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Finance Research Letters 38 (2021) 101732

Contents lists available at ScienceDirect

Finance Research Letters

journal homepage: www.elsevier.com/locate/frl

COVID-19 lockdowns, stimulus packages, travel bans, and stock returns

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ARTICLE INFO

Keywords:
COVID-19
Stock markets
G7

ABSTRACT

This paper examines the effect of government responses of G7 countries to the coronavirus pandemic (COVID-19) on stock market returns. Using time-series data, we show that lockdowns, travel bans, and economic stimulus packages all had a positive effect on the G7 stock markets. However, lockdowns were most effective in cushioning the effects of COVID-19. Our results are robust to different measures of returns and controls for other factors of returns.

1. Introduction

In this paper, we examine how government responses to COVID-19 effected stock markets of the G7 countries. This is an important issue to understand because as much as COVID-19 has been an unprecedented event, its scale has been matched by government policies to cushion its negative repercussions (Phan and Narayan, 2020). Governments responded with multiple policy approaches to minimize the repercussions of the pandemic. Travel bans (closing international borders), lockdowns (restricting the movement of people), and stimulus packages (to offer support to workers and businesses who lost jobs and output, respectively) were implemented not only in the G7 countries but became key policy tools across the globe. It is, therefore, imperative to understand what effect these policies had on the stock markets. Our hypothesis is that these policies, because they mitigate the spread of COVID-19 and help subdue panic, had a positive effect on stock markets. Our hypothesis is rooted in the investor sentiment driven stock return hypothesis. Several studies (see Baker and Wurgler, 2006; Chen et al., 2020; Yu and Yuan, 2011; Narayan, 2019) show that investor sentiment influences stock returns. We argue that when the market is down, faced with a pandemic such as COVID-19, government policies that mitigate the effects of the pandemic will have a positive effect on stock returns.

We test this hypothesis using time series predictive regression models fitted to daily time series data for G7 countries. The regression models are specified to test and understand the effects on stock returns of government policies—namely, country lockdown, stimulus packages, and travel bans. Our analysis unravels that while all policies, on aggregate, had a positive effect on the G7 country stock market excess returns, country lockdown influenced returns in most (5/7) countries followed by stimulus packages (3/7 countries) and travel bans (2/7 countries). These findings are robust to controls for key factors of returns. Indeed, our goal is not to judge the effectiveness of government policies in a comparative manner. Our idea is to evaluate the aggregate effect of government policies in mitigating the effects of COVID-19 on stock markets.

Our findings contribute to an evolving literature on the economic and financial effects of COVID-19. This literature has examined

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https://doi.org/10.1016/j.frl.2020.101732
Received 7 June 2020; Received in revised form 22 July 2020; Accepted 20 August 2020
Available online 20 August 2020
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Table 1
Descriptive statistics.
This table reports the list of stock indexes (Panel A) and events (Panel B). Panel C has descriptive statistics, namely, mean of stock price index returns, its standard deviation (SD), skewness, kurtosis, the Jarque–Bera (JB) test of non-normality of returns, autocorrelation-the first-order autoregressive (AR(1)), and a test for heteroskedasticity (ARCH). The null hypothesis of normality is based on the *p*-value from the JB test. ARCH (1) refers to a Lagrange multiplier test of the zero-slope restriction in an ARCH regression of order 1 and the *p*-value of the test is reported.

