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# Conventional monetary policy, COVID-19, and stock markets in emerging economies<sup>☆</sup>

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## ABSTRACT

We examine whether conventional monetary policy moderated the impact of the COVID-19 pandemic on stock markets. Using daily historical data on emerging economies, we show that the pandemic has an adverse impact on stock markets by reducing stock returns. We then show that, in the presence of conventional monetary policy, the adverse impact does not disappear. We probe into the robustness of these findings by considering, among others, alternative COVID-19 indicators, fixed effects, cointegrating dynamics, stock market characteristics, and monetary policy frameworks, and find them to be robust. An implication is that conventional monetary policy alone may not be an effective tool during the pandemic and that policymakers should coordinate conventional monetary policy with other policies to restore stock markets to their pre-crisis level.

## 1. Introduction

The novel coronavirus (COVID-19) adversely affected global economies and financial markets (see [Sha and Sharma, 2020](#)). In response, policymakers implemented various policies—lockdowns, monetary policy expansions, fiscal stimulus packages, etc.—to reduce the spread of the virus and to moderate or avert its impact on the economy and financial markets ([Phan and Narayan, 2020](#); [Iyke, 2020a](#); [Prabheesh et al., 2021](#)). In this regard, several studies examine the extent of COVID-19's impact and the efficacy of the policy responses in limiting the spread as well as the adverse effect of the pandemic (see [Carlsson-Szlezak et al., 2020](#); [Devpura and Narayan, 2020](#); [Iyke, 2020b](#); [Narayan, 2020](#); [Rizvi et al., 2021](#)). However, very little is known regarding the role of monetary policy in moderating the impact of COVID-19 on stock markets. To this end, we address this research gap by specifically focusing on emerging market economies, which are often considered more volatile and susceptible to shocks in the literature (see e.g., [Bekaert and Harvey, 1997](#); [Aggarwal et al., 1999](#)). Our hypothesis is that the COVID-19 pandemic has a negative impact on stock markets by reducing returns and that conventional monetary policy (expansion) will reduce or eliminate this negative impact.

Our hypothesis is grounded on two strands of established finance and economic literatures: (a) on the connection between extreme events like the pandemic and financial markets (see [Manela and Moreira, 2017](#); [Danielsson et al., 2018](#); [Ali et al., 2021](#); [Haldar and](#)

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Sethi, 2021; Iyke and Ho, 2021), and (b) on the connection between monetary policy and financial markets (see Ehrmann and Fratzscher, 2004; Gurkaynak et al., 2004; Maio and Philip, 2015; Rizvi et al., 2021). First, the contagiousness and fatality of COVID-19 led to fear and panic and restrictive measures (e.g., lockdowns and travel bans), which are unfavorable for investment activities and financial markets. Theoretically, the adverse information linked to an extreme event like COVID-19 can generate financial frictions by increasing default risk and the cost of borrowing, and in turn reducing investment and productivity (see Bernanke et al., 1999; Christiano et al., 2014). The bad news related to COVID-19 can enhance the option value of waiting in line with the irreversibility of investment theory, in turn hurting productivity and profitability (see Bernanke, 1983). Similarly, pessimism regarding the future of the economy (or the negative investor sentiment) causes a substantial decrease in trading activities and stock prices (see Baker and Wurgler, 2006).

Second, monetary policy can shape stock prices through the discount and wealth channels. If the central bank raises the policy rate to reduce inflation, real interest rates (or the cost of borrowing) will increase, causing a reduction in dividends and stock return premium, since real interest rates are critical to agents' market uncertainty (see, Thorbecke, 1997). The reduction in dividends and stock return premium reduces consumption and investment through the Tobin Q effect (see Bjørnland and Leitemo, 2009). Similarly, monetary policy can influence stock prices through forward guidance and quantitative easing channels. From the forward guidance channel, central bank announcements shape the expectations and discussions of market participants, thereby shaping the behavior of forward-looking financial variables like stock prices (see Galloppo and Paimanova, 2017; Lüdering and Tillmann, 2020). From the quantitative easing channel, investors react to central bank repurchases of assets by rebalancing their portfolios, which affect asset prices (see Kojien et al., 2017).

From these theoretical connections, it implies that if extreme events like COVID-19 cause an adverse response of stock prices, monetary policy expansion in the form of interest rate cuts, forward guidance (optimistic and effective central bank communications) and quantitative easing can be used to revamp the stock markets. To test our hypothesis, we draw on daily stock indices, measures of COVID-19 (new cases and deaths), short-term interest rates, and conditioning information, such as oil prices and exchange rates, of emerging economies spanning the period from 1st January 2020 to 4th June 2021. Our main analysis entails estimating two empirical models. First, to establish the impact of the pandemic on stock markets, we regress stock returns on growth in COVID-19 related deaths. Second, to examine the role of conventional monetary policy in moderating the impact of the pandemic on stock markets, we regress stock returns on growth in COVID-19 related deaths, the short-term rates, and the interaction of growth in COVID-19 related deaths and the short-term rates. Our robustness checks entail various specifications and estimation strategies, such as using alternative COVID-19 indicators, controlling the movements in exchange rates and oil prices, controlling fixed effects and cointegration dynamics, and conditioning the estimates on the median of the stock returns across values of the predictors.

Our estimations yield the following findings. First, we establish that the pandemic has a negative impact on the stock markets of emerging economies. Stock returns decline in response to an increase in the growth in COVID-19 deaths, consistent with the theoretical arguments that extreme events have adverse impacts on stock markets. Second, conventional monetary policy does not taper off the negative impact of the pandemic on stock markets, rejecting our hypothesis. Specifically, the negative impact of the pandemic on stock returns disappears if we interact the COVID-19 indicators with the conventional monetary policy indicator (i.e., the policy rates), meaning that conventional monetary policy alone cannot reverse the negative impact of the pandemic on stock markets. We show both findings to withstand our robustness checks, which include using alternative COVID-19 indicators, controlling the movements in exchange rates and oil prices, controlling fixed effects, serial correlation, heteroskedasticity, cross-sectional dependence, and cointegrating dynamics, conditioning the estimates on the median of the stock returns across values of the predictors, considering external factors (monetary policy stance, economic policy uncertainty, and geopolitical risk), the nature of countries' monetary policy frameworks (flexible inflation targeters vs. others), the level of stock market development, and whether countries have Islamic stock markets.

Impliedly, while monetary policies are useful to overcoming crises (see e.g., Christiano et al., 2004; Fiordelisi et al., 2014; Cortes et al., 2022), our findings emphasize that conventional monetary policy alone is not very effective, in particular, during the ongoing pandemic. We demonstrate that conventional monetary policy is not very potent when economies face extreme unprecedented shocks like the COVID-19 pandemic. For economies unconstrained by the zero-lower bound of policy rates, when implemented alone, small but significant interest rate cuts to ease the cost of borrowing may not necessarily restore stock markets to their pre-shock levels. Policymakers would have to complement interest rate cuts with unconventional monetary policies to prevent a full-blown financial crisis. Admittedly, central banks have already resorted to unconventional monetary policies to help overcome the negative impact of the pandemic and hence our finding could be viewed as a support for such policies since conventional monetary policy appears to be less effective.

