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How stock markets reacted to COVID-19? Evidence from 25 countries

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ABSTRACT
The objective of this paper is to analyse how COVID-19 related government policies influenced stock markets. Of the 25 countries we consider, stock returns did not react to any of the three policies – the stimulus package, lockdown, and travel ban in 20% of countries. For around 48% of countries, the effect on returns was negative, due largely to the stimulus package and lockdown policies. Of the 13 countries that experienced a change in the cash rate, returns were negative for 46% of the markets. The travel ban had the least effect on stock returns.

1. Introduction
It is not difficult to see why pandemics, such as the current COVID-19, would have a negative effect on financial markets (Haroon and Rizvi, 2020). The unprecedented nature of COVID-19 has motivated several studies to explore its effects on different aspects of the global economic system. To summarize this literature and its features, consider the following recent developments. There are studies that examine contagion effects due to COVID-19 (see Corbet et al., 2020; Akhtaruzzaman et al., 2020), the effect of COVID-19 on other assets like bitcoin or oil (see Conlon and McGee, 2020; Chen et al., 2020; Gil-Alana and Monge, 2020; Qin et al., 2020; Lyke 2020a; Huang and Zheng, 2020); stock markets (see Gil-Alana and Claudio-Quiroga, 2020; Zhang et al., 2020; Haroon and Rizvi, 2020; Ali et al., 2020; Al-Awadhi et al., 2020; Prabheesh et al., 2020; Salisu and Sikiru, 2020); corporate performance of energy firms (Fu and Shen, 2020; Shen et al., 2020); politics (see Apergis and Apergis 2020); exchange rate predictability and evolution (Iyke, 2020b; Narayan, 2020); global trade (C.T. and Prabheesh, 2020); air quality (Ming et al., 2020); labour market (Yu et al., 2020; Zhang et al., 2020); policy uncertainty (Iyke, 2020c); market volatility (Sharma, 2020); and insurance market (Wang et al., 2020).

We add to this literature by studying the stock market response to government policies. It is unclear which specific government policies (namely, lockdown, the stimulus package, travel ban, or monetary policy), and to what extent, have impacted stock returns. Our hypothesis is that a priori the effect of government policies on stock returns is indeterminate because while on the one hand policies, such as lockdown and travel ban, help mitigate the spread of the virus, on the other hand, they reduce economic activity.

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1 It is impossible to cite all studies given the evolution nature of research on COVID-19. For a non-econometric analysis of COVID-19, see Tisdell (2020) and for a central bank perspective, see Debelle (2020).

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Our hypothesis is somewhat related to Zaremba et al. (2020), who use the government response stringency index to evaluate the response of stock market volatility. They show that volatility was a result of government responses. Less related to our hypothesis is the work of Zhang et al. (2020), who study the effect of macroeconomic events in the US (zero-percent interest rate and unlimited quantitative easing) on stock market volatility.

Our hypothesis is broadly related to these studies but different in the following way. We consider specific dates of country lockdown, the fiscal stimulus package, and travel ban. None of these three policy responses has been evaluated in terms of how they instigated stock market reactions within an event study framework. A large sample of markets, analysed within an event study framework, allows us to deduce patterns such as, for instance, whether COVID-19 led to return reversals or drifts. Our approach offers two interesting findings. First, we discover that government policy responses have had a heterogeneous effect on country stock returns. In 20% of the countries, for instance, none of the policies had any statistically significant effect on returns. The fiscal stimulus package and country lockdowns had a negative effect on returns for most countries (between 40 and 48% of countries). The travel ban, by contrast, had the least negative effect. Second, in about 40% of the countries there is evidence of both return reversals and drifts. In these countries, however, return drifts are the dominant feature of a market’s reaction to the COVID-19 pandemic. Third, we also consider monetary policy by considering the first change in the cash rate. We find that the returns of five markets reacted positively to a change in the cash rate, while the fiscal stimulus package had resulted in positive returns for three markets only. Our findings pass several robustness tests.

Our hypothesis is somewhat related to the work of Zhang et al. (2020), who study the effect of macroeconomic events in the US (zero-percent interest rate and unlimited quantitative easing) on stock market volatility. Our hypothesis is broadly related to these studies but different in the following way. We consider specific dates of country lockdown, the fiscal stimulus package, and travel ban. None of these three policy responses has been evaluated in terms of how they instigated stock market reactions within an event study framework. A large sample of markets, analysed within an event study framework, allows us to deduce patterns such as, for instance, whether COVID-19 led to return reversals or drifts. Our approach offers two interesting findings. First, we discover that government policy responses have had a heterogeneous effect on country stock returns. In 20% of the countries, for instance, none of the policies had any statistically significant effect on returns. The fiscal stimulus package and country lockdowns had a negative effect on returns for most countries (between 40 and 48% of countries). The travel ban, by contrast, had the least negative effect. Second, in about 40% of the countries there is evidence of both return reversals and drifts. In these countries, however, return drifts are the dominant feature of a market’s reaction to the COVID-19 pandemic. Third, we also consider monetary policy by considering the first change in the cash rate. We find that the returns of five markets reacted positively to a change in the cash rate, while the fiscal stimulus package had resulted in positive returns for three markets only. Our findings pass several robustness tests.

These findings contribute to the new literature on COVID-19. Our study, for instance, is closely related to He et al. (2020) and He et al. (2020), who show that COVID-19 affects sectors and industries, respectively, in a heterogeneous manner. Iyke (2020b) shows that firm returns, and volatility, respond heterogeneously to COVID-19 in the case of US gas and oil companies. Using a different approach (event study) and examining a different question (effectiveness of government policies), we also find that those policies did not have a homogenous effect on all 25 countries in our sample. In fact, in 20% of the countries, we do not find any statistically significant effect of policies. Overall, our finding is consistent with the nascent literature on COVID-19 suggesting that the COVID-19 experience of each country and each firm is likely to be different. Our finding is also consistent with Klose and Tillmann (2020), who find that monetary policies have been proven to be more effective in quickly boosting investors’ confidence and stock markets than fiscal policies.

2. Methodology

The empirical analysis is based on an event study methodology. We examine the impact of COVID-19 events on the performance of the benchmark equity index returns of 25 countries. For each country, we start by computing the daily returns for all the firms in our sample. The abnormal returns are computed using both the CAPM and Fama and French (1993) three-factor models, which the following regression:

\[ R_{i,t} = \alpha_{i,t} + \beta_{i,t}(R_{m,t} - R_{f,t}) + \hat{SMB}_{i,t} \times SMB + \hat{HML}_{i,t} \times HML \] (1)
| Country/Events | $-5$ | $-4$ | $-3$ | $-2$ | $-1$ | $0$ | $+1$ | $+2$ | $+3$ | $+4$ | $+5$ |
|---------------|------|------|------|------|------|-----|------|------|------|------|------|
| US            | $-0.34^{**}$ | $-0.41^{***}$ | $0.14^*$ | $-0.29^{***}$ | $-0.26^{***}$ | $-0.99^{***}$ | $0.24^*$ | $-0.61^{***}$ | $-0.102^{***}$ | $-0.037^{***}$ | $-0.03^{***}$ |
| Spain         | $(2.85)$ | $(3.22)$ | $(1.81)$ | $(0.67)$ | $(2.68)$ | $(2.17)$ | $(3.02)$ | $(1.82)$ | $(3.69)$ | $(3.90)$ | $(3.98)$ |
| Italy         | $(0.92)$ | $-1.17^{**}$ | $-0.52$ | $-0.44$ | $-0.45$ | $-0.55$ | $0.81^{***}$ | $-0.04$ | $-0.80$ | $0.16$ | $0.42$ |
| France        | $(0.22)$ | $(0.04)$ | $(0.20)$ | $(0.01)$ | $(0.12)$ | $0.44$ | $1.36^*$ | $-0.94$ | $0.29$ | $0.16$ | $0.60$ |
| Germany       | $(0.64)$ | $(2.48)$ | $(1.98)$ | $(2.82)$ | $(3.97)$ | $(3.92)$ | $(0.95)$ | $1.05$ | $0.08$ | $0.39$ | $0.43$ |
| UK            | $(0.11)$ | $(2.11)$ | $(1.56)$ | $(1.35)$ | $(0.57)$ | $(3.21)$ | $(5.37)$ | $(4.64)$ | $(1.78)$ | $(1.32)$ | $(0.70)$ |
| China         | $0.03^{**}$  | $0.04^{***}$ | $0.06^{***}$ | $0.05^{***}$ | $0.05^{***}$ | $0.04^{***}$ | $0.23^{***}$ | $0.87^{***}$ | $0.31^{***}$ | $0.08^{***}$ | $(0.97)$ |
| Turkey        | $-0.54$ | $-3.49^{***}$ | $1.45^{**}$ | $-2.50^{***}$ | $-2.52^{***}$ | $-0.52$ | $0.14$ | $0.48^{**}$ | $-0.72$ | $0.29^{**}$ | $(1.69)^{*}$ |
| Belgium       | $0.73$ | $0.64$ | $0.11$ | $0.40$ | $0.50$ | $0.58$ | $0.53$ | $0.50$ | $0.16$ | $0.38$ | $-0.21$ |
| Netherlands   | $-0.34$ | $-1.52$ | $1.72^{**}$ | $-0.87$ | $1.63$ | $0.86$ | $1.57$ | $0.58$ | $-1.38$ | $-0.74$ | $-0.14$ |
| Brazil        | $1.51^{**}$ | $1.19^{**}$ | $-0.79^{*}$ | $-4.18^{***}$ | $1.15^{*}$ | $-3.70^{***}$ | $-0.35$ | $-4.86^{***}$ | $0.75$ | $0.64$ | $-1.46^{**}$ |
| Canada        | $-2.09^{***}$ | $-2.63^{***}$ | $-1.53^{***}$ | $-1.64^{***}$ | $-1.69^{***}$ | $-3.81^{***}$ | $0.88^{***}$ | $0.31$ | $-2.36^{***}$ | $0.53$ | $3.32^{***}$ |
| Russia        | $-0.74$ | $-1.61^{**}$ | $1.69^{**}$ | $1.42^{**}$ | $0.18$ | $2.07^{***}$ | $0.56$ | $0.22$ | $-0.72^{**}$ | $0.49$ | $1.50^{**}$ |
| Switzerland   | $-0.48$ | $0.61$ | $0.09$ | $-0.68$ | $-2.92^{***}$ | $0.26$ | $1.98$ | $0.56$ | $1.08$ | $1.09^{**}$ | $1.42^{**}$ |
| Portugal      | $-0.29$ | $0.34$ | $-0.52$ | $-2.85$ | $-1.24$ | $0.25$ | $1.68$ | $0.77$ | $0.91$ | $-0.63$ | $-0.31$ |
| Austria       | $-0.64$ | $-1.46$ | $-1.57$ | $-0.57$ | $0.99$ | $0.86$ | $0.90$ | $0.44$ | $-0.72$ | $0.99$ | $0.16$ |
| India         | $0.59^{**}$ | $-1.83^{***}$ | $1.68^{***}$ | $0.16$ | $0.26$ | $-1.77^{***}$ | $-1.94^{***}$ | $1.00^{***}$ | $-2.30^{***}$ | $-0.85^{**}$ | $-0.21$ |
| Israel        | $-0.29$ | $1.55^{***}$ | $1.96^{***}$ | $1.28^{***}$ | $0.37$ | $-0.04$ | $1.20^{***}$ | $0.41$ | $1.58^{***}$ | $0.17$ | $0.92^{**}$ |
| Ireland       | $1.26$ | $0.60$ | $-0.04$ | $-1.87$ | $-0.98$ | $-3.89^{***}$ | $-3.08^{***}$ | $-1.95$ | $-3.36$ | $3.06^{**}$ | $-1.00$ |
| Sweden        | $0.03$ | $0.00$ | $-0.27$ | $-0.16$ | $-0.19$ | $-0.35$ | $0.20$ | $0.17$ | $-0.77$ | $0.96^{**}$ | $0.03$ |
| Peru          | $0.01$ | $0.00$ | $-1.32^{**}$ | $0.21$ | $-0.04$ | $-2.34^{***}$ | $0.63$ | $0.49$ | $-0.08$ | $-0.61$ | $0.24$ |
| S.Korea       | $0.61^{**}$ | $-0.61^{***}$ | $-0.30^{***}$ | $-0.30^{***}$ | $-0.68^{***}$ | $0.50^{**}$ | $0.34^{***}$ | $-0.54^{***}$ | $0.23^{***}$ | $-0.09$ | $-0.33^{**}$ |
| Japan         | $0.26^{***}$ | $0.24^{*}$ | $-0.26^{**}$ | $-0.31^{*}$ | $-0.21^{**}$ | $-0.62^{***}$ | $-1.20^{***}$ | $0.07$ | $1.01^{***}$ | $-0.09$ | $0.73^{**}$ |
| Chile         | $-0.12$ | $0.24$ | $-0.29$ | $-0.58$ | $-1.27$ | $1.97^{***}$ | $0.29$ | $0.41$ | $-0.23$ | $-1.89^{***}$ | $0.52$ |
| Poland        | $7.10^{***}$ | $1.03^{**}$ | $-1.38^{***}$ | $2.08^{***}$ | $0.74^{**}$ | $-1.14^{**}$ | $0.23^{***}$ | $0.03$ | $0.43^{**}$ | $(0.77)$ | $(0.33)$ |

**Table 2**

Average Abnormal Returns - five days before and after the stimulus package with Fama-French three-factor model.

This table reports average abnormal returns (AARs) for five days before and after the stimulus package announcement across 25 countries based on the Fama-French three-factor model. The model is estimated using the estimation window of 02/01/2019 to 31/10/2019. The AAR at the market level on the event day $t$ is computed by cross-sectionally averaging the AR of all firms within the aggregate market. The ordinary cross-sectional approach is used for significance testing. $t$-statistics are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively.
This table reports average abnormal returns (AARs) for five days before and after the lockdown across 25 countries based on the Fama-French three-factor model. The model is estimated using the estimation window of 02/01/2019 to 31/10/2019. The AAR at the market level on the event day cross-sectional approach is used for significance testing.