Panel A: List of stock indexes

Country	Stock index
Canada	S&P/TSX Composite Index
France	France CAC 40
Germany	Dax 30 Performance
Italy	FTSE MIB Index
Japan	Nikkei 225 Stock Average
United Kingdom	FTSE All Share
United States	S&P 500 Composite

Panel B: List of events

Country	Lockdown	Stimulus package	Travel ban
Canada	16-Mar-20	18-Mar-20	16-Mar-20
France	16-Mar-20	17-Mar-20	17-Mar-20
Germany	20-Mar-20	1-Mar-20	17-Mar-20
Italy	10-Mar-20	11-Mar-20	10-Mar-20
Japan	13-Mar-20	5-Mar-20	1-Feb-20
United Kingdom	16-Mar-20	17-Mar-20	25-Mar-20
United States	19-Mar-20	6-Mar-20	31-Jan-20

Panel C: Descriptive statistics

Country	Mean	SD	Skewness	Kurtosis	JB	AR(1)		ARCH(1)
Canada	-0.079	2.142	-1.430	19.846	0.000	-0.299	(0.000)	0.001
France	-0.119	1.885	-2.019	17.211	0.000	0.008	(0.859)	0.190
Germany	-0.094	1.877	-1.448	19.542	0.000	0.025	(0.697)	0.834
Italy	-0.114	2.183	-3.471	31.366	0.000	-0.098	(0.011)	0.246
Japan	-0.057	1.516	0.291	10.099	0.000	0.164	(0.000)	0.000
United Kingdom	-0.134	1.679	-1.524	16.344	0.000	0.029	(0.473)	0.053
United States	-0.027	2.185	-0.823	13.364	0.000	-0.395	(0.000)	0.000

how COVID-19 pandemic has influenced the oil market (see Salisu and Adediran 2020; Narayan, 2020; Gil-Alana and Monge, 2020; Devpura and Narayan, 2020; Iyke, 2020a; Qin et al., 2020; Huang and Zheng, 2020; Prabheesh et al. 2020 and Liu et al., 2020); stock market (see Lyócsa et al., 2020; Lyócsa and Molnár, 2020; Mishra et al. 2020; Zhang et al., 2020; Haroon and Rizvi, 2020; Ali et al., 2020; Al-Awadhi et al., 2020); corporate performance (Fu and Shen, 2020; Shen et al. 2020); exchange rates (Iyke, 2020b); global trade and insurance (C.T and Prabheesh, 2020; Wang et al. 2020); industry and sector effects (He et al. 2020a, b; Xiong et al. 2020; Gu et al. 2020); fear and sentiment effects (Chen et al., 2020; Salisu and Akanni, 2020) and politics and environment (see Apergis and Apergis, 2020; Ming et al. 2020).

Of these studies, our work is most closely related to the literature on COVID-19 and stock markets. None of these studies explore the role of specific government policies (lockdowns, stimulus packages, and travel bans) on the stock market. Our study is, therefore, the first to evaluate the how COVID-19 pandemic related government policies affected the stock market and in doing so complements not only the literature on COVID-19 and stock markets but the overall literature on COVID-19's effect on the financial and economic systems.

2. Data and results

2.1. A. Data

Our data is time-series and covers the sample July 1, 2019 to April 16, 2020. Financial data are collected from Datastream. Crude oil price (proxied by WTI crude oil price) is collected from the U.S. Energy Information Administration (EIA); see https://www.eia.gov/. The dates for each event (travel ban, lockdown, and the stimulus package) are collected from various internet sources such as the WHO website, the New York Times, the Washington Post, BBC, CNN, CNBC, and the Guardian.

Table 1 has details on stock indexes (Panel A) and list of events (Panel B). With reference to Panel B, to summarize, we see that: (a) of the G7 countries, Italy was first to lockdown (March 10, 2020) followed by Japan (March 13, 2020); (b) Germany (March 20, 2020) and the US (March 19, 2020) locked down much later; (c) the US was the first to start travel ban (January 31, 2020) followed by Japan (February 1, 2020); (d) France and Germany imposed travel bans much later (March 17, 2020); and (e) stimulus packages were announced immediately following the lockdown in Canada, France, Italy, and the UK while in Germany, Japan and the US packages were announced well before the lockdown. The message is that amongst the G7 countries, there is no consistency in terms of government responses to the COVID-19 pandemic. This opens the possibility that these government responses would likely have different