Existing studies show that the COVID-19 pandemic: (a) has significantly impacted all aspects of economies and financial markets and (b) the policy responses have mixed outcomes. For instance, COVID-19 induced a decline in credit and output (Barro et al., 2020; Choi, 2020; Liu et al., 2020), a decline in the labor force participation rate (Bauer and Weber, 2020), a decline in consumption and investment (Yu et al., 2020), and consequently, and a decline in stock market liquidity and prices (He et al., 2020; Topcu and Gulal, 2020; Zhang et al., 2020; Ali et al., 2021). The policy responses that followed yielded mixed impacts on the economy and financial markets. For example, Eichenbaum et al. (2020) demonstrate that COVID-19 containment policies would increase the severity of a recession induced by the pandemic but can save several lives. Narayan et al. (2021) and Rizvi et al. (2021) show that the travel bans, lockdowns, and economic stimulus packages positively impacted stock markets, whereas Baig et al. (2021), Bannigidadmth et al. (2021), and Yang and Deng (2021) find the opposite results. Narayan (2021) and Padhan and Prabheesh (2021) provide a survey of the literature.

Our study is closely related to both strands of literature in that we consider the impact of COVID-19 on stock markets and explore

the effectiveness of the policy responses in averting the negative impact of the pandemic on financial markets. Our point of departure from both strands of literature is that we provide an empirical assessment regarding the effectiveness of monetary policy—conventional monetary policy, in particular—in moderating the impact of COVID-19 on stock markets. The closest studies to ours are, among others, [Wei and Han \(2021\)](#), [Cortes et al. \(2022\)](#), and [Yilmazkuday \(2022\)](#), who examined the transmission of monetary policy (conventional and unconventional) during the pandemic.<sup>1</sup> We depart from these studies by exclusively focusing on emerging markets and by specifically examining the role of conventional monetary policy in reversing the negative impact of the pandemic on stock markets. Equity markets in emerging economies are distinct from those in advanced economies; for instance, they are more volatile, have lower turnover ratios, and market movements are dominated by a few large firms ([Bekaert and Harvey, 1997](#); [Chan and Hameed, 2006](#)). Therefore, it is more appropriate to separately consider these countries, in contrast to lumping them together. In addition, apart from [Wei and Han \(2021\)](#), the other studies do not consider stock markets in their analysis. Our analysis moves beyond the event study employed in [Wei and Han \(2021\)](#) to consider various issues (serial correlation, heteroskedasticity, and cross-sectional dependence) as well as the monetary policy frameworks and stock market characteristics that may mask the role of conventional monetary policy during the pandemic.

Our study is also closely related to [Baig et al. \(2021\)](#), [Bannigidmath et al. \(2021\)](#), [Narayan et al. \(2021\)](#), [Rizvi et al. \(2021\)](#), [Yang and Deng \(2021\)](#), and [Karavias et al. \(2022\)](#), who considered the role of stimulus packages in abating the negative impact of COVID-19 on stock markets. We depart from these studies by considering the role of monetary policy in this picture. In other words, our exploits complete the evidence regarding how fiscal, monetary, and other policy responses can help to mitigate the negative ramifications of the pandemic. Thus, our study also enriches the literature on the policy interventions required to overturn crises (see [Assenza et al., 2020](#); [Kahn and Wagner, 2021](#); [Mitman and Rabinovich, 2020](#); [Moser and Yared, 2020](#)). These studies identify normative economic scenarios and attempt to explain possible alternatives through which policies can be used to prevent crises, while our study establishes a positive economic scenario by showing that conventional monetary policy is less effective during the pandemic.<sup>2</sup> We demonstrate that, among others, conventional monetary policy alone is inadequate to achieving economic and financial recovery from the pandemic and hence should be considered in an optimal policy mix to achieve this objective.

In addition, our study adds to the emerging economy literature on the impact of COVID-19 on emerging stock markets and the most effective policy responses to overcome it, such as [Mishra et al. \(2020\)](#), [Topcu and Gulal \(2020\)](#), [Yan and Qian \(2020\)](#), [Iyke and Ho \(2021\)](#), and [Liu \(2021\)](#). None of these studies considered the role of monetary policy in moderating the impact of the pandemic. Emerging stock markets are distinct from developed markets. They are considerably more volatile than developed stock markets, while the publicly listed firms make up a small percentage of the aggregate economy ([Bekaert and Harvey, 2017](#)). These markets are frequently introducing new investment products and regulations to attract investors and to become more liquid and are shown to provide substantial diversification benefits to investors (see [Li et al., 2003](#); [Zhang and Li, 2014](#); [Kocaarslan et al., 2017](#); [Bae et al., 2019](#)) and hence it is interesting to understand how they responded to the various policies introduced during the pandemic.

The paper proceeds as follows. In [Section 2](#), we detail our data and methodology. [Section 3](#) reports the results and the robustness checks, while [Section 4](#) concludes the paper.

## 2. Methodology and data

### 2.1. Data

We collect data on 23 emerging markets,<sup>3</sup> which have been impacted by COVID-19 and for which daily data on the variables of interest are readily available from the date the first COVID-19 case was recorded, 1st January 2020, to the latest date when this study commenced, 4th June 2021. The sample period is sufficient to understand the dynamics of COVID-19's impact on emerging stock markets and how monetary policy moderates this impact. For each country, we collect data on stock price indices (*SP*), new COVID-19 deaths (*ND*) and cases (*NC*), monetary policy rates/short-term interest rates (*PR*), and exchange rates (*EX*). We also collect data on the oil price (*OIL*). We transform the *SP* into returns (*SP\_RET*) as  $SP\_RET_{it} = \ln(SP_{it}/SP_{it-1}) * 100$ , where *i* and *t* denote, country and time, respectively.<sup>4</sup> We calculate the growth in *ND* and *NC* (i.e., *ND\_GROW* and *NC\_GROW*), as well as *EX* and *OIL* returns (i.e., *EX\_RET* and *OIL\_RET*, respectively), following suit. In addition, we compute and use the natural logarithms of *ND* and *NC* (i.e., *lnND* and *lnNC*) in robustness checks. [Table A.1](#) of Appendix shows details of the variables for each of the countries in our study.