| Country/Events | -5  | -4  | -3  | -2  | -1  | 0   | +1  | +2  | +3  | +4  | +5  |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| US             | -1.02*** | -0.83*** | -0.95** | -1.10*** | -1.76*** | 0.15 | -0.60** | 1.79*** | 1.60*** | -0.25 |
| Spain          | (3.69) | (3.80) | (2.53) | (3.37) | (4.53) | (0.49) | (0.42) | (2.35) | (6.38) | (7.10) |
| Italy          | -0.16 | 0.92 | -0.45 | -0.81 | 0.36 | -0.45 | -0.81 | 0.36 | -0.45 | -0.81 |
| France         | (0.19) | (1.37) | (1.90) | (0.32) | (0.65) | (0.74) | (1.27) | (0.41) | (1.32) | (0.69) |
| UK             | -0.30 | -1.18** | -0.70** | 0.22 | -0.15 | 0.12 | 0.44 | 1.36* | -0.04 | -0.80 |
| Germany        | -0.19 | (0.04) | (0.25) | (0.00) | (2.12) | (0.70) | (0.95) | (0.82) | (0.62) | (1.85) |
| China          | 0.13** | 0.07 | 0.46** | 0.46** | 1.10*** | 1.79*** | 1.60*** | 2.48** | -0.20 | -0.24 |
| Korea          | (2.51) | -1.19 | (0.62) | (0.78) | (1.02) | (0.99) | (1.21) | (1.99) | (0.58) | (0.97) |
| Turkey         | -0.24 | -1.27*** | -3.15*** | -0.54 | -3.49** | 1.45** | -2.55*** | -0.52 | -0.02 | -0.24 |
| Belgium        | -0.73 | -0.67* | -1.20 | 0.79 | -0.93 | 1.11 | 0.67 | -0.44 | 0.02 | -0.73 |
| Netherlands    | -1.00 | -0.12 | -0.34 | -1.52 | 1.72** | -0.87 | 1.63 | 0.86 | -1.57 | -0.58 |
| Brazil         | -3.70*** | -0.35 | -1.35** | -0.75 | -1.46** | 0.84 | 2.61*** | -0.54 | -1.03*** | -0.38 |
| Canada         | -2.89*** | -0.25 | -2.09*** | -2.63*** | -1.53*** | 1.64** | -1.69*** | -0.83** | 0.31 | -2.36*** |
| Russia         | 0.81 | 2.07*** | 0.56 | 0.22 | 0.72** | 0.49 | 1.59*** | -0.39 | 0.03 | 0.32 |
| Switzerland    | 0.65* | -0.48 | 0.21 | -0.08 | 1.31* | -0.59 | -2.92*** | -0.68 | 1.08 | -1.09* |
| Portugal       | -0.29 | 0.77 | 0.03 | 0.52 | -0.23 | -0.51 | 0.17 | 0.68 | -0.91 | 0.63 |
| Austria        | 0.92** | 0.21 | -0.24 | -0.72 | -1.12 | -0.87** | -0.64 | -1.46 | -1.57 | -0.57 |
| India          | 0.16 | 0.26 | -1.77*** | -1.94*** | 1.00*** | -2.30*** | -2.85*** | -0.21 | 0.30 | 1.82** |
| Israel         | -2.85*** | -1.89*** | -2.39*** | -0.35 | -0.92 | 2.41*** | -0.59 | -0.29 | 1.53*** | 1.96*** |
| Ireland        | -0.08 | 0.61 | -1.26 | -0.60 | -0.04 | -1.87 | -0.98 | 3.89** | -3.08** | -1.95 |
| Sweden         | -0.15 | 0.18 | 0.03 | 0.00 | -0.27 | 0.16 | -0.19 | -0.35 | 0.20 | 0.17 |
| Peru           | -0.01 | 0.00 | -1.32** | 0.21 | -0.04 | -0.24** | -0.63 | 0.49 | -0.08 | -0.61 |
| S.Korea        | -0.13 | 0.37** | -0.22 | 0.25** | -0.15 | 0.22 | 0.09** | -0.66** | -0.66** | -0.21 |
| Japan          | -0.67*** | -1.20*** | 0.07 | 1.01*** | -0.09 | 0.38 | 0.48** | 1.00*** | 1.11*** | 0.39 |
| Chile          | -0.12 | 0.24 | -0.29 | -0.29 | -1.27 | 1.97*** | 0.29 | 0.41 | -0.23 | -1.89*** |
| Poland         | 1.47*** | 0.05 | -0.24 | -0.68*** | 0.07*** | -3.45*** | -7.10*** | 1.03*** | -1.38*** | 2.08*** |

Average Abnormal Returns - five days before and after the lockdown with the Fama-French three-factor model.
Table 4
Average Abnormal Returns five days before and after the travel ban with the Fama-French three-factor model

This table reports average abnormal returns (AARs) for five days before and after the travel ban across 25 countries based on the Fama-French three-factor model. The model is estimated using the estimation window of 02/01/2019 to 31/10/2019. The AAR at the market level on the event day is computed by cross-sectionally averaging the AR of all firms within the aggregate market. The ordinary cross-sectional approach is used for significance testing. t-statistics are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively.

| Country/Events | -5 | -4 | -3 | -2 | -1 | 0 | +1 | +2 | +3 | +4 | +5 |
|----------------|----|----|----|----|----|---|----|----|----|----|----|
| US             | -0.06 | -0.06 | -0.03 | -0.09 | -0.13* | -0.07 | -0.10* | 0.07 | 0.07 | -0.21*** | -0.16** |
| Spain          | 0.42 | -0.59 | -0.05 | 0.07 | -0.16 | 0.92 | -1.17* | -0.41 | 0.52 | -0.85 | -1.55 |
| Italy          | -0.30 | -1.18*** | -0.70** | 0.22 | -0.14 | 0.01 | 0.12 | 0.44 | 1.36* | -0.04 | -0.80 |
| France         | 0.02 | 0.09 | -1.10 | 0.00 | -1.75** | -1.19 | 0.69 | -0.44 | 1.65* | 0.43 | 0.62 |
| Germany        | 3.73*** | -3.40*** | 0.75 | 0.38 | -3.48*** | 1.06* | -1.92* | 3.10*** | -3.03*** | 2.32*** | -1.49 |
| UK             | -3.05*** | -2.69*** | 4.89*** | -2.68*** | 1.40*** | 2.06*** | 1.49*** | -0.12 | -1.22*** | 1.08*** | -0.20 |
| China          | -0.32*** | 0.02 | -0.73*** | -0.24*** | -0.18*** | -0.24*** | 0.03 | 0.06 | -0.21*** | 0.34*** | -0.05 |
| Turkey         | -1.27*** | -3.15*** | -2.42*** | -0.54 | -3.49*** | 1.45*** | -2.50*** | -2.52*** | -0.52 | -0.24 | 1.48*** |
| Belgium        | 0.79 | -0.93 | -1.11 | 0.67 | -0.44 | 0.02 | -0.73 | 0.84 | 0.11 | 0.40 | 0.50 |
| Netherlands    | -0.12 | -0.34 | -1.52 | 1.72** | -0.87 | 1.63 | 0.86 | -1.57 | -0.58 | -1.38 | -0.74 |
| Brazil         | 0.64 | -1.46*** | 0.84 | 2.81*** | 2.29*** | -0.54 | 0.21 | 1.59*** | -0.56 | 0.83*** | -0.83*** |
| Canada         | -2.89*** | -0.13 | -2.09*** | -2.63*** | -1.53*** | -1.64*** | -1.69*** | -3.81*** | 0.88*** | 0.31 | -2.36*** |
| Russia         | 0.15 | -0.42 | 0.05 | 0.53** | 0.31 | -0.48** | -0.26 | 0.60** | 0.25 | -0.09 | 0.02 |
| Switzerland    | 0.21 | -0.08 | -1.31* | -0.59 | -2.92*** | -0.68 | 1.08 | -1.09* | 1.42** | 0.46 | 2.15*** |
| Portugal       | 1.77*** | -0.29 | 0.34 | -0.52 | -2.85 | -1.24 | 0.25 | 1.68 | 0.77 | -0.91 | -0.63 |
| Austria        | -0.87* | -0.64 | -1.46 | -1.57 | -0.57 | 0.99 | 0.86 | 0.90 | 0.44 | -0.72 | 0.99 |
| India          | -0.05 | 0.04 | -0.35*** | -0.16 | -0.34*** | -0.05 | -0.51*** | 0.12 | -0.04 | 0.20 | 0.07** |
| Israel         | -0.04 | -0.35*** | -0.48*** | -0.02 | -0.11 | 0.10 | -0.63*** | -0.66*** | -0.13 | 0.71*** | 0.10 |
| Sweden         | 0.09 | 0.03 | 0.01 | 0.06 | -0.11 | -0.01 | 0.04 | -0.15 | 0.18 | 0.13 | 0.03 |
| Peru           | -0.56 | 0.22 | 0.32 | 1.51 | -1.38 | -0.50 | -0.44 | -0.88 | -0.47 | -0.63 | -0.01 |
| S.Korea        | -0.47*** | 0.62*** | 0.36*** | -0.30*** | 0.50*** | 0.49*** | -0.39*** | -2.39*** | 0.19* | -2.36*** | -1.11*** |
| Japan          | 0.28*** | -0.16** | -0.12*** | 0.35*** | -0.24* | -0.04 | 0.06 | 0.27*** | -0.30*** | -0.22* | -0.24*** |
| Chile          | -0.42 | -0.01 | 0.27 | -0.12 | 0.24 | -0.29 | -0.58 | -1.27 | 1.97*** | 0.29 | 0.41 |
| Poland         | -0.68*** | -5.60*** | 0.77*** | -3.45*** | -7.10*** | 1.03*** | -1.38*** | 2.08*** | -0.23 | 0.74** | 0.03 |