Table 2
Effect of national lockdowns on stock returns.
This table reports the results for testing the effect of national lockdowns on stock returns. The regression model has the following form: $Return_t = \alpha + \sum_{i=1}^{5}\beta_i LOCKDOWN_{t-i} + \beta_5 OIL_{t-1} + \beta_6 Return_{t-1} + \beta_7 VOL_{t-1} + \beta_8 MON_t + \beta_9 TUE_t + \beta_{10} THU_t + \beta_{11} FRI_t + \varepsilon_t$ where $Return_t$ is country stock index return;$LOCKDOWN_t$ is the dummy variable equal 1 if the country is in lockdown and zero otherwise; OIL_t is the WTI crude oil return; VOL_t is the stock return volatility; MON_t, TUE_t, THU_t, and FRI_t are dummy variables that control for day-of-week effect. The *p*-values are generated after correcting for Newey and West (1987) standard errors that are robust to heteroskedasticity and autocorrelation of up to 12 lags. We report the sum of the lagged coefficients and the *p*-value of the Wald test examining the null hypothesis of $\sum_{i=1}^{5}\beta_i = 0$. Finally, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Canada	France	Germany	Italy	Japan	UK	US
$LOCKDOWN_{t-1}$	6.001**	6.722***	-0.793	0.384	0.133	5.141***	-1.157
	(0.011)	(0.000)	(0.368)	(0.371)	(0.906)	(0.000)	(0.246)
$LOCKDOWN_{t-2}$	-7.170***	-9.685***	11.995***	-19.627***	4.501***	-6.680***	-2.974***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
$LOCKDOWN_{t-3}$	6.431***	8.399***	-8.039***	29.228***	-2.160***	5.036***	12.658***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$LOCKDOWN_{t-4}$	-3.029*	2.722***	0.383	-18.574***	0.465	0.735	-1.427
	(0.067)	(0.005)	(0.673)	(0.000)	(0.125)	(0.226)	(0.336)
$LOCKDOWN_{t-5}$	-0.042	-6.627***	-2.588**	8.848***	2.458***	-2.492***	-5.183***
	(0.978)	(0.000)	(0.040)	(0.000)	(0.003)	(0.000)	(0.000)
OIL_{t-1}	0.027	0.045	0.027	0.013	0.039*	0.024	0.054**
	(0.472)	(0.230)	(0.460)	(0.720)	(0.077)	(0.424)	(0.043)
$Return_{t-1}$	-0.237	0.014	-0.024	0.152	-0.032	0.033	-0.533***
	(0.112)	(0.898)	(0.820)	(0.102)	(0.755)	(0.736)	(0.000)
VOL_{t-1}	-0.046***	-0.066**	-0.048*	0.012	-0.475***	-0.083***	-0.033**
	(0.002)	(0.027)	(0.090)	(0.178)	(0.001)	(0.001)	(0.030)
MON_t	-0.511	-0.443	-0.100	-0.237	-0.297	-0.186	-0.268
	(0.268)	(0.327)	(0.812)	(0.588)	(0.332)	(0.641)	(0.563)
TUE_t	0.188	0.318	0.418	0.599*	0.367	0.371	0.116
	(0.475)	(0.281)	(0.171)	(0.085)	(0.177)	(0.175)	(0.679)
THU_t	-0.260	-0.162	-0.045	0.462	-0.243	-0.194	0.080
	(0.496)	(0.718)	(0.919)	(0.168)	(0.492)	(0.613)	(0.855)
FRI_t	-0.204	-0.121	0.185	-0.280	0.070	0.009	0.038
	(0.537)	(0.728)	(0.602)	(0.385)	(0.798)	(0.978)	(0.910)
Constant	0.086	0.042	-0.129	-0.231	0.437	-0.048	-0.024
	(0.647)	(0.860)	(0.603)	(0.314)	(0.116)	(0.816)	(0.922)
$\bar{R}^2$	0.239	0.154	0.175	0.452	0.182	0.107	0.331
Wald test	2.191**	1.530*	0.958	0.259	5.397***	1.740*	1.917**
	(0.018)	(0.091)	(0.193)	(0.668)	(0.003)	(0.053)	(0.019)

effects on their stock markets.