<sup>1</sup> For instance, [Wei and Han \(2021\)](#) use an event study methodology to show that the pandemic has severely weakened the transmission of monetary policy to financial markets in 37 countries, which are severely impacted by the pandemic. They demonstrate that, unlike conventional monetary policy, unconventional monetary policy can still influence stock and exchange rate markets in these countries. [Cortes et al. \(2022\)](#) compare the monetary policy interventions of the US Federal Reserve during the subprime crises and the COVID-19 pandemic, in terms of their disaster risk reduction effectiveness. Their model-free measures of disaster risk obtained from daily options data suggest that the interventions during both crises led to tail risk reduction in domestic equity markets. [Yilmazkuday \(2022\)](#) shows that emerging markets managed to cut their interest rates in response to exchange rate volatility and reduced economic activity, in contrast to advanced economies.

<sup>2</sup> We thank one of the reviewers for this insight.

<sup>3</sup> These emerging markets are Argentina, Bangladesh, Bulgaria, Brazil, Chile, China, Colombia, Hungary, India, Indonesia, Morocco, Mexico, Malaysia, Peru, Philippines, Pakistan, Poland, Romania, Russia, Thailand, Turkey, South Africa, and United Arab Emirates.

<sup>4</sup> Using logarithm returns of nominal stock prices is not uncommon in the literature (see e.g., [Yang and Deng, 2021](#); [Wei and Han, 2021](#); [Karavias et al., 2022](#)).

## 2.2. Methodology

Our empirical model connecting stock returns, COVID-19, and conventional monetary policy has a strong theoretical underpinning. In theory, the negative information associated with an extreme event like the pandemic can create financial frictions because it increases borrowing cost and default risk, which reduce investment and productivity (Bernanke et al., 1999; Christiano et al., 2014). This kind of event is linked with bad news, which only increases the option value of waiting, causing a reduction in productivity and profitability (Bernanke, 1983). Investors would typically be pessimistic as the future of the economy becomes uncertain and therefore would reduce their stock market activities causing stock prices to plummet (Baker and Wurgler, 2006), as we saw at the onset of COVID-19. Through the discount and wealth channels, the monetary authority could prevent the stock market from a meltdown from the pandemic.<sup>5</sup> The central bank could raise the policy rate causing real interest rates to increase (via a fall in inflation) leading to a reduction in dividends and stock return premium (Thorbecke, 1997), and in consumption and investment through the Tobin Q effect (Bjørnland and Leitemo, 2009; Juhro et al., 2021).

Following these theoretical arguments, we establish the impact of COVID-19 on emerging stock markets through

$$SP\_RET_{it} = \alpha + \beta ND\_GROW_{it} + \varepsilon_{it} \quad (1)$$

Here,  $\alpha$  and  $\beta$  are regression parameters and  $\varepsilon_{it}$  is the error term. Because  $T > N$ , there are possible cross-sectional correlations and  $Cov(\varepsilon_{it}, \varepsilon_{jt}) \neq 0$  for  $i \neq j$ ; hence asymptotic estimates depend on  $T \rightarrow \infty$  (see Cameron and Trivedi, 2005, p. 723). This means, to obtain consistent estimates, we should apply the pooled ordinary least squares (OLS) estimator with White standard errors or other long panel estimators but the fixed effects estimator to estimate  $\alpha$  and  $\beta$  (i.e.,  $\hat{\alpha}$  and  $\hat{\beta}$ ).

The forgoing theoretical arguments imply that policymakers can counter the adverse impact of the pandemic via monetary and other policies. Thus, founded on these theoretical arguments, we examine the moderating effect of conventional monetary policy on the stock return–COVID-19 relation by estimating the following reduced-form model

$$SP\_RET_{it} = \alpha + \beta_1 ND\_GROW_{it} + \beta_2 PR_{it} + \beta_3 ND\_GROW_{it} * PR_{it} + \varepsilon_{it}. \quad (2)$$

Here,  $\alpha$  and  $\beta_i$  ( $i = 1, 2, 3$ ) are regression parameters, which are estimated using the pooled OLS estimator with White standard errors. We are interested in the parameter  $\beta_3$ , which shows how conventional monetary policy affects the impact of COVID-19 on stock returns. Hypothetically, we argue that COVID-19 has a negative impact on stock markets, which is weakened by downward policy rate adjustments (i.e., loose monetary policy) to propel stock market activity. This means  $\hat{\beta}$  in Eq. (1) should be negative and statistically significant, while  $\hat{\beta}_3$  in Eq. (2) should be positive and statistically significant for our hypothesis to hold true. We test this in what follows.

## 3. Empirical results

### 3.1. Preliminary analysis

The summary statistics in Table 1 shows that, on average, these countries recorded 6696 new COVID-19 cases resulting in 157 new deaths over the period from 1st January 2021 to 4th June 2021. These figures translate to approximately 2.34% case fatality rate, which is the proportion of people diagnosed with COVID-19 who died from it.<sup>6</sup> As a comparison, the average of the global case fatality rate is 2.61%.<sup>7</sup> For these countries, COVID-19 is nearly as deadly as the Spanish (1918) flu, deadlier than the Asian (1956–58; 1968–1969) flu, and other influenza pandemics, which had case fatality rates of >2.5%, about 0.1%, and < 0.1%, respectively (see Taubenberger and Morens, 2006; Li et al., 2008).

Although average stock return was positive over the sample period (i.e., 0.03%), skewness of stock returns was negative (−1.50%) implying that losses were more common in emerging markets during the sample period. Since COVID-19 induced negative sentiments in the market (see Chen et al., 2020), we can attribute the negative stock return skewness to it—we will show this later. Short term interest rates are generally high and volatile in emerging markets due to both inflationary pressures and high default risk (see Arellano, 2008). Hence, the average policy rate of 4.06% is considerably at the lower end. In fact, policy rates were generally lower during COVID-19 than in other periods, indicating that central banks in these countries adjusted the rates downwards to boost economic activity and the stock markets. In Section III-C, we examine the effectiveness of this loose monetary policy in averting the negative impact of COVID-19 on stock markets.

In Table 2, we examine the stationary properties of the variables before proceeding with estimation of the regressions. Here, we apply two popular panel unit root tests, namely the Levin et al. (2002) and Im et al. (2003) tests, considering a constant and a constant plus trend in the unit root test regressions. The COVID-19 indicators ( $ND\_GROW$ ,  $NC\_GROW$ ,  $\ln ND$ , and  $\ln NC$ ) are non-stationary. Thus,

<sup>5</sup> Alternatively, the monetary authority can counter the pandemic through unconventional monetary policies like forward guidance and quantitative easing. The central bank can strategically communicate its monetary policy stance to the market to influence the discourse and expectations of market participants, and in turn stock prices (Galloppo and Paimanova, 2017; Lüdering and Tillmann, 2020). Likewise, the central bank can purchase assets to rebalance its portfolios and this influences asset prices (Kojien et al., 2017; Juhro et al., 2021).

<sup>6</sup> We calculated the case fatality rate as  $\text{average COVID} - 19 \text{ deaths} / \text{average COVID} - 19 \text{ cases} * 100$ .