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Table 5
AAR, CAAR and BHAR using the Fama-French three-factor model
This table reports average abnormal returns (AARs), cumulative average abnormal returns (CAARs), and average buy-hold abnormal returns for 3 events across 25 countries based on the Fama French three-factor model. The model is estimated using the estimation window of 02/01/2019 to 31/10/2019. The event dates for all 3 events across 25 countries are available from Table 1. The ordinary cross-sectional approach is used for significance testing. t-statistics are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. NA indicates that the event did not occur for that specific country.

| Country | Panel A: AAR(0, +5) | Panel B: CAAR(0, +5) | Panel C: BHAR(0, +5) |
|---------|---------------------|----------------------|---------------------|
|         | Lockdown Stimulus package | Travel ban | Lockdown Stimulus package | Travel ban | Lockdown Stimulus package | Travel ban |
| US      | 0.15 (0.49) -0.26** (1.07) 2.80*** (4.34) -3.47*** (-5.99) -0.40** (2.34) 3.22*** (-4.32) 2.97*** (-5.76) -0.42** (-2.42) |
| Spain   | -0.85 (0.74) -1.55 0.92 -3.40 -3.40* -2.55 -3.03 -3.85** -1.99 |
| Italy   | 0.01 (0.02) 0.12 (0.25) 0.01 (0.02) 1.08 1.23 (0.49) 1.08 (0.49) 0.94 (0.47) 1.22 0.94 (0.56) (0.47) |
| France  | -1.75** (2.12) -1.19 (1.34) 0.01 (0.14) -1.46 -0.91 (0.91) 0.91 (0.63) -1.75 0.57 0.57 |
| Germany | -3.03*** (2.31) 1.27*** (1.78) 1.06* (1.78) -0.13 0.44 (0.64) 0.05 (0.64) 0.02 0.36 -0.18 |
| UK      | -5.65*** (4.54) -4.92*** (1.21) 2.06*** (1.78) -14.97*** -7.04** 3.09*** -14.22*** -8.17*** 2.93*** |
| China   | -0.11 (2.86) -0.04 (8.05) 0.24*** (9.42) 0.12 (9.51) -0.70*** -0.62*** 0.10 -0.55** 0.62** |
| Turkey  | -1.62 (2.18) -0.39 (8.05) 0.52 (9.42) 1.45*** -7.82*** 4.08*** -2.85** -7.05** -4.35*** |
| Belgium | -5.65 (2.18) -1.28 (8.05) 3.00 (9.42) -1.34 0.93 (9.51) 0.05 (0.64) -2.22 0.36 (0.64) |
| Netherlands | -0.87 (0.72) 0.86 (1.36) 1.62 (0.23) -0.52 -3.54* -1.76 -0.63 4.02* -2.16 |
| Brazil  | -1.46** (0.46) -3.70*** (0.95) -0.54 3.93*** -8.98*** -6.20*** 3.68** -7.48*** -5.31*** |
| Canada  | -1.64** (0.49) -3.81*** (0.95) -0.54 3.93*** -8.98*** -6.20*** 3.68** -7.48*** -5.31*** |
| Russia  | 2.07*** (1.37) -0.48 (2.65) 3.49*** (2.65) 1.42*** (2.74) 0.05 3.53*** 4.23*** 0.04 0.07 |
| Switzerland | -0.59 (2.65) -2.92*** (2.65) -0.68 2.79 -1.74 3.33*** 2.67 -1.59 3.47** |
| Portugal | 0.25 (0.19) 0.25 (0.19) 1.24 0.86 0.86 1.24 0.86 (0.57) 0.86 (0.57) -0.07 0.63 0.63 -0.25 (0.43) |
| Austria | -0.87* (0.19) -1.28 (0.46) 0.99 (0.46) -4.11 2.64 3.47 2.64 (0.57) 2.64 (0.57) (0.04) 0.63 0.63-0.14 |
| India   | -2.00*** (1.75) -0.05 (0.46) 3.88*** (1.14) -3.88*** -0.05 (1.14) 0.21 -3.88*** -0.21 0.30 0.30 0.21 |
| Israel  | 2.41*** (3.87) -0.04 (0.10) 6.31*** (4.67) 3.91*** (3.88) 0.72 6.90*** 4.27*** 0.71 (4.44) |
| Ireland | -1.87 (3.87) -3.89** (0.10) NA -15.46*** -10.54*** NA -15.46*** -10.54*** NA |
| Sweden  | 0.27 (3.87) 0.35 (3.87) 0.27 (3.87) 0.35 (3.87) 0.27 (3.87) 0.27 (3.87) 0.27 (3.87) 0.27 (3.87) 0.27 (3.87) |
| Peru    | -0.64 (2.21) -0.42 (2.21) -0.05 (2.21) -0.42 (2.21) -0.05 (2.21) -0.64 (2.21) -0.64 (2.21) -0.64 (2.21) -0.64 (2.21) |
| S.Korea | -0.22 (3.55) -0.62** (5.06) -0.04 (1.18) -0.62** (5.06) -0.04 (1.18) -0.22 (1.18) -0.22 (1.18) -0.22 (1.18) -0.22 (1.18) |
| Japan   | 0.38 (1.57) -0.62** (4.02) 0.38 (1.57) -0.62** (4.02) 0.38 (1.57) 0.38 (1.57) 0.38 (1.57) 0.38 (1.57) 0.38 (1.57) |
| Chile   | -1.97*** (3.33) -1.97*** (3.33) -0.29 (3.33) -2.88** (3.33) -0.29 (3.33) -2.88** (3.33) -0.29 (3.33) -2.88** (3.33) -0.29 (3.33) |
| Poland  | 0.77*** (2.24) 0.74** (2.23) 0.77*** (2.23) 0.74** (2.23) 0.77*** (2.23) 0.74** (2.23) 0.77*** (2.23) 0.74** (2.23) 0.77*** (2.23) |

where \( R_{ij,t} \) is the excess return of firm \( i \) of country \( j \) on day \( t \); \( R_{j,f,t} \) is the risk-free rate of country \( j \); \( R_{nj,t} \) is the value-weighted benchmark index return of country \( j \); \( SMB_t \) is the size factor computed as small-minus-big firm market capitalization; and \( HML_t \) is the value factor computed as high-minus-low book-to-market firms. The model is estimated using the estimation period of 02/01/2019 – 31/10/2019. Using the ordinary least square estimates \( \hat{\alpha}_j, \hat{\beta}_{ij}, \hat{smb}_i, \) and \( \hat{hml}_i \) from Eq. (1), the abnormal return (AR) for each firm \( i \) of country \( j \) on day \( t \) is computed as:

\[
AR_{ij,t} = R_{ij,t} - \hat{\alpha}_j - \hat{\beta}_{ij}(R_{nj,t} - R_{j,f,t}) - \hat{smb}_iSMB_t - \hat{hml}_iHML_t
\]
Table 6
Impact of monetary policy on stock returns - CAAR and BHAR
This table reports average abnormal returns (AARs), cumulative average abnormal returns (CAARs), and average buy-hold abnormal returns across 13 countries based on the Fama French three-factor model. The model is estimated using the estimation window of 02/01/2019 to 31/10/2019. The event dates for all the countries are reported in square brackets in the first column. The ordinary cross-sectional approach is used for significance testing. t-statistics are reported in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively.

