factors contributed to the reduction in gross domestic product of most countries around the world. The severity was enough for the pandemic to trigger its own recession, the COVID-19 recession (Maliszewska et al., 2020).

The financial market also saw the impact of COVID-19. Particularly, the stock markets had a drop in stock price. Loser stocks such as hospitality and entertainment had their value fallen as much as 70% (Mazur et al., 2021). Many researches showed that COVID-19 cases and deaths have a negative impact on stock return (Al-Awadhi et al., 2020). The price of stock had dropped so much that the stock markets around the world crashed at around February and March 2020. It is common to assume that COVID-19 decreased the cash flow of various business resulting in lower stock price. However, COVID-19 also affected stock price through the discount rate which is the weighted average of cost of equity and debt. As discount rate grow, cash flow gets heavily discounted resulting in less stock price.

The growing discount rate is caused by the rise of equity premium. It is known that equity premium tends to increase during recession. Campbell & Cochrane (1999) proposed a consumption-based model showing that people become more risk averse during economic recession. When consumption and income levels are low, they will demand a higher equity risk premium near business-cycle troughs to be willing to take on the risk from holding stocks. This Countercyclical risk aversion suggests that the risk premium is countercyclical; equity premium is expected to increase in recession, it also becomes more predictable resulting in countercyclical return predictability.

Stock return predictability measures how well a variable from current period can predict the equity premium of the next period (Rapach & Zhou, 2013). With the rising trend of equity premium during recession, many researchers also found the evidence that return predictability increased including in the recent COVID-19 recession (Hong et al., 2021). They detected the increase in return predictability which happened around February 2020 coinciding with the stock market crash.

Since COVID-19 caused damage to both human life and economy, governments started implementing policies to alleviate the pandemic (Hale et al., 2020). The responses can be categorized as closure and containment measure which includes lockdown and travel ban, economic measure which is about debt relief and income support and health system measure which deals with the countries' public health. The measures were successful at reducing the spread of the virus and many research papers documented the positive effects of the measures on stock which can possibly reduce return predictability.

The main purpose of this paper is to measure what kind of impact government responses to COVID-19, which include containment and closure, economic and health system measure, have on stock return predictability.

## LITERATURE REVIEWS

### **COVID-19 and government responses impact on stock market and real economy**

The stock market saw negative return resulting in price drop and stock market crash. The factors that may cause the drop in stock price were examined. Al-Awadhi et al. (2020) and Pham et al. (2020) found that total cases and death negatively affected stock market return. Furthermore, Ashraf (2020) documented stock markets reacting negatively on confirmed cases and confirmed deaths.

As for the impact of COVID-19 on economy, COVID-19 pandemic was found to affect various economic indicators which made up GDP on both the income and consumption side. At the personal level, the containment and closure measure as a response to the spread of COVID-19 caused an increase unemployment rate in the short term (Bauer & Weber, 2021). While income was also found to decline at the start of the pandemic as well (Han et al., 2020). Along with the income, Liu et al. (2020) found that household consumption saw decline in China. As for corporations, Shen et al. (2020) found that COVID-19 had a negative effect on firm performance by reducing investment scales in fixed asset and firm's total revenue. This eventually contributed to the negative return and the drop in stock price. The trade of goods as in export and import also dropped as studied by Vidya & Prabheesh (2020) and the reduction in trade was forecasted to continue at least until the end of 2020. All of these decline in economic activities caused a global negative GDP growth (Maliszewska et al., 2020). This negative GDP growth were severe and long enough to be considered an economic recession.

In response to COVID-19, government had implemented various policies to stop the spread of COVID-19 pandemic (Hale et al., 2020). Government response to COVID-19 can be classified as Containment and Closure measure such as lockdown and travel ban policies, Economic measure such as stimulus package in form of income support and debt relief policies and Health system measure which tracks public health policies such as COVID-19 testing, mask mandate, vaccination and public information campaign. These policies were found to have impacts on stock market and economy as well. Overall, all three measures have positive impacts on both stock market return and economy as they alleviate the spread of COVID-19. Phan & Narayan (2020), Deng et al. (2022) and Narayan et al. (2021) found that containment and closure as well as economic measures have significant positive effect on stock market return. While Chang et al. (2021) showed that health system measure has a positive but small impact. As for it effect on economy, Economic measure directly increased income, Han et al. (2020). While containment and closure measure had mixed results since it also caused unemployment in short-term but as it stopped the spread of COVID-19, it should have positive effect on economy long-term. Therefore, government response to COVID-19 should reduce recession caused by COVID-19.