<sup>7</sup> This is calculated using the data from <https://ourworldindata.org/grapher/deaths-covid-19-vs-case-fatality-rate>.

**Table 1**  
Summary statistics.

	Mean	Max	Min	SD	Skewness	JB	Obs
<i>ND</i>	157.3546	4529.0000	-2.0000	368.5403	6.0092	0.0000	8533
<i>NC</i>	6695.8000	414,188.0000	0.0000	22,556.6900	10.7830	0.0000	8533
<i>lnND</i>	3.9795	8.4183	0.0000	1.8677	-0.3219	0.0000	6610
<i>lnNC</i>	7.1583	12.9341	0.0000	2.3520	-0.8244	0.0000	7469
<i>ND_GROW</i>	1.1369	432.1923	-349.6508	62.7195	0.2110	0.0000	6369
<i>NC_GROW</i>	1.8151	489.7840	-309.1042	47.5303	0.3387	0.0000	7317
<i>SP_RET</i>	0.0287	13.0229	-16.2903	1.6497	-1.5037	0.0000	8556
<i>PR</i>	4.0567	42.4600	-0.6500	5.7843	3.4989	0.0000	8150
<i>EX_RET</i>	0.0140	8.3566	-4.6276	0.6655	0.8642	0.0000	8556
<i>OIL_RET</i>	0.0375	19.0774	-27.9762	3.8871	-1.6216	0.0000	8349

The table shows summary statistics of the variables over the sample period from 1st January 2020 to 4th June 2021. The statistics Max, Min, SD, JB, and Obs, respectively, denote maximum, minimum, standard deviation, *p*-values under the Jarque-Bera test, and observations.

we include them in the regressions in first differences.<sup>8</sup> The evidence is in favor of the remaining variables being stationary.

### 3.2. The impact of COVID-19 on stock returns

To test our hypothesis that COVID-19 has a negative impact on stock markets in emerging economies, we estimate Eq. (1) using the pooled OLS estimator with White standard errors. Our benchmark model considers *ND\_GROW* as main COVID-19 indicator. We consider COVID-19 deaths instead of cases because deaths should logically induce more fear and panic than mere infections and hence should generate negative and stronger investor sentiments. This means that the higher the number of COVID-19 deaths, the more likely will investors panic and in turn inducing stock market fluctuations. In Table 3, we report estimates of the basic regression, which only contains a COVID-19 indicator as a predictor of stock returns. In the Column (1) we consider our main COVID-19 measure, *ND\_GROW*. Here, we find a negative and statistically significant impact of the pandemic on stock returns. Because this could be driven by the COVID-19 indicator, *ND\_GROW*, we consider three alternative indicators, namely *NC\_GROW*, *lnND*, and *lnNC*, in Columns (2), (3), and (4), respectively. Estimates of  $\beta$  considering these alternative COVID-19 indicators are also statistically significant and carry negative signs. These basic results suggest that COVID-19 has a negative impact on the stock markets of the emerging economies.

The basic estimates may not be revealing the full picture given that they do not control known predictors of stock returns (see Phan et al., 2015). Firms are generally exposed to both systematic and macroeconomic risks (see Iyke and Ho, 2021); thus, stock prices should reflect variations in these risk factors. Because our framework focuses on market returns rather than firm-specific returns, we do not control for systematic risks, but macroeconomic risks, such as those originating from the movements of exchange rates and oil prices. Our more robust estimates controlling for these omitted predictors are reported in Table 4. Clearly, the negative impact of COVID-19 on emerging stock markets is further strengthened controlling for the movements of exchange rates and oil prices proxied by *EX\_RET* and *OIL\_RET*, respectively.

Together, Tables 3 and 4 show strong evidence in support of our hypothesis that COVID-19 has a negative impact on stock markets in emerging economies. This finding is broadly consistent with the recent studies showing the adverse impact of the pandemic of stock markets, such as Zhang et al. (2020), Ali et al. (2021), and Haldar and Sethi (2021), who find the pandemic to adversely impact emerging stock markets. The infections and deaths associated with the pandemic have induced government responses like boarder lockdowns, stay-home, restrictive business activities, etc., which created unfavorable business and investor sentiments, in turn, cautionary investment activities, and a decline in stock market liquidity and prices, in line with the reasoning of the cautionary investment under uncertainty and investor sentiment literatures (see Baker and Wurgler, 2006).

### 3.3. The moderating role of monetary policy

The unprecedented levels of uncertainty and the fear of economic collapse induced by COVID-19 spurred several policy responses. From the monetary side, central banks deployed both expansionary/loose conventional and unconventional monetary policies to cushion economies from the unexpected adverse demand and supply shocks of COVID-19. Given the documented connection between stock markets and monetary policy (see e.g., Juhro et al., 2021), we argued that the latter could have helped moderate the negative impact of COVID-19 on the former.

To test this hypothesis, we estimate Eq. (2) using the pooled OLS estimator with White standard errors and report the results in Table 5. If monetary policy moderates the impact of COVID-19 on stock returns, the coefficient of the interaction between *ND\_GROW* and *PR*,  $\hat{\beta}_3$ , should be positive and significant. Columns (1) to (3) show estimates from the basic to the full specifications. The coefficient of the interaction between *ND\_GROW* and *PR*,  $\hat{\beta}_3$ , is negative but insignificant, implying that conventional monetary policy alone did not avert the negative impact of COVID-19 on emerging stock markets. Thus, our hypothesis does not hold true. Our finding

<sup>8</sup> Note that including *lnND* and *lnNC* in their first differences in the regressions is the same as including *ND\_GROW* and *NC\_GROW* in the regressions, except that we scaled the latter variables by 100.

**Table 2**  
Unit root test results.

Variable	Panel A: Constant		Panel B: Constant and Trend	
	LLC (p-value)	IPS (p-value)	LLC (p-value)	IPS (p-value)
<i>SP_RET</i>	-82.9903 (0.0000)	-73.6819 (0.0000)	-116.1880 (0.0000)	-80.3960 (0.0000)
<i>PR</i>	-4.3436 (0.0000)	-6.1972 (0.0000)	0.3266 (0.6280)	-1.3452 (0.0893)
<i>lnND</i>	-1.6363 (0.0509)	-3.9028 (0.0000)	1.6700 (0.9525)	-0.2001 (0.4207)
<i>lnNC</i>	-3.0910 (0.0010)	-5.8997 (0.0000)	2.5609 (0.9948)	-0.7879 (0.2154)
<i>ND_GROW</i>	40.8718 (1.0000)	-43.0992 (0.0000)	55.9160 (1.0000)	-44.0143 (0.0000)
<i>NC_GROW</i>	20.8924 (1.0000)	-40.1552 (0.0000)	51.7489 (1.0000)	-39.7107 (0.0000)
<i>EX_RET</i>	-79.8541 (0.0000)	-78.7502 (0.0000)	-111.6630 (0.0000)	-85.8229 (0.0000)
<i>OIL_RET</i>	-97.1529 (0.0000)	-85.4383 (0.0000)	-130.6820 (0.0000)	-91.4945 (0.0000)

The table shows the panel unit root test results of the variables. These are based on the LLC and IPS tests and considering constant and constant plus trend in the test regressions.