| Country/Event date | AAR (0,0) | CAAR (0,+5) | BHAR (0,+5) | CAAR (-5,+5) | BHAR (-5,+5) | CAAR (-10,+10) | BHAR (-10,+10) |
|--------------------|-----------|-------------|-------------|--------------|--------------|----------------|----------------|
| US [03/03/20]     | 0.14*     | -1.24***    | -1.10***    | -2.49***     | -2.18***     | -6.74***       | -4.26***       |
|                    | (1.81)    | (-2.90)     | (-2.78)     | (-4.58)      | (-4.64)      | (-5.97)        | (-5.46)        |
| UK [11/03/2020]   | -0.35***  | -1.84***    | -1.47***    | -2.08***     | -1.53***     | -20.20***      | -16.49***      |
|                    | (-2.86)   | (-17.52)    | (-18.64)    | (-17.04)     | (-18.23)     | (-17.64)       | (-19.89)       |
| China [20/02/20]  | -0.32***  | 1.54***     | 1.52***     | 2.58***      | 2.65***      | 4.11***        | 4.42***        |
|                    | (-5.82)   | (9.19)      | (8.63)      | (11.58)      | (10.91)      | (12.97)        | (11.92)        |
| Turkey [17/01/20] | -0.02     | 2.12***     | 2.23***     | 3.25***      | 3.54***      | 1.75*          | 1.39           |
|                    | (-0.10)   | (3.32)      | (3.12)      | (3.64)       | (3.29)       | (1.93)         | (1.51)         |
| Brazil [05/02/20] | 0.13      | -1.42***    | -1.48***    | -1.77***     | -1.76**      | -1.82**        | -2.02**        |
|                    | (0.68)    | (-2.66)     | (-2.78)     | (-2.35)      | (-2.47)      | (-2.03)        | (-2.22)        |
| Canada [04/03/20] | 0.14      | -6.61***    | -6.04***    | -7.90***     | -7.54***     | -21.06***      | -17.56***      |
|                    | (0.81)    | (-5.87)     | (-6.08)     | (-5.53)      | (-5.96)      | (-7.84)        | (-8.41)        |
| Russia [07/02/20] | 0.02      | 0.55        | 0.54        | 0.58         | 0.55         | 1.50*          | 1.46*          |
|                    | (0.11)    | (1.37)      | (1.32)      | (0.89)       | (0.85)       | (1.78)         | (1.71)         |
| India [27/03/20]  | 0.30      | 4.84***     | 4.97***     | -1.47**      | -0.61*       | -4.78***       | -3.00***       |
|                    | (1.59)    | (9.75)      | (9.99)      | (-2.24)      | (-1.00)      | (-5.06)        | (-3.69)        |
| Israel [06/04/20] | 0.92**    | 2.18***     | 2.39***     | -4.78***     | -3.00**      | 8.38***        | 10.38***       |
|                    | (2.50)    | (2.57)      | (2.49)      | (-5.06)      | (-3.69)      | (5.57)         | (5.20)         |
| Peru [19/03/20]   | -0.47     | -2.23       | -2.13       | -3.91*       | -3.80*       | -8.26**        | -7.41**        |
|                    | (-1.10)   | (-1.32)     | (-1.28)     | (-1.73)      | (-1.98)      | (-2.42)        | (-2.92)        |
| S.Korea [16/03/20]| 0.11      | -6.87***    | -6.41***    | -14.51***    | -11.04***    | -6.38***       | -6.57***       |
|                    | (0.74)    | (-13.18)    | (-14.05)    | (-19.95)     | (-20.07)     | (-19.19)       | (-10.85)       |
| Chile [16/03/20]  | -0.29     | -3.40***    | -3.07***    | -3.44*       | -3.28**      | -7.86***       | -6.04**        |
|                    | (-0.44)   | (-2.21)     | (-2.39)     | (-1.93)      | (-2.40)      | (-3.69)        | (-4.04)        |
| Poland [17/03/20] | 2.08***   | 1.76**      | 1.58**      | -8.37***     | -8.95***     | -12.24***      | -12.59***      |
|                    | (5.08)    | (2.47)      | (2.16)      | (-8.91)      | (-10.98)     | (-10.25)       | (-12.63)       |

The abnormal returns are computed for the event window \((T_1, T_2)\). We have undertaken analysis with \((-5, +5)\), \((0, +5)\), and \((-10, +10)\) event windows. The policy event dates for all the events across 25 countries are available from Table 1. The average abnormal return (AAR\(j\)) at the market level for each country \(j\) is the event day is computed by cross-sectionally averaging the AR of all firms within the aggregate market. The ordinary cross-sectional approach is used for significance testing. This is a standard practice used in the literature (see, MacKinlay, 1997). We also analyse cumulative average abnormal returns (CAARs) and average buy-hold abnormal returns (BHARs). The CAAR\(j\) for an event window \((T_1, T_2)\) is computed as:

\[
CAAR_{j, T_1, T_2} = \sum_{t=T_1}^{T_2} AAR_{jt}
\]  

(3)

Lastly, the BHAR\(j, T_1, T_2\) for each firm \(i\) of country \(j\) for an event window \((T_1, T_2)\) is:

\[
BHAR_{j, T_1, T_2} = \frac{1}{T_2 - T_1} \left( \sum_{t=T_1}^{T_2} (1 + R_{jt}) - \sum_{t=T_1}^{T_2} \left[ 1 + E(R_{jt}) \right] \right)
\]  

(4)

where \(E(R_{jt})\) is the expected excess return of the firm computed using Eq. (1). Finally, the BHARs are averaged across all firms within the aggregate market. The ordinary cross-sectional approach is used for statistical significance testing of CAAR and average BHAR.

3. Results

We use time-series data covering the sample period January 2, 2019 to August 31, 2020. Our sample focuses on the top-25 most affected countries in terms of the number of infected cases and deaths. We collect stock price data for these 25 countries from Datastream while the event dates for lockdown, the fiscal stimulus package, and travel ban are collected from various internet sources, such as the World Health Organization website, the New York Times, the Washington Post, BBC, CNN, CNBC, and The Guardian. The event dates for 25 countries are listed in Table 1.

The average abnormal returns at the market level are reported in Table 2. We see that in 11/25 countries, the day the stimulus package was imposed, it had a statistically significant negative effect on returns. Returns of the UK were the most impacted; returns fell by 4.92% (t-statistic = -13.42), followed by Ireland (-3.89%, t-statistic = -2.34), Canada (-3.81%, t-statistic = -4.78), and Brazil (-3.70%, t-statistic = -3.96). In three countries, namely Germany (1.27%, t-statistic = 3.21), Russia (2.07%, t-statistic = 2.65) and Poland (0.74%, t-statistic = 2.23), stimulus package had a statistically significant positive effect on returns.