We use stock index prices to calculate the stock returns for each country. Their descriptive statistics reported in Panel C display the usual features associated with high-frequency stock price data—namely, fat-tailed distribution and a left-skewed distribution—both implying (and supported by the Jarque-Bera test) that returns are not normally distributed. Further tests of persistency and heteroskedasticity suggest, as expected, that returns are less persistent and characterized by heteroskedasticity. The overall implication from these statistics is that while the OLS model will be sufficient, heteroskedasticity and volatility should be controlled for. Moreover, we conclude that while returns are stationary, controlling its persistency will lead to no loss of information.

2.2. B. Results

Our empirical model for modelling stock returns based on daily data follows Garcia (2013) in terms of specification. In addition to controls for volatility and day of the week effects, we also control for oil price effects given the well-established empirical association between stock returns and oil prices (see Narayan and Sharma, 2011). The regression model has the following form:

$$Return_t = \alpha + \sum_{i=1}^{5}\beta_i GOVT_{t-i} + \beta_5 OIL_{t-1} + \beta_6 Return_{t-1} + \beta_7 VOL_{t-1} + \beta_8 MON_t + \beta_9 TUE_t + \beta_{10} THU_t + \beta_{11} FRI_t + \varepsilon_t$$

where $Return_t$ is country stock index return;$GOVT_t$ represents one of the three government policies we consider and is in the form of a dummy variable that is equal to 1 if the country has imposed say a lockdown and zero otherwise. In a similar way, dummy variables for stimulus package and travel ban are constructed using dates reported in Table 1. Furthermore, OIL_t is the WTI crude oil price returns; VOL_t is the stock return volatility, which is proxied by the variance generated from a GARCH(1,1) model; and MON_t, TUE_t, THU_t, FRI_t are dummy variables that control for day-of-week effects. The regression is estimated using OLS and the *p*-values are corrected for the Newey and West (1987) standard errors that are robust to heteroskedasticity and autocorrelation of up to 12 lags. We report the sum of the lagged coefficients and *p*-values of a Wald test with the null hypothesis that $\sum_{i=1}^{5}\beta_i = 0$. We test the effect of lockdown over a week