**Table 3**  
The impact of COVID-19 on stock returns.

Variable	(1)	(2)	(3)	(4)
Constant	0.1256 (0.0000)	0.0922 (0.0000)	0.1269 (0.0000)	0.0942 (0.0000)
$\Delta ND\_GROW_{it}$	-0.0003 (0.0436)			
$\Delta NC\_GROW_{it}$		-0.0007 (0.0418)		
$\Delta lnND_{it}$			-0.0597 (0.0282)	
$\Delta lnNC_{it}$				-0.2350 (0.0000)
R <sup>2</sup>	0.0007	0.0013	0.0008	0.0049

This table shows the results obtained by estimating Eq. (1) using the pooled OLS estimator with White standard errors. These are basic regressions without controls. The Columns (1), (2), (3), and (4), respectively, use *ND\_GROW*, *NC\_GROW*, *lnND*, and *lnNC* as measures of COVID-19. The symbol  $\Delta$  denotes the first difference operator.

**Table 4**  
The impact of COVID-19 on stock returns controlling exchange rate and oil price movements.

Variable	(1)	(2)	(3)	(4)
Constant	0.0984 (0.0000)	0.0670 (0.0002)	0.1005 (0.0000)	0.0672 (0.0003)
$\Delta ND\_GROW_{it}$	-0.0004 (0.0265)			
$\Delta NC\_GROW_{it}$		-0.0007 (0.0529)		
$\Delta lnND_{it}$			-0.0579 (0.0314)	
$\Delta lnNC_{it}$				-0.1927 (0.0001)
<i>EX_RET<sub>it</sub></i>	-0.4474 (0.0000)	-0.5688 (0.0000)	-0.4719 (0.0000)	-0.5530 (0.0000)
<i>OIL_RET<sub>it</sub></i>	0.0605 (0.0000)	0.0852 (0.0000)	0.0585 (0.0000)	0.0933 (0.0000)
R <sup>2</sup>	0.0816	0.1104	0.0825	0.1133

This table shows the results obtained by estimating Eq. (1) using the pooled OLS estimator with White standard errors. These regressions control for movements in exchange rates (*EX\_RET*) and oil prices (*OIL\_RET*). The Columns (1), (2), (3), and (4), respectively, use *ND\_GROW*, *NC\_GROW*, *lnND*, and *lnNC* as measures of COVID-19. The symbol  $\Delta$  denotes the first difference operator.

**Table 5**  
The role of conventional monetary policy.

Variable	(1)	(2)	(3)
Constant	0.1152 (0.0000)	0.0999 (0.0000)	0.0743 (0.0003)
$\Delta ND\_GROW_{it}$	-0.0003 (0.1174)	-0.0003 (0.0611)	-0.0003 (0.0656)
$PR_{it}$	0.0037 (0.3936)	0.0064 (0.1278)	0.0067 (0.1141)
$\Delta ND\_GROW_{it} * PR_{it}$	-0.0000 (0.5920)	-0.0000 (0.5988)	-0.0000 (0.6400)
$EX\_RET_{it}$		-0.4798 (0.0000)	-0.4558 (0.0000)
$OIL\_RET_{it}$			0.0625 (0.0000)
R <sup>2</sup>	0.0011	0.0576	0.0839

This table shows the results obtained by estimating Eq. (2) using the pooled OLS estimator with White standard errors. This equation regresses  $SP\_RET$  on  $\Delta ND\_GROW$ ,  $PR$ , and  $\Delta ND\_GROW * PR$ . We control  $EX\_RET$  in Column (2), and  $EX\_RET$  and  $OIL\_RET$  in Column (3). The symbol  $\Delta$  denotes the first difference operator.

is consistent with the recent evidence that the policy responses to reverse the negative impact of the pandemic on financial markets are less effective (see [Wei and Han, 2021](#)). This is also in line with the evidence that conventional monetary policy tends to be less effective during periods of low interest rates ([Borio and Gambacorta, 2017](#)).<sup>9</sup> However, our finding contradicts studies, such as [Zhang et al. \(2020\)](#) and [Narayan et al. \(2021\)](#), which show that the policy interventions attenuate the adverse impact of COVID-19 on financial markets. We must emphasize that, while these studies consider policy interventions and countries that are different from ours, our aims are similar in that we both attempted to evaluate the effectiveness of the policy interventions during the pandemic.<sup>10</sup>

We further document that the movements of exchange rates and oil prices proxied by  $EX\_RET$  and  $OIL\_RET$ , respectively, enter the regressions significantly. Specifically,  $EX\_RET$  negatively affects stock returns, implying that depreciation of the local currency against foreign currencies—in this case, the US dollar—hurts the local stock markets. Exchange rate risk is shown to affect the value of firms, which is why firms allocate substantial resources to manage it ([Jorion, 1991](#); [Dominguez and Tesar, 2006](#)). If the local stock market has substantial foreign participants, depreciation of the local currency tends to hurt it, as shown by [Iyke and Ho \(2021\)](#) because it reduces returns obtained by these investors. Emerging stock markets are increasingly seen as destinations for risk diversifications by global investors and indeed these markets have generated diversification benefits for investors (see [Harvey, 1995](#); [Li et al., 2003](#)). Hence, it is obvious why the depreciation of emerging market currencies adversely impacts their stock markets, as we documented.

The movements of oil prices,  $OIL\_RET$ , positively affect stock markets, consistent with [Narayan and Narayan \(2010\)](#), but contrary to earlier evidence presented by [Jones and Kaul \(1996\)](#), and [Papapetrou \(2001\)](#). [Ramos and Veiga \(2013\)](#) attempted to settle this debate by showing that an increase in oil prices have a positive effect on stock markets of oil-exporters and a negative effect on stock markets of oil-importers. In this sense, it appears that distinguishing countries by oil-importing and exporting statuses provide a better understanding regarding the impact of oil price movements on stock markets, but this is not the focus of our analysis. The key message here is that, even after controlling foreign exchange and oil market activities, clearly conventional monetary policy alone does not appear to reverse the adverse impact of COVID-19 on stock markets in these emerging economies.