On the other hand, also had a negative effect on stock returns in 10/25 countries. Again, the most negatively affected
country was the UK (−6.52%, \( t \)-statistic = −16.86) followed by Turkey (−3.49%, \( t \)-statistic = −5.65), and Germany (−3.03%, \( t \)-statistic = −4.54). Two countries—Israel (2.41% and \( t \)-statistic = 3.87) and Poland (0.77, \( t \)-statistic = 3.24)—had a statistically significant positive effect from lockdown announcement on returns (see Table 3).

When travel ban was imposed, we see stock returns of eight countries reacting statistically significantly. Interestingly, in five countries, namely, Germany (1.08%, \( t \)-statistic = 1.81), the UK (2.06%, \( t \)-statistic = 8.05), Turkey (1.45%, \( t \)-statistic = 3.00), South Korea (0.49%, \( t \)-statistic = 5.06), and Poland (1.03, \( t \)-statistic = 2.81), the travel ban had a positive and statistically significant effect on returns. In only three countries, namely, the China (−0.24%, \( t \)-statistic = −3.80), Canada (−1.64%, \( t \)-statistic = 2.51), and Russia (−0.48, \( t \)-statistic = −2.04) the effect was negative and statistically significant (see Table 4).

In summary, we see that of the three events, in general, lockdown and stimulus package had a statistically significant negative effect on returns in 40% and 44% of the markets, respectively. The travel ban, by comparison, had more cases of significantly positive effect on returns than negative effects.

We now consider cumulative effects over the five days following the event. The results are reported in Table 5. With lockdown, we observe that 14/25 countries are statistically significantly affected. For five countries (the US, Brazil, Russia, Israel, and Japan), the five-day effect on returns was statistically significant and positive. For the remaining nine countries, the effect was negative and statistically significant. This negative effect was in the range −14.97% (\( t \)-statistic = −19.01) for the UK to −0.44% (\( t \)-statistic = −1.78) in the case of South Korea. The cumulative five-day effect of the stimulus package was most negative on returns—in 11 countries, the effect was statistically significant and negative with the effect falling in the range −10.54% (\( t \)-statistic = −3.33) for Ireland to −0.48% (\( t \)-statistic = −2.00) in the case of South Korea. In only three countries, namely, Turkey (4.08%, \( t \)-statistic = 3.53), Russia (4.12%, \( t \)-statistic = 3.27), and Israel (3.91%, \( t \)-statistic = 3.88), the effect was positive and statistically significant. The cumulative five-day effect of travel ban follows a similar trend with three countries (the UK, Switzerland, and Poland) experiencing a statistically significant positive effect on returns while seven countries (the US, China, Turkey, Brazil, Canada, South Korea, and Chile) experiencing a statistically significant negative effect on returns.

Table 5 (Panel C) has the BHAR results. The BHAR results reported in the last three columns reveal that 13/25, 14/25, and 10/25 markets statistically significantly reacted to lockdowns, the stimulus package, and travel ban, respectively.

We also consider the impact of monetary policy on stock returns (see Table 6). Stock markets may respond differently to monetary policy relative to the fiscal stimulus package.\(^2\) In our sample, the monetary policy changes occurred in 13/25 countries. On the day the first change in the cash rate was announced, returns of three markets (the US, Israel, and Poland) increased while only two countries (the UK and China) experienced a decrease in returns. The cumulative effect over five days following the event indicates a fall in returns for six markets, ranging from −18.45% (\( t \)-statistic = −17.52) in the case of the UK to −1.24% (\( t \)-statistic = −2.90) in the case of the US. The cumulative returns over five days following the event increased for five markets (China, Turkey, India, Israel, and Poland).

What are the patterns in these results? (1) For the US, France, Germany, the UK, Turkey, Brazil, Canada, Austria, India, Ireland, South Korea, Japan, and Chile, based on AAR model,—52% of the markets—one of these three policies (lockdown, stimulus package, and travel ban) had a negative effect on returns in the five days post-event. (2) For the US, the UK, Turkey, Brazil, Japan, Poland, Russia, Israel, and China (that is, for 9/25 markets), the post-event effect over five days was positive. (3) the evidence from (1) and (2) suggests that, overall, the negative effect over the five-day post-event window dominates the positive effect except for Japan, suggesting that the net effect of policies in the post-event period was negative. (4) For six countries (Italy, Spain, Belgium, Portugal, Austria, and Sweden), there was no effect on returns. (5) Monetary policies have been proven to be more effective in quickly boosting investors’ confidence and stock markets than fiscal policies (Klose and Tillmann, 2020). Due to this, we see that the returns of five markets reacted positively to change in the cash rate, while the fiscal stimulus package had resulted in positive returns for three markets only.

We also consider any possible evidence of return reversals and drifts by returning to results reported in Tables 2–4. We start with lockdown effects. For the US, on the event day, the market did not react statistically significantly. We see though that in the five days leading up to the event, abnormal returns were negative and statistically significant. However, post-event, on days 3 and 4 that is, the effect was statistically significant and positive, suggesting evidence of return reversal. A similar pattern of return reversal can be observed in Israel, Poland, France, and Germany. On the other hand, we notice return drift (meaning negative returns have continued post the event without signs of recovery) for India, Chile, Japan, the UK, Turkey, Brazil, and Canada. China is the only market where most days prior and all five days after the event, returns were positive and statistically significant.

When the stimulus package is taken as an event, we notice a pattern of return drift for India, South Korea, Chile, Germany, Brazil and the US. For Ireland, Japan, Poland, Switzerland, Russia, Canada, China, and the UK, there is evidence of return reversal. For the travel ban, relatively less evidence of reversals and drifts are found compared to the other two events. Return drift was observed for the US, Germany, Canada, and South Korea while reversals were observed for Italy, Turkey, Japan, and Poland.

4. Robustness tests

We undertake several robustness tests. First, we control for the effect of firm characteristic on abnormal returns\(^3\) by estimating the regression:

\(^2\) We thank an anonymous reviewer for this suggestion.

\(^3\) We thank an anonymous reviewer for this suggestion.
Table 7
Control for firm-characteristic variables
This table reports cumulative average abnormal returns of each event after controlling for firm-characteristic variables. We run the following regression:

\[ CAAR_i = \alpha + \beta_1 SIZE_i + \beta_2 MB_i + \beta_3 LEV_i + \beta_4 PRO_i + \beta_5 TAN_i + \beta_6 LIQ_i + \beta_7 DY_i + \beta_8 VOL_i + \epsilon_i \]

where \( CAAR_i \) is the cumulative average abnormal returns using a 11-day event window; \( SIZE_i \) is firm size; \( MB_i \) is market-to-book ratio; \( LEV_i \) is firm leverage computed as the ratio of total debts on common equity; \( PRO_i \) is profitability computed as the return on equity; \( TAN_i \) is the Amihud (2002) measure of liquidity; \( DY_i \) is dividend yield; and \( VOL_i \) is stock volatility. Finally, *, ** and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