Table 3
Effect of stimulus packages on stock returns.
This table reports the results for testing the effect of stimulus packages on stock returns. The regression model has the following form: $Return_t = \alpha + \sum_{i=1}^{5}\beta_i PACKAGE_{t-i} + \beta_5 OIL_{t-1} + \beta_6 Return_{t-1} + \beta_7 VOL_{t-1} + \beta_8 MON_t + \beta_9 TUE_t + \beta_{10} THU_t + \beta_{11} FRI_t + \varepsilon_t$ where $Return_t$ is country stock index return;$PACKAGE_t$ is the dummy variable that equals 1 from the day the stimulus package was announced and zero otherwise; OIL_t is the WTI crude oil price return; VOL_t is the stock return volatility; MON_t, TUE_t, THU_t, and FRI_t are dummy variables that control for day-of-week effect. The *p*-values are generated after correcting for Newey and West (1987) standard errors that are robust to heteroskedasticity and autocorrelation of up to 12 lags. We report the sum of the lagged coefficients and the *p*-value of the Wald test examining the null hypothesis of $\sum_{i=1}^{5}\beta_i = 0$. Finally, ** *, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Canada	France	Germany	Italy	Japan	UK	US
$PACKAGE_{t-1}$	4.314***	-4.309***	0.717	-18.948***	-2.975***	-2.386**	-7.515***
	(0.003)	(0.007)	(0.137)	(0.000)	(0.000)	(0.014)	(0.000)
$PACKAGE_{t-2}$	-2.613	8.651***	0.805*	29.366***	-1.110*	5.178***	9.503***
	(0.246)	(0.000)	(0.064)	(0.000)	(0.058)	(0.000)	(0.000)
$PACKAGE_{t-3}$	-6.135***	2.655***	-2.784***	-18.109***	6.247***	0.849	-3.273
	(0.000)	(0.006)	(0.000)	(0.000)	(0.000)	(0.177)	(0.155)
$PACKAGE_{t-4}$	15.043***	-9.229***	-2.127***	10.309***	-4.565***	-6.547***	-9.849***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)
$PACKAGE_{t-5}$	-8.726***	3.500***	3.579***	-2.277	2.709*	4.546***	13.202***
	(0.000)	(0.005)	(0.001)	(0.156)	(0.072)	(0.000)	(0.000)
OIL_{t-1}	0.027	0.037	0.031	0.016	0.033	0.023	0.025
	(0.465)	(0.284)	(0.365)	(0.683)	(0.141)	(0.447)	(0.217)
$Return_{t-1}$	-0.279	0.004	0.006	0.163*	0.160	0.010	-0.483***
	(0.164)	(0.976)	(0.941)	(0.065)	(0.276)	(0.927)	(0.001)
VOL_{t-1}	-0.036***	-0.036	-0.022	0.005	-0.027	-0.058**	-0.045***
	(0.000)	(0.219)	(0.562)	(0.706)	(0.909)	(0.024)	(0.009)
MON_t	-0.336	-0.392	-0.152	-0.260	-0.221	-0.105	-0.371
	(0.401)	(0.350)	(0.712)	(0.562)	(0.439)	(0.769)	(0.455)
TUE_t	0.136	0.438	0.674*	0.545	0.434	0.467*	0.025
	(0.590)	(0.125)	(0.088)	(0.121)	(0.151)	(0.088)	(0.934)
THU_t	-0.222	-0.163	0.052	0.446	-0.243	-0.205	0.192
	(0.578)	(0.715)	(0.904)	(0.184)	(0.551)	(0.591)	(0.533)
FRI_t	-0.171	-0.120	0.271	-0.304	0.157	-0.001	-0.229
	(0.579)	(0.721)	(0.419)	(0.350)	(0.555)	(0.996)	(0.532)
Constant	0.034	-0.034	-0.171	-0.188	0.002	-0.106	0.135
	(0.853)	(0.880)	(0.488)	(0.420)	(0.996)	(0.586)	(0.607)
$\overline{R}^2$	0.334	0.121	-0.003	0.455	0.090	0.105	0.420
Wald test	1.884**	1.268	0.190	0.341	0.306	1.640*	2.069**
	(0.016)	(0.167)	(0.877)	(0.576)	(0.905)	(0.099)	(0.034)

(5-day), thus we use five lags. The results are reported in Table 2. Consider individual lagged coefficients: we find that 26 out of 35 coefficients of *LOCKDOWN* are statically significant. However, the signs are mixed. Thirteen negative coefficients and 13 positive coefficients are found. These type of reactions to news in financial markets are attributed to investor under reaction and over reaction (see Narayan and Sharma, 2011 and Iyke 2020). We focus on the sum of the effects presented as the Wald test, which has the joint null hypothesis that the sum of effects over the five days is zero. The Wald test results are reported in the last row. The sum effects are important when shocks persist over time because they tell us the aggregate or net effect of the shock. This is what we discover. The first message of our results is that the effect of lockdown on stock returns is positive, largest for Japan (5.397%, *p*-value = 0.003) and weakest for Italy (0.259%, *p*-value = 0.668). Only for Germany and Italy, the effect of lockdown is statistically zero, suggesting no effect on their stock returns. For the other five countries, each day of lockdown improved stock returns by between 1.53% (France) to 5.397% (Japan).