### 3.4. Robustness checks

In our main analysis, we applied the White standard errors to tackle potential cross-sectional correlations, which may lead to  $Cov(\epsilon_{it}, \epsilon_{jt}) \neq 0$  for  $i \neq j$  and asymptotic estimates that are dependent on  $T \rightarrow \infty$  (see [Cameron and Trivedi, 2005](#), p. 723). Although the White standard errors allow us to possibly reduced biasedness due to heteroskedastic errors since they are heteroskedasticity-consistent, both serial correlation and cross-sectional dependence may still pose challenges.<sup>11</sup> Financial markets have become strongly interconnected and as a result experience significant spillover of shocks. We address these concerns by re-producing the estimates in [Tables 4 and 5](#) applying the pooled OLS estimator with [Driscoll and Kraay \(1998\)](#) standard errors instead of White standard errors. These results are shown in [Tables 6 and 7](#). Together, [Tables 6 and 7](#) show strong evidence in support of our findings that COVID-19 has a negative impact on stock markets in emerging economies and that the statistical significance of the impact of COVID-19 on stock markets disappears in the presence of conventional monetary policy.

Perhaps, our estimates are influenced by our COVID-19 indicator,  $ND\_GROW$ , and hence without observing estimates produced

<sup>9</sup> [Borio and Gambacorta \(2017\)](#) considered advanced countries, whose interest rates are lower than those considered in our study. Yet, it appears that the interest rates of the emerging countries considered in our study are considerably low to render conventional monetary policy less effective during the pandemic, as evidenced by our estimates.

<sup>10</sup> For instance, [Zhang et al. \(2020\)](#) show that US unlimited quantitative easing prevented investor panic but widened the gap between short- and long-term expectations. [Narayan et al. \(2021\)](#) consider the effect of government policy interventions on the stock markets in G7 countries.

<sup>11</sup> Our unreported Durbin-Watson statistics for [Tables 3 to 7](#), which are available upon request, indicate absence of serial correlation.



**Table 6**  
Driscoll-Kraay standard error-based estimate of the impact of COVID-19 on stock returns.

Variable	(1)	(2)	(3)	(4)
Constant	0.0984 (0.0041)	0.0670 (0.1376)	0.1005 (0.0033)	0.0672 (0.1723)
$\Delta ND\_GROW_{it}$	-0.0004 (0.0451)			
$\Delta NC\_GROW_{it}$		-0.0007 (0.0034)		
$\Delta \ln ND_{it}$			-0.0579 (0.0344)	
$\Delta \ln NC_{it}$				-0.1927 (0.0013)
$EX\_RET_{it}$	-0.4474 (0.0000)	-0.5688 (0.0000)	-0.4719 (0.0000)	-0.5530 (0.0000)
$OIL\_RET_{it}$	0.0605 (0.0000)	0.0852 (0.0006)	0.0585 (0.0000)	0.0933 (0.0010)
R <sup>2</sup>	0.0816	0.1104	0.0825	0.1133

This table shows the results obtained by estimating Eq. (1) using the pooled OLS estimator with Driscoll-Kraay (1998) standard errors. These regressions control for movements in exchange rates ( $EX\_RET$ ) and oil prices ( $OIL\_RET$ ). The Columns (1), (2), (3), and (4), respectively, use  $ND\_GROW$ ,  $NC\_GROW$ ,  $\ln ND$ , and  $\ln NC$  as measures of COVID-19. The symbol  $\Delta$  denotes the first difference operator.

**Table 7**  
Driscoll-Kraay standard error-based estimate of the role of monetary policy.

Variable	(1)	(2)	(3)
Constant	0.1152 (0.0049)	0.0999 (0.0056)	0.0743 (0.0269)
$\Delta ND\_GROW_{it}$	-0.0003 (0.1138)	-0.0003 (0.0573)	-0.0003 (0.0637)
$PR_{it}$	0.0037 (0.3633)	0.0064 (0.1093)	0.0067 (0.1031)
$\Delta ND\_GROW_{it} * PR_{it}$	-0.0000 (0.5524)	-0.0000 (0.5654)	-0.0000 (0.6103)
$EX\_RET_{it}$		-0.4798 (0.0000)	-0.4558 (0.0000)
$OIL\_RET_{it}$			0.0625 (0.0000)
R <sup>2</sup>	0.0011	0.0576	0.0839

This table shows the results obtained by estimating Eq. (2) using the pooled OLS estimator with Driscoll-Kraay (1998) standard errors. This equation regresses  $SP\_RET$  on  $\Delta ND\_GROW$ ,  $PR$ , and  $\Delta ND\_GROW * PR$ . We control  $EX\_RET$  in Column (2), and  $EX\_RET$  and  $OIL\_RET$  in Column (3). The symbol  $\Delta$  denotes the first difference operator.

**Table 8**  
Considering alternative COVID-19 indicators.

Variable	Panel A: $\Delta NC\_GROW_{it}$			Panel B: $\Delta \ln ND_{it}$			Panel C: $\Delta \ln NC_{it}$		
Constant	0.0915 (0.0001)	0.0778 (0.0006)	0.0491 (0.0282)	0.1224 (0.0000)	0.1065 (0.0000)	0.0821 (0.0001)	0.0985 (0.0000)	0.0847 (0.0003)	0.0542 (0.0193)
$COVID_{it}$	-0.0004 (0.2611)	-0.0004 (0.2583)	-0.0003 (0.3487)	-0.0686 (0.0245)	-0.0681 (0.0219)	-0.0650 (0.0295)	-0.1533 (0.0163)	-0.1238 (0.0438)	-0.1078 (0.0694)
$PR_{it}$	0.0005 (0.9193)	0.0041 (0.4115)	0.0048 (0.3281)	0.0025 (0.5667)	0.0053 (0.2107)	0.0056 (0.1858)	-0.0003 (0.9507)	0.0031 (0.5562)	0.0041 (0.4284)
$COVID_{it} * PR_{it}$	-0.0002 (0.1784)	-0.0002 (0.1702)	-0.0002 (0.1251)	0.0016 (0.7481)	0.0012 (0.8171)	0.0011 (0.8221)	-0.0429 (0.0519)	-0.0442 (0.0417)	-0.0429 (0.0381)
$EX\_RET_{it}$		-0.6222 (0.0000)	-0.5730 (0.0000)		-0.5008 (0.0000)	-0.4786 (0.0000)		-0.6089 (0.0000)	-0.5567 (0.0000)
$OIL\_RET_{it}$			0.0902 (0.0000)			0.0611 (0.0000)		0.0978 (0.0000)	0.0978 (0.0000)
R <sup>2</sup>	0.0033	0.0715	0.1165	0.0010	0.0606	0.0850	0.0088	0.0704	0.1209

This table shows the results obtained considering alternative COVID-19 indicators and estimating Eq. (2) using the pooled OLS estimator with White standard errors. This equation regresses  $SP\_RET$  on the COVID-19 indicators ( $COVID$ ),  $PR$ , and  $COVID * PR$ . Panels A, B, and C consider the COVID-19 indicators,  $NC\_GROW$ ,  $\ln ND$ , and  $\ln NC$ , respectively. The symbol  $\Delta$  denotes the first difference operator.