### **Time-varying Return Predictability**

Stock return predictability is a measure of how well a variable, the predictor, can predict equity premium (Rapach & Zhou, 2013). Return predictability was founded to be tied to business cycles. it increases in recession and weaken in expansion. To explain this phenomenon, Campbell & Cochrane (1999) and Cochrane (2008) built a consumption-based model showing that people become more risk averse when the economy is in recession and demand higher risk premium to invest in risky asset, leading to high return predictability. There were many research papers that confirmed Campbell and Cochrane model with real results such as Rapach et al. (2010) finding that US stock return predictability increased during recession. While Golez & Koudijs (2018) confirmed the same evidence as well for US and European countries by dating business cycles back for four hundred years and finding the increase in return predictability during recessions.

Aside from the dynamic of equity premium and expected return increasing return predictability, Henkel et al. (2011) mentioned that the change in return predictability may come from

dynamics of predictors. Macroeconomic interest rate variables such as short interest rate, term spread and default spread are the result of interaction between market participants and central banks. Short interest rate in expansion is usually persistence due to smoothing efforts by monetary authority where as in recession, interest rate become more varying and informative as a predictor. He suggested that term spread, a difference between long-term yield and short interest, also have similar properties to short interest. As for default yield spread, the spread between investment grade bond, is expected to be more informative in recession due to conservatism in accounting where company recognizes potential loss such as provision but not potential profit. The result is that company's yield becomes more informative during recession when there are more potential losses. As predictors become more informative in recession, predictive power of these variables increase resulting in higher return predictability.

### Hypothesis development

Since COVID-19 became a pandemic in 2020 and caused recession, researchers started looking for the increase in return predictability. Hong et al. (2021) found the increase in return predictability in the US. It happened in February which is around the same time stock market crashed. As equity premium and return predictability increased in the COVID-19 recession, the model by Campbell & Cochrane (1999) can explain why the stock price dropped in literature relating to the impact of COVID-19 and stock market return. When equity premium increases from a recession, the discount rate also increases and therefore reducing the value of the firm. The rise in return predictability is a byproduct of the rise in equity premium.

Since COVID-19 caused recession and recession increased return predictability, if government responses were able to reduce the spread of COVID-19 or alleviate recession we may be able to find these measures as factors explaining the decrease in return predictability. These assumptions lead to the following hypotheses

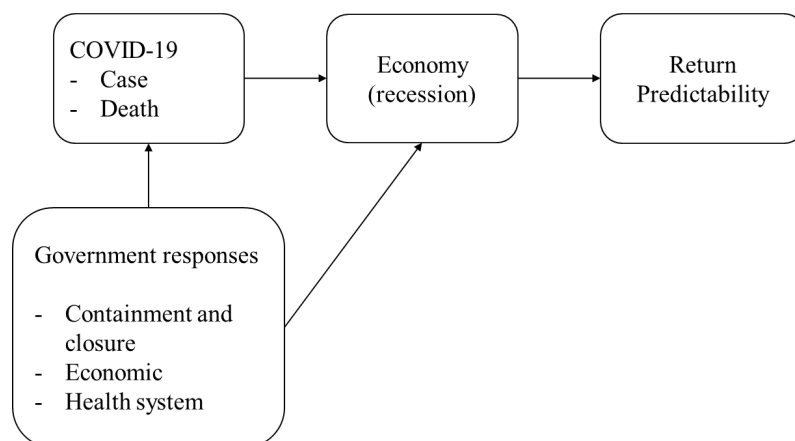


Figure 1. Conceptual frame work

H1: cases and deaths have a positive impact on return predictability.

Death and injury from COVID-19 reduce economic activities by reducing income and consumption. Therefore, they should intensify the recession causing an increase in return predictability.

H2: government responses have a negative impact on return predictability.

Economic measure aims to improves economy, while containment and closure measure along with health system measure reduce the spread of COVID-19. As the spread of COVID-19 is alleviated and economy recovers. The recession should de-intensify resulting in a decrease in return predictability.