We read evidence on *PACAKGE*. Out of 35 *PACKAGE* coefficients, 10 are positive and statistically significant. The Wald test with the joint null hypothesis that the sum of effects over the five days is zero is rejected in three (Canada, the UK, and the US) out of seven countries. For the other countries, the announcement and onset of stimulus packages did not positively move stock returns (Table 3). Finally, with travel ban, again we see that it was ineffective for Germany and Italy but effective for all other markets (Table 4).[1]

We conclude the results with a robustness test. One way our results could be sensitive is the way we treat our dependent variable. We consider stock price index returns. The literature on asset pricing has also used excess return; that is, index returns less the risk-free

[1] In three countries, two of the three policies take place on the same day. These countries are Canada (lockdown and travel ban on 16 March), France (stimulus package and travel ban on 17 March), and Italy (lockdown and travel ban on 10 March). Therefore, for these countries the direct or explicit effectiveness of specific policies cannot be judged. Indeed, our goal is not to judge the effectiveness (or undertake a horse race) of government policies. Our contribution is merely to evaluate the aggregate effect of government policies in mitigating the effects of COVID-19 on stock markets. Future research, as time progresses, will have more scope (with greater availability of data) to construct policy effectiveness indices to judge the effectiveness of specific policies. In any such future work, greater emphasis should be placed on those countries we identify here as undergoing simultaneous change in policy.

Table 4
Effect of travel bans on stock returns.
This table reports the results for testing the effect of travel bans on stock returns. The regression model has the following form: $Return_t = \alpha + \sum_{i=1}^{5}\beta_i TRAVELBAN_{t-i} + \beta_5 OIL_{t-1} + \beta_6 Return_{t-1} + \beta_7 VOL_{t-1} + \beta_8 MON_t + \beta_9 TUE_t + \beta_{10} THU_t + \beta_{11} FRI_t + \varepsilon_t$ where $Return_t$ is country stock index return; $TRAVELBAN_t$ is the dummy variable that equals 1 if the country is in travel ban phase and zero otherwise; OIL_t is the WTI crude oil return; VOL_t is the stock return volatility; MON_t, TUE_t, THU_t, and FRI_t are dummy variables that control for day-of-week effect. The *p*-values are generated after correcting for Newey and West (1987) standard errors that are robust to heteroskedasticity and autocorrelation of up to 12 lags. We report the sum of the lagged coefficients and the *p*-value of the Wald test examining the null hypothesis of $\sum_{i=1}^{5}\beta_i = 0$. Finally, ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Canada	France	Germany	Italy	Japan	UK	US
$TRAVELBAN_{t-1}$	6.001**	6.722***	-0.793	0.384	0.133	5.141***	-1.157
	(0.011)	(0.000)	(0.368)	(0.371)	(0.906)	(0.000)	(0.246)
$TRAVELBAN_{t-2}$	-7.170***	-9.685***	11.995***	-19.627***	4.501***	-6.680***	-2.974***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
$TRAVELBAN_{t-3}$	6.431***	8.399***	-8.039***	29.228***	-2.160***	5.036***	12.658***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$TRAVELBAN_{t-4}$	-3.029*	2.722***	0.383	-18.574***	0.465	0.735	-1.427
	(0.067)	(0.005)	(0.673)	(0.000)	(0.125)	(0.226)	(0.336)
$TRAVELBAN_{t-5}$	-0.042	-6.627***	-2.588**	8.848***	2.458***	-2.492***	-5.183***
	(0.978)	(0.000)	(0.040)	(0.000)	(0.003)	(0.000)	(0.000)
OIL_{t-1}	0.027	0.045	0.027	0.013	0.039*	0.024	0.054**
	(0.472)	(0.230)	(0.460)	(0.720)	(0.077)	(0.424)	(0.043)
$Return_{t-1}$	-0.237	0.014	-0.024	0.152	-0.032	0.033	-0.533***
	(0.112)	(0.898)	(0.820)	(0.102)	(0.755)	(0.736)	(0.000)
VOL_{t-1}	-0.046***	-0.066**	-0.048*	0.012	-0.475***	-0.083***	-0.033**
	(0.002)	(0.027)	(0.090)	(0.178)	(0.001)	(0.001)	(0.030)
MON_t	-0.511	-0.443	-0.100	-0.237	-0.297	-0.186	-0.268
	(0.268)	(0.327)	(0.812)	(0.588)	(0.332)	(0.641)	(0.563)
TUE_t	0.188	0.318	0.418	0.599*	0.367	0.371	0.116
	(0.475)	(0.281)	(0.171)	(0.085)	(0.177)	(0.175)	(0.679)
THU_t	-0.260	-0.162	-0.045	0.462	-0.243	-0.194	0.080
	(0.496)	(0.718)	(0.919)	(0.168)	(0.492)	(0.613)	(0.855)
FRI_t	-0.204	-0.121	0.185	-0.280	0.070	0.009	0.038
	(0.537)	(0.728)	(0.602)	(0.385)	(0.798)	(0.978)	(0.910)
Constant	0.086	0.042	-0.129	-0.231	0.437	-0.048	-0.024
	(0.647)	(0.860)	(0.603)	(0.314)	(0.116)	(0.816)	(0.922)
$\bar{R}^2$	0.239	0.154	0.175	0.452	0.182	0.107	0.331
Wald test	2.191**	1.530*	0.958	0.259	5.397***	1.740*	1.917**
	(0.018)	(0.091)	(0.193)	(0.668)	(0.003)	(0.053)	(0.019)