using alternative indicators, there is doubt regarding the effectiveness of monetary policy in averting the impact of COVID-19 on stock markets. Accordingly, we consider three alternative COVID-19 indicators, viz.  $NC\_GROW$ ,  $\ln ND$ , and  $\ln NC$ . Replacing  $ND\_GROW$  with these indicators in Eq. (2) and applying the pooled OLS estimator with White standard errors, we find qualitatively consistent evidence that monetary policy does not render the impact of COVID-19 on stock markets ineffective (see Table 8). In fact, the estimates obtained using  $\ln NC$ , which are reported in Panel C of Table 8, suggest that the impact of COVID-19 on stock markets is negative and statistically even in the presence of monetary policy. This is regardless of the fact that new COVID-19 cases,  $NC$ , are less indicative of the fatality of the pandemic, as opposed to new COVID-19 deaths—the latter which has strong negative sentiment regarding the future. Besides, since our predictand,  $SP\_RET$ , is in return form, intuitively, the growth rate of  $NC$ ,  $NC\_GROW$ , is a more appropriate predictor as compared with  $\ln NC$ . As we see, in Panel A of Table 8, the interaction of  $NC\_GROW$  and  $PR$  (i.e.  $NC\_GROW*PR$ ) enters the regressions insignificantly, further suggesting that our finding is not influenced by our COVID-19 indicator choice.

Another concern is whether our estimates are influenced by ignoring fixed effects. Since  $T > N$  in our setup, cross-sectional units are potentially correlated meaning that  $Cov(\varepsilon_{it}, \varepsilon_{jt}) \neq 0$  for  $i \neq j$  and that asymptotic estimates depend on  $T \rightarrow \infty$  (see Cameron and Trivedi, 2005, p. 723). Under this setting, short panel estimators like the fixed and random effects estimators produce inefficient estimates. Our baseline strategy entails estimating Eq. (2) using the pooled OLS estimator with White standard errors to sidestep this problem. Yet, it is necessary to also show that our findings are not contingent on our empirical strategy. To this end, we address fixed effects by considering only cross-sectional effects because we run into singularity of the covariance matrix as  $T \rightarrow \infty$ . These estimates are shown in Panel A of Table 9. Evidently, our findings are not driven by fixed effects.

In addition, since the time dimension of our data is considerably larger than the cross-sectional dimension, a concern is that our baseline strategy of estimating Eq. (2) by the pooled OLS estimator with White standard errors ignores the cointegrating dynamics of the variables. Hence, the coefficients, particularly that of the interaction term,  $\hat{\beta}_3$ , and their statistical significances are far from what are expected if we account for the cointegrating dynamics of the variables. We address this concern by applying the pooled Fully Modified Least Squares (FMOLS) estimator developed by Phillips and Moon (1999) to estimate Eq. (2).<sup>12</sup> The estimates, which are reported in Panel B of Table 9, are consistent with our main estimates in Table 5. That is, the interaction between COVID-19 and monetary policy enters all regressions negatively and insignificantly meaning that conventional monetary policy alone does not weaken the impact of the pandemic.

Moreover, our estimates so far are based on the conditional mean of the stock returns across values of the predictors. Would our findings hold true if our estimates are based on the conditional median of the stock returns across values of the predictors? We examine this via the quantile regression estimator (QREG). Specifically, we consider the 0.5 quantile (i.e., the 50th percentile or median), when estimating Eq. (2). The estimates, which are reported in Panel C of Table 9, are consistent with the main estimates in Table 5.<sup>13</sup>

Finally, the LLC test considering a constant only in the unit root test regression suggests that the policy rate ( $PR$ ) may not be stationary. The evidence regarding whether short-term interest rates are stationary is controversial and dates to Cox et al. (1985), who show that they are a stationary process, and Campbell and Shiller (1987), who refute this finding. Therefore, with no absolute foolproof evidence that  $PR$  is a stationary process, we consider alternative regressions in which the variable enters in first difference. We then estimate these regressions using the pooled OLS estimator with White standard errors and report the results in Panel D of Table 9. As with the main estimates in Table 5, we find that the statistical significance of the impact of COVID-19 on stock markets disappears in the presence of conventional monetary policy. Thus, to summarize whether considered in level or first difference, the stationarity property of  $PR$  is inconsequential to our findings.

### 3.5. Additional analysis

#### 3.5.1. The role of external factors

This subsection addresses other issues that may potentially impact our findings. Countries have become more open now than ever leading to substantial cross-border listings, an ever-growing presence of multinational firms, and consequently blurred national stock market boundaries. Therefore, domestic investor sentiments are shaped by both domestic and international policies.<sup>14</sup> Indeed, studies document that external developments play an important role in the stock markets of emerging countries (see Maćkowiak, 2007; Apostolou and Beirne, 2019; Kannadhasan and Das, 2020; Lakdawala, 2021). Although our main analysis controlled for exchange rate and oil price movements, controlling for external factors like conventional monetary policy stance, economic policy uncertainty, and geopolitical risk would provide closure to our analysis, since they can influence the stock markets in emerging countries.

Consistent with prior research (see, e.g., Kannadhasan and Das, 2020), we considered both economic policy uncertainty and geopolitical risk in our regressions. Since the global economic policy uncertainty index is not available at daily frequency, we used the daily US economic policy uncertainty index, which is based on newspaper archives from Access World New's NewsBank service. The data is from <https://www.policyuncertainty.com/>. Similarly, we collected daily global geopolitical risk index data from <https://www.matteiocoviello.com/gpr.htm>. The geopolitical risk index is constructed based on automated text-search results of the electronic

<sup>12</sup> Since this estimator entails non-stationary variables, we do not difference the COVID-19 variable. Panel autoregressive distributed lag estimators would have been suitable given that our setup has I(0) and I(1) variables. However, the variance-covariance matrix under this approach is non-singular and hence we are unable to recover meaningful estimates of parameters.

<sup>13</sup> Note that choosing both extremes [i.e., 0.05 and 0.95 quantiles] produces qualitatively consistent estimates and hence does not affect our findings.

<sup>14</sup> We thank one of the reviewers for highlighting this point.