## RESEARCH METHODOLOGY

### Data used in research

This paper covers the period from 2019-2021. Financial data are obtained from Bloomberg while data on COVID-19 and government response to COVID-19 are collected from Oxford COVID-19 tracker. This paper data's cover 41 countries ranging from secondary emerging stock markets to developed stock markets as classified by FTSE equity classification 2021 with the exception of Egypt, Hong Kong, Kuwait, Pakistan, Qatar and Saudi Arabia due to data availability. There are roughly two step in methodology and here is the methodology and data used for each step.

### Finding stock return predictability

Return predictability is obtained by finding monthly R squared from a regression where a predictor(X) and equity premium both from the previous period (daily) are regressed on equity premium(r) of the current period. Predictors used in this paper are interest rate variables including treasury bill, government bond, term spread and default yield spread as they are expected to have better ability to forecast during recession. Each predictor yields their own R squared.

$$r_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 r_{t-1} + \varepsilon_t$$

Determining the impact of government response to COVID-19 on stock return predictability Government responses are scored out of 100, categorized and then formed into a monthly index according to data from Oxford COVID-19 tracker. The indices include containment and closure index, economic response index and health system index. These indices along with dummy for cases and deaths from COVID-19, which are used as variables to account for the severity of COVID-19, along with control variables are regressed on monthly return predictability from the previous step to find the impact of COVID-19 and government response to COVID-19 on return predictability with a fixed effect model.

$$R^2_{it} = \alpha_1 + \beta_1 CC_{it} + \beta_2 E_{it} + \beta_3 HS_{it} + \beta_4 CASE_{it} + \beta_5 DEATH_{it} + \beta^c X^c_{it} + \varepsilon_{it}$$

Dependent variable:

$R^2$  = monthly return predictability obtained from each predictor in the previous step.

Independent variables:

CC = containment and closure index. It tracks policies related to lockdown and travel ban

E = economic index. It scores policies such as debt relieve and income support measures.

HS = health system index. Public health policies such as COVID-19 testing, mask mandate, public information service, healthcare and vaccination comprised this index

CASE = dummy for an increase in cases compared to previous month

DEATH = dummy for an increase in deaths compared to previous month

Control variables:

$X^c$  = suite of control variables, including PPI and stock market turnover, are used to control for different in stock market development level (Shamsuddin & Kim, 2010).

## RESEARCH RESULTS

Overall, government responses to COVID-19 are shown to have negative impacted on return predictability with each kind of response resulting in varying amount of changes in R squared from different predictors. All measures have at least one significant negative impact on the variety of return predictability from the predictors. The only type of return predictability to not detect significant effect from any regressor is the default yield spread but this could be due to the low sample size as unlike other predictors, most countries did not publish information on their default yield spread resulting in the lack of data. The result of the regression of government responses, cases and deaths on return predictability from the second equation is shown in Table 1.

From Table 1, both case and death dummies which accounted for the increase of case and death over the previous period have insignificant effect across all return predictability. These means both cases and death have no impact on return predictability despite earlier paper such as Ashraf (2020) noting the negative of case and death on stock return. Due to this finding, we fail to reject null hypothesis for hypothesis 1: deaths and cases have a positive impact on return predictability.

Next is the result of the impact of government responses to COVID-19 on return predictability, starting with health system measure, it turned out to be the measure with significant negative effect on all type of R squared except for default yield spread. Furthermore, the beta is the highest when compared to other government response measure. Health measure such as COVID-19 testing, mask mandate, public information campaign, vaccination and medicine can effectively reduce the impact of COVID-19 on the economy as it reduces the chance for the disease to spread in the first place. As the spread is prevented, the recession is alleviated and return predictability is reduced back to normal.