rate of return. We conduct all tests using excess returns as a dependent variable. The risk-free rate of return is proxied by the country's three-month Treasury bill rate. Our results hold except for those on travel ban; see Table 5. With raw returns, travel bans impacted stock returns of five countries while with excess returns it only influenced returns of two countries. We take excess return-based results as our main results. Although, strictly speaking, we cannot compare the effectiveness of the three policies given that some policies were implemented almost simultaneously (see Footnote 1), we can infer that government policies on aggregate did work to cushion the effect of COVID-19 on the stock markets. Country lockdown worked in 5/7 countries (except Germany and Italy). Stimulus packages improved stock market returns in Canada, the UK and the US while travel bans boosted stock returns of Canada and Germany only.

3. Concluding remarks

This paper attempts to understand the effects on stock returns from government policies—namely, country lockdown, stimulus packages, and travel bans—on stock returns. Using a time-series regression model that controls for well-known factors of returns (and in excess returns as part of robustness tests), we demonstrate that all policies on aggregate had a positive effect on the G7 country stock market excess returns. Our analysis and findings contribute to the literature on understanding the mitigating effects of COVID-19 pandemic via specific government policies. Ours is the first study to empirically evaluate the effect of government policies to counter the repercussions of COVID-19. We stop short of claiming that any specific policy was more effective. Our empirical setup does not allow us to make such a claim. We leave this for future research.

CRediT authorship contribution statement

Paresh Kumar Narayan: Investigation, Methodology, Writing - original draft, Supervision, Writing - review & editing. **Dinh Hoang Bach Phan:** Methodology, Formal analysis, Data curation, Conceptualization, Writing - review & editing. **Guangqiang Liu:** Conceptualization, Formal analysis, Writing - review & editing.

Table 5
Robustness tests
This table reports results for a robustness test using excess returns. See notes in previous tables.