| Country/Events | Lockdown | Stimulus package | Travel ban | Cash rate |
|----------------|----------|------------------|------------|-----------|
| US             | -0.83*** | -1.00***         | -0.09      | -0.83***  |
| Spain          | -2.28    | -0.89            | -2.48**    | NA        |
| Italy          | -2.08    | -1.96            | -2.08      | NA        |
| France         | -3.56**  | -3.28***         | -3.28***   | NA        |
| Germany        | 0.58     | -1.591**         | 0.36       | NA        |
| UK             | -2.09*** | -1.76***         | 0.24       | -2.17***  |
| China          | -0.02    | -0.03            | -0.21**    | 0.11      |
| Turkey         | -0.56    | -0.21            | -0.56      | -0.39     |
| Belgium        | -0.92    | -0.47            | 0.82       | NA        |
| Netherlands    | -1.39    | 0.06             | -1.01      | NA        |
| Brazil         | 0.59     | 1.27             | 0.80       | 0.15      |
| Canada         | -1.53**  | -1.62***         | -1.53*     | 0.37      |
| Russia         | 0.62     | 0.25             | 0.40       | 0.450*    |
| Switzerland    | -3.11    | -3.28            | -2.21      | NA        |
| Portugal       | -3.89**  | -3.89*           | -3.69      | NA        |
| Austria        | -1.53    | -1.78            | -2.64      | NA        |
| India          | -1.12*** | -1.61***         | -0.25      | -0.76***  |
| Israel         | 0.06     | 0.66             | -0.13      | 0.01      |
| Ireland        | -1.59    | -1.16            | NA         | NA        |
| Sweden         | -0.87    | -0.59            | -1.33**    | NA        |
| Peru           | 0.40     | 0.40             | -0.57      | -0.13     |
| S.Korea        | -0.12    | -0.21*           | -0.86***   | -1.53***  |
| Japan          | -0.59    | -1.36***         | 0.00       | NA        |
| Chile          | -0.15    | -0.15            | 0.09       | 0.09      |
| Poland         | -0.93*** | -0.49*           | -0.91***   | -0.78***  |

where \( CAAR_i \) is the cumulative average abnormal returns using a 11-day event window; \( SIZE_i \) is firm size computed as the natural logarithm of total assets; \( MB_i \) is market-to-book ratio; \( LEV_i \) is firm leverage computed as the ratio of total debts on common equity; \( PRO_i \) is profitability computed as the return on equity; \( TAN_i \) is the ratio of tangible assets to total assets; \( LIQ_i \) is the Amihud (2002) measure of liquidity; \( DY_i \) is dividend yield; and \( VOL_i \) is stock volatility computed as the variance of one-year daily stock returns. We find that the abnormal returns are still significant after controlling firm-characteristic variables (see Table 7). Specifically, the effect of lockdown is statistically significant in eight countries (the US, Spain, France, the UK, Canada, Portugal, India, and Poland), while 10 countries (the US, France, Germany, the UK, Canada, Portugal, India, South Korea, Japan, and Poland) experience a statistically
significant effect on stock returns from the stimulus packages. Considering the travel ban and monetary policy, we find statistically significant abnormal returns in seven and six countries, respectively.

Second, we consider the impact of policies on returns by considering a longer event window of (−10, +10) days. The results, reported in Panel B of Table 8, reveal that the cumulative returns are negative and statistically significant for 13/25, 13/25, and 12/25 markets to lockdown, the stimulus package, and travel ban, respectively. With the monetary policy change, cumulative returns are negative for nine markets (see Table 6 CAAR(−10, +10)).

Third, we exclude nine countries that have undergone a short-sale ban and test whether our results hold. In unreported results, the average abnormal returns five days following the lockdown and fiscal stimulus package events are negative and statistically significant for 6/16 and 9/16 markets. With travel ban, we find returns are statistically significant for nine markets. Our findings hold even after several robustness tests. Detailed results are available upon request.

Table 8
CAAR using the Fama-French model over (−5, +5) and (−10, +10) window
This table reports cumulative average abnormal returns (CAARs) across 25 countries based on the Fama French three-factor model. The model is estimated using the estimation window of 02/01/2019 to 31/10/2019. The event dates for all 3 events across 25 countries are available from Table 1.
The ordinary cross-sectional approach is used for significance testing. Finally, *, ** and *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

| Country/Events | Panel A: CAAR (−5, +5) | Panel B: CAAR (−10, +10) |
|----------------|------------------------|--------------------------|
|                | Lockdown | Stimulus package | Travel ban | Lockdown | Stimulus package | Travel ban |
| US             | −2.87*** | −4.46*** | −0.77*** | −7.69*** | −8.21*** | −0.79** |
| Spain          | −4.15    | (−5.89) | −3.32     | (−7.27) | (−6.68) | (−2.44) |
| Italy          | −1.02    | (−1.14) | −0.05     | −1.02    | −2.39    | −2.39 |
| France         | −2.26    | (−0.35) | −1.06     | −0.74    | −0.08    | (−0.74) |
| Germany        | −1.39    | (−0.35) | −2.38     | −2.70    | −5.14    | −4.94 |
| UK             | −19.66***| −17.13***| 0.96      | −17.35***| −16.13***| −9.42*** |
| China          | −0.12    | (−0.64) | (2.89)    | (−8.54) | (−0.73) | (−0.59) |
| Turkey         | −15.54***| −3.52*** | −13.72*** | −12.56***| −10.05***| −10.89***|
| Belgium        | −3.51    | (−0.96) | 0.11      | −2.26    | 1.62     | −2.36 |
| Netherlands    | −3.15    | −2.91   | −2.89     | −4.48*   | −5.32**  | −4.25** |
| Brazil         | −4.62*** | −12.13***| −1.10     | −12.50***| −10.49***| −5.03*** |
| Canada         | −17.58***| −10.74***| −17.58*** | −16.31***| −16.82***| −16.31***|
| Russia         | 5.71***  | 5.07*** | 0.66      | 5.26***  | 0.12     | 2.29** |
| Switzerland    | −3.78    | −3.98   | −1.35     | −2.86    | −4.22**  | −4.23** |
| Portugal       | −3.70    | (−1.14) | −1.62     | −4.06    | −4.06    | −5.03 |
| Austria        | −5.18    | −0.60   | −1.63     | −3.40    | −1.77    | 0.01 |
| India          | −6.16*** | −8.39*** | −1.07***  | −7.06***  | −4.56***  | −1.34 |
| Israel         | −7.06*** | −4.56*** | −1.34     | −4.34**  | 8.18***  | −1.99*** |
| Ireland        | −16.84***| −15.31***| NA        | −14.64***| −11.37***| NA |
| Sweden         | −0.41    | −0.36   | 0.30      | −0.38    | −0.72    | 0.67 |
| Peru           | −4.09*** | −4.09*** | −2.82     | −9.29***  | −9.29***  | −6.66** |
| S.Korea        | −0.80*** | −0.62*  | −7.04***  | −0.99***  | −6.62***  | −12.48***|
| Japan          | 2.47**   | −2.14***| −0.35     | 0.79     | 1.21     | −1.49** |
| Chile          | −4.89*** | −4.89*** | −3.44*    | −6.95***  | −6.95***  | −7.86** |
| Poland         | −13.05***| −5.22*** | −1.37***  | −18.00*** | −13.69***| −13.71** |

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5. Concluding remarks

This paper sets out to evaluate the response of stock markets of 25 countries from specific government policies. We consider four specific policies, namely, country lockdown, the stimulus package, travel ban, and monetary policy. Using an event study approach, we show that the 25 countries responded heterogeneously to these government policies. In around 30% of the countries, none of these policies mattered to stock returns. In countries where they mattered, the effect was predominantly negative. In 40% of the markets, we also discover evidence of either return reversals or return drifts although in our analysis return drifts are more dominant. Among all the policies, the change in the cash rate had a positive impact on returns for most markets (around 20%). Overall, therefore, we claim that government policies although aimed at mitigating the effect of COVID-19 had more negative effects than positive.