Table 1. Regression result of government responses, cases and death on return predictability

Variables	$R^2_{t\text{-bill}}$	$R^2_{\text{gov bond}}$	$R^2_{\text{term spread}}$	$R^2_{\text{default spread}}$
CC	-0.0613*** (0.0215)	-0.0047 (0.0219)	0.0008 (0.0218)	-0.0042 (0.0853)
E	-0.0193 (0.0165)	-0.0288** (0.0168)	-0.0163 (0.0167)	-0.0665 (0.0556)
HS	-0.0542** (0.0240)	-0.1161*** (0.0245)	-0.1134*** (0.0243)	0.0121 (0.0735)
CASE	0.1786 (0.7848)	0.3895 (0.7991)	0.1432 (0.7953)	0.6598 (2.4969)
DEATH	-0.8644 (0.7947)	-1.9081 (0.8092)	-2.0603 (0.8054)	-0.8018 (2.3330)
PPI	0.1312 (0.2538)	0.4607** (0.2584)	0.7032*** (0.2572)	-1.0155 (1.3669)
Market turnover	0.1211 (0.1202)	-0.0221 (0.1224)	0.0272 (0.1219)	0.5106 (0.3566)
Constant	18.9080*** (1.5569)	22.2526*** (1.5853)	20.5720*** (1.5779)	10.0740* (5.8543)
Observation	984	984	984	120
R-squared	0.0549	0.0733	0.0613	0.0561

Standard error in the parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Containment and closure measure is shown to have impact on return predictability as well and the impact is significant and negative for R squared from treasury bill. the lockdown and travel ban policies are proven to reduce the severity of the impact COVID-19 on economy by reducing the opportunities for COVID-19 to pass on from the infected to healthy people and alleviate the recession at the root of the problem resulting in a reduction in return predictability. Finally, Economic measure which include income support and debt relief has negative effect on return predictability but is only significant for model with R squared from government bond despite having a direct impact on the economy by increasing income and consumption. It also has the weakest negative effect of all measures as it has the lowest beta in absolute value. The results from all three government responses to COVID-19 were found to be consistent with our hypothesis 2: government responses have a negative impact on return predictability.

## **DISCUSSION & CONCLUSION**

### **Discussion**

Starting with the discussion on the results for death and case, we found no significant effect for both dummy variables contrary to Ashraf (2020) and my hypothesis. one possible explanation is that the research paper was published when COVID-19 was still considered a life-threatening disease with no vaccination and medication made specifically for it. People suffering from the disease were likely unable to engage in economic activities. Therefore, stock markets reacted strongly to the increase in cases and deaths early on. However, as time passed, vaccination and medicine had greatly improved. Cases and deaths from COVID-19 are viewed as not so different from common influenza's. Essentially, COVID became normalized and stock markets no longer reacted to it.

Next is the discussion on government response measures which include health system, containment and closure, and economic measures. All measures have a significant negative effects as hypothesized. Both containment and closure, and health system measure treated the problem at its root by stopping the spread of COVID-19 and ultimately reduced the recession from COVID-19. Therefore, they showed comparatively higher negative effects on return predictability than economic measure. Meanwhile, economic measure gave money via debt relief and income support directly to people affected by COVID-19. It increased income and consumption for the people, and successfully reduced the economic recession but it did not solve the COVID-19 pandemic itself which is the root cause for the recession. Therefore, it has lower impact compared to measures which aimed to reduce the spread of COVID-19.

### **Conclusion**

Campbell & Cochrane (1999) linked the increase in return predictability to recession due to risk aversion in USA. Later on, researchers would find similar results on many other stock markets. With the outbreak of COVID-19, Hong et al., (2021) proved that COVID-19 recession caused an increase in return predictability in USA. This study first finds return predictability in a global scale and then attempts to find variables in COVID-19 pandemic which could explain the change in return predictability.

Due to the effect of COVID-19 on people as well as the measures against it being extensively recorded, it gave this research an opportunity to examine which kind of government policies affects the performance of stock return predictability. The main contribution of this paper is to show that all government responses to COVID-19 which includes containment and closure, economic and health system can reduce the recession from COVID and cause the reduction in stock return predictability. These measures worked by either reducing the spread of COVID itself or the economic effects of it. Furthermore, this paper found that measures that were more direct to treating the root cause, the spread of COVID, such as health and containment policies are more effective than a measure which treats the symptom such as economic measure as viewed through the reduction in return predictability.

As for the limitation, this paper only studies one specific recession caused by COVID-19 pandemic. Therefore, the measures that were used are specific to public health policies with a few economic policies in the economic measure. Further studies can try to expand the scope by looking at recession that could be alleviated by a more general solution. This would allow researcher to find measures that can be more useful in normal recession and not just ones used for pandemic which is rarely a cause for recession.

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**Data Availability Statement:** The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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