Panel A: Lockdown							
	Canada	France	Germany	Italy	Japan	UK	US
$LOCKDOWN_{t-1}$	6.003**	6.722***	-0.793	0.384	0.133	5.142***	-1.156
	(0.011)	(0.000)	(0.368)	(0.371)	(0.905)	(0.000)	(0.247)
$LOCKDOWN_{t-2}$	-7.168***	-9.685***	11.994***	-19.627***	4.501***	-6.680***	-2.970***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
$LOCKDOWN_{t-3}$	6.432***	8.399***	-8.039***	29.228***	-2.160***	5.036***	12.658***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$LOCKDOWN_{t-4}$	-3.029*	2.722***	0.383	-18.574***	0.465	0.735	-1.423
	(0.067)	(0.005)	(0.674)	(0.000)	(0.125)	(0.226)	(0.337)
$LOCKDOWN_{t-5}$	-0.039	-6.628***	-2.588**	8.848***	2.458***	-2.491***	-5.184***
	(0.979)	(0.000)	(0.040)	(0.000)	(0.003)	(0.000)	(0.000)
Wald test	2.199**	1.530*	0.957	0.259	5.397***	1.742*	1.925**
	(0.018)	(0.091)	(0.193)	(0.668)	(0.003)	(0.052)	(0.019)
Panel B: Stimulus package							
	Canada	France	Germany	Italy	Japan	UK	US
$PACKAGE_{t-1}$	4.317***	-4.309***	0.717	-18.948***	-2.975***	-2.385**	-7.508***
	(0.003)	(0.007)	(0.137)	(0.000)	(0.000)	(0.014)	(0.000)
$PACKAGE_{t-2}$	-2.611	8.651***	0.805*	29.366***	-1.110*	5.178***	9.502***
	(0.247)	(0.000)	(0.064)	(0.000)	(0.058)	(0.000)	(0.000)
$PACKAGE_{t-3}$	-6.134***	2.655***	-2.784***	-18.108***	6.247***	0.849	-3.274
	(0.000)	(0.006)	(0.000)	(0.000)	(0.000)	(0.176)	(0.155)
$PACKAGE_{t-4}$	15.042***	-9.229***	-2.127***	10.309***	-4.565***	-6.547***	-9.847***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)
$PACKAGE_{t-5}$	-8.722***	3.500***	3.578***	-2.277	2.709*	4.546***	13.205***
	(0.000)	(0.005)	(0.001)	(0.156)	(0.072)	(0.000)	(0.000)
Wald test	1.892**	1.268	0.189	0.341	0.306	1.642*	2.078**
	(0.015)	(0.168)	(0.877)	(0.576)	(0.905)	(0.099)	(0.033)
Panel C: Travel ban							
	Canada	France	Germany	Italy	Japan	UK	US
$TRAVELBAN_{t-1}$	6.003**	-4.309***	-3.493***	0.384	0.245	4.361***	0.232
	(0.011)	(0.007)	(0.005)	(0.371)	(0.347)	(0.005)	(0.542)
$TRAVELBAN_{t-2}$	-7.168***	8.651***	7.359***	-19.627***	0.680**	-8.094***	1.482**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.034)	(0.000)	(0.014)
$TRAVELBAN_{t-3}$	6.432***	2.655***	2.354***	29.228***	1.422***	5.934***	-0.065
	(0.000)	(0.006)	(0.001)	(0.000)	(0.001)	(0.000)	(0.853)
$TRAVELBAN_{t-4}$	-3.029*	-9.229***	-7.131***	-18.574***	-3.006***	0.857	-1.064***
	(0.067)	(0.000)	(0.000)	(0.000)	(0.000)	(0.361)	(0.009)
$TRAVELBAN_{t-5}$	-0.039	3.500***	2.748***	8.848***	-0.033	-2.593**	-0.736
	(0.979)	(0.005)	(0.003)	(0.000)	(0.960)	(0.013)	(0.384)
Wald test	2.199**	1.268	1.838*	0.259	-0.692	0.465	-0.151
	(0.018)	(0.168)	(0.063)	(0.668)	(0.160)	(0.530)	(0.817)

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.frl.2020.101732.

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