CRediT authorship contribution statement

Deepa Bannigidadmath: Conceptualization, Formal analysis, Methodology, Software. Paresh Kumar Narayan: Conceptualization, Supervision, Methodology, Writing – original draft, Writing – review & editing. Dinh Hoang Bach Phan: Conceptualization, Formal analysis, Data curation. Qiang Gong: Conceptualization, Validation, Writing – review & editing.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.frl.2021.102161.

References

Akhtaruzzaman, M., Boubaker, S., Sensoy, A., 2000. Financial contagion during COVID-19 crisis. Financ. Res. Lett. https://doi.org/10.1016/j.frl.2020.101604.
Al-Awdadi, A.M., Al-Saified, K., Al-Wadhidi, A., Alhamadi, S., 2020. Death and contagious infectious diseases: impact of the COVID-19 virus on stock market returns. J. Behav. Exp. Finance, 100326.
Ali, M., Alam, N., Rizvi, S.A.R., 2020. Coronavirus (COVID-19) – an epidemic or pandemic for financial markets. J. Behav. Exp. Finance, 100341.
Amihud, Y., 2002. Illiquidity and stock returns: cross-section and time-series effects. J. Financ. Mark. 5, 31–56.
Apergis, E., Apergis, N., 2020. Can the COVID-19 pandemic and oil prices drive the US partisan conflict index? Energy Res. Lett. 1 (1), 13144. https://doi.org/10.46557/001c.13144.
C.T., V., Prabhuees, K.P., 2020. Implications of COVID-19 pandemic on the global trade networks. Emerg. Mark. Financ. Trade 56 (10), 2408–2421. https://doi.org/10.1080/1540496X.2020.1785426.
Chen, C., Liu, L., Zhao, N., 2020. Fear sentiment, uncertainty, and bitcoin price dynamics: the case of COVID-19. Emerg. Mark. Financ. Trade 56 (10), 2298–2309. https://doi.org/10.1080/1540496X.2020.1787150.
Corbet, S., Larkin, C., Lucey, B., 2020. The contagion effects of the COVID-19 pandemic: evidence from gold and cryptocurrencies. Financ. Res. Lett., 101554 https://doi.org/10.1016/j.frl.2020.101554.
Conlon, T., Geiger, R., 2020. Safe haven or risky hazard? Bitcoing during the COVID-19 bear market. Financ. Res. Lett., 101607 https://doi.org/10.1016/j.frl.2020.101607.
Debelle, G., 2020. The Reserve Bank of Australia’s policy actions and balance sheet. Econ Anal Policy 68, 285–295.
Fu, M., Shen, H., 2020. COVID-19 and corporate performance in the energy industry. Energy Res. Lett. 1 (1), 12967. https://doi.org/10.46557/001c.12967.
Gil-Alana, L.A., Monge, M., 2020. Crude oil prices and COVID-19: persistence of the shock. Energy Res. Lett. 1 (1), 13200. https://doi.org/10.46557/001c.13200.
Gil-Alana, L.A., Claudio-Quiroga, G., 2020. The COVID-19 impact on the Asian stock markets. Asian Econ. Lett. 1 (2) https://doi.org/10.46557/001c.17656.
Haroon, O., Rizvi, S.A.R., 2020. COVID-19: media coverage and financial markets behavior—a sectoral inquiry. J. Behav. Exp. Finance, 100343.
He, P., Sun, Y., Zhang, Y., Li, T., 2020a. COVID-19 impact on stock prices across different sectors—an event study based on the Chinese stock market. Emerg. Mark. Financ. Trade 56 (10), 2198–2212. https://doi.org/10.1080/1540496X.2020.1785865.
He, P., Niu, H., Sun, Z., Li, T., 2020b. Accounting index of COVID-19 impact on Chinese industries: a case study using big data portrait analysis. Emerg. Mark. Financ. Trade 56 (10), 2332–2349. https://doi.org/10.1080/1540496X.2020.1785866.
Huang, W., Zheng, Y., 2020. COVID-19: structural changes in the relationship between investor sentiment and crude oil futures price. Energy Res. Lett. 1 (2), 13685. https://doi.org/10.46557/001c.13685.
Iyke, B., 2020a. COVID-19: the reaction of US oil and gas producers to the pandemic. Energy Res. Lett. 1 (2), 13912. https://doi.org/10.46557/001c.13912.
Iyke, B.N., 2020b. The disease outbreak channel of exchange rate return predictability: evidence from COVID-19. Emerg. Mark. Financ. Trade 56 (10), 2277–2297. https://doi.org/10.1080/1540496X.2020.1784718.
Iyke, B.N., 2020c. Economic policy uncertainty in times of COVID-19 pandemic. Asian Econ. Lett. 1 (2) https://doi.org/10.46557/001c.17665.
Klose, J., Tillmann, P., 2020. COVID-19 and Financial Markets: A Panel Analysis for European Countries (No. 202025). Philippus-Universitat Marburg, Faculty of Business Administration and Economics, Department of Economics.
MacKinlay, A.C., 1997. Event studies in economics and finance. J. Econ. Lit. 35, 13–39.
Ming, W., Zhou, Z., Al-H, Bi-H, Zhong, Y., 2020. COVID-19 and air quality: evidence from China. Emerg. Mark. Financ. Trade 56 (10), 2422–2442. https://doi.org/10.1080/1540496X.2020.1790353.
Narayan, P.K., 2020. Has COVID-19 changed exchange rate shocks to shocks? Asian Econ. Lett. 1 (1) https://doi.org/10.46557/001c.17389.
Prabhuees, K.P., Padhan, R., Garg, B., 2020. COVID-19 and the oil price—stock market nexus: evidence from net oil-importing countries. Energy Res. Lett. 1 (2), 13745. https://doi.org/10.46557/001c.13745.
Qin, M., Zhang, Y.C., Su, C.W., 2020. The essential role of pandemics: a fresh insight into the oil market. Energy Res. Lett. 1 (1), 13166. https://doi.org/10.46557/001c.13166.
Salsu, A.A., Sikiru, A.A., 2020. Pandemics and the Asia-pacific Islamic stocks. Asian Econ. Lett. 1 (1) https://doi.org/10.46557/001c.17413.
Sharma, S.S., 2020. A note on the Asian market volatility during the COVID-19 pandemic. Asian Econ. Lett. 1 (2) https://doi.org/10.46557/001c.17661.
Shen, H., Fu, M., Fan, H., Yu, Z., Chen, Y., 2020. The impact of the COVID-19 pandemic on firm performance. Emerg. Mark. Financ. Trade. https://doi.org/10.1080/1540496X.2020.1785863.
Tisdell, C.A., 2020. Economic, social and political issues raised by the COVID-19 pandemic. Econ. Anal. Policy 68, 17–28.
Wang, Y., Zhang, D., Wang, X., Fu, Q., 2020. How does COVID-19 affect China’s insurance market? Emerg. Mark. Financ. Trade. https://doi.org/10.1080/1540496X.2020.1791074.
Yu, Z., Xiao, Y., Li, Y., 2020. The response of the labor force participation rate to an epidemic: evidence from a cross-country analysis. Emerg. Mark. Financ. Trade 56 (10), 2390–2407. https://doi.org/10.1080/1540496X.2020.1784717.

Zaremba, A., Kizys, R., Aharon, D.Y., Demir, E., 2020. Infected markets: novel coronavirus, government interventions, and stock return volatility around the globe. Financ. Res. Lett., 101597 https://doi.org/10.1016/j.frl.2020.101597.

Zhang, D., Hu, M., Ji, Q., 2020. Financial markets under the global pandemic of COVID-19. Financ. Res. Lett., 101528