**Table 9**  
Considering alternative empirical estimation strategies.

Variable	Panel A: FE			Panel B: FMOLS			Panel C: QREG			Panel D: $\Delta PR$		
Constant	0.1610	0.1610	0.1327	–	–	–	0.0550	0.0453	0.0427	0.1345	0.1300	0.1097
	(0.0114)	(0.0088)	(0.0285)	–	–	–	(0.0009)	(0.0059)	(0.0101)	(0.0000)	(0.0000)	(0.0000)
$COVID_{it}$	–0.0003	–0.0003	–0.0003	–0.0003	–0.0003	–0.0003	–0.0002	–0.0003	–0.0003	–0.0003	–0.0003	–0.0003
	(0.1138)	(0.0584)	(0.0625)	(0.3897)	(0.3987)	(0.4254)	(0.1347)	(0.0890)	(0.0724)	(0.1315)	(0.0682)	(0.0447)
$PR_{it}$	–0.0076	–0.0086	–0.0076	–0.0070	–0.0074	–0.0080	0.0109	0.0130	0.0133	–0.0254	–0.0295	–0.0272
	(0.5481)	(0.4926)	(0.5441)	(0.3338)	(0.2819)	(0.2396)	(0.0089)	(0.0003)	(0.0000)	(0.6277)	(0.5729)	(0.5968)
$COVID_{it} \times PR_{it}$	–0.0000	–0.0000	–0.0000	–0.0000	–0.0000	–0.0000	–0.0000	–0.0000	–0.0000	0.0000	0.0000	0.0000
	(0.5842)	(0.5899)	(0.6318)	(0.7163)	(0.6452)	(0.6559)	(0.5585)	(0.6037)	(0.6732)	(0.9916)	(0.9691)	(0.9091)
$EX\_RET_{it}$		–0.4832	–0.4593		–0.5013	–0.4813		–0.3262	–0.3201		–0.4681	–0.4419
		(0.0000)	(0.0000)		(0.0000)	(0.0000)		(0.0000)	(0.0000)		(0.0000)	(0.0000)
$OIL\_RET_{it}$			0.0621			0.0670			0.0546			0.0636
			(0.0000)			(0.0000)			(0.0000)			(0.0000)
$R^2$	0.0034	0.0605	0.0864	0.0032	0.0607	0.0903	0.0018	0.0194	0.0308	0.0005	0.0558	0.0836

This table shows the results obtained considering alternative estimation strategies in place of the pooled OLS estimator with White standard errors when estimating Eq. (2). Panels A, B, and C consider the FE, FMOLS, and QREG estimators, respectively. Panel D uses the baseline estimation strategy but replaces PR with  $\Delta PR$ . The symbols – and  $\Delta$  denote, respectively, not applicable and first difference operator.

archives of 10 leading newspapers.<sup>15</sup> Because our dependent variable is stock returns, we computed the growth rates of economic policy uncertainty and geopolitical risk indices, ensured they are stationary, and included these variables in the regressions.<sup>16</sup> In Column (1) of Table A.2, we controlled economic policy uncertainty. In Column (2) of the same table, we controlled both economic policy uncertainty and geopolitical risk. In both instances, we find no statistically significant impact of COVID-19 on stock returns in the presence of conventional monetary policy, consistent with the baseline results.

In addition to economic policy uncertainty and geopolitical risk, prior studies have shown that external monetary policies influence emerging stock markets (see Maćkowiak, 2007; Apostolou and Beirne, 2019; Lakdawala, 2021). Hence, we considered the impact of external monetary policy stance in our regression. We measured external monetary policy stance as the US daily federal funds effective rate, which is taken from the FRED database at <https://fred.stlouisfed.org/series/DFE#0>. The regression results, controlling for external monetary policy stance, are shown in Column (3) of Table A.2.<sup>17</sup> Like the baseline, the COVID-19 pandemic has no statistically significant impact on stock returns in the presence of the domestic conventional monetary policy and considering external monetary policy stance.

### 3.5.2. The role of monetary policy frameworks and stock market characteristics

We take the analysis further by considering the roles of: (a) the monetary policy framework and (b) the nature of the stock markets. The monetary policy framework and the stock markets differ across emerging economies. For instance, some of the countries pursue flexible inflation targeting, whereas others do not. Besides, some of the stock markets are more developed than others. These differences could potentially influence the transmission of monetary policy to the stock markets and hence should be controlled to better appraise our results.

To examine the role of monetary policy in shaping the impact of COVID-19 on stock markets under different monetary frameworks, we grouped countries into two: flexible inflation targeting countries and other countries. The flexible inflation targeting countries are Argentina, Brazil, Chile, Colombia, Hungary, Indonesia, India, Mexico, Peru, Philippines, Poland, Romania, Thailand, and Turkey, while the remaining countries have different monetary frameworks.<sup>18</sup> Columns (1) and (2) of Table A.3 report the regression results for the flexible inflation targeting countries and for the other countries, respectively. These results suggest that our baseline finding of non-statistically significant impact of COVID-19 pandemic on stock markets in the presence of conventional monetary policy is not driven by the monetary policy frameworks pursued in these countries.

We controlled for the differences in stock market characteristics by grouping countries according to market capitalization to gross domestic product and turnover ratios of the stock markets in these countries. We ranked the countries by a five-year (i.e. 2016–2020) average of market capitalization to gross domestic product and turnover ratios and placed the top 11 into more developed stock markets and the bottom 11 into less developed stock markets.<sup>19</sup> Pakistan is excluded from this analysis because it does not have the required data for the classification. The results for the more developed and the less developed stock markets are shown in Columns (3) and (4) of Table A.3, respectively. These results are consistent with the baseline, suggesting that the impact of the pandemic on stock markets in the presence of conventional monetary policy is not statistically significant regardless of the level of stock market development.

Finally, prior research has shown that Islamic financial activities have experienced substantial growth over the years (see Pepinsky, 2013), and that Islamic financial markets are guided by stricter principles that differ markedly from the traditional financial markets (see Kuran, 1995; Hearn et al., 2011; Juhro et al., 2020), which make them more resilient in times of crisis (see Mirza et al., 2022). Accordingly, it is important to understand whether the moderating role of conventional monetary policy in the negative relation between stock markets and the pandemic differs across countries with Islamic stock markets and those without Islamic stock markets. To do this, we grouped countries by Islamic dominance using data from <https://worldpopulationreview.com/country-rankings/muslim-majority-countries>. This data ranks countries by Muslim majority and hence allows us to uniquely identify their Islamic orientation.<sup>20</sup> Columns (5) and (6) of Table A.3 report, respectively, the results for the countries with Islamic and those without Islamic stock markets. It turns out that our baseline results are not influenced by whether countries have Islamic stock markets. In summary, the impact of the pandemic on stock markets in the presence of conventional monetary policy is not statistically significant, even after controlling for monetary policy frameworks and stock market characteristics. In other words, conventional monetary policy alone is less effective in overturning the negative impact of the pandemic on stock markets.

<sup>15</sup> See <https://www.matteociacoviello.com/gpr.htm> for details on its construction.

<sup>16</sup> Like stock returns, we compute these variables as  $growth\ in\ Y = \ln(Y_{it}/Y_{it-1}) * 100$ , where  $Y$  is either the economic policy uncertainty or geopolitical risk index. Our unreported LLC and IPS test results, which are available upon request, suggest that both variables are stationary.

<sup>17</sup> The LLC and IPS test results, which are available upon request, suggest that the measure of external monetary policy stance (i.e. the US daily federal funds effective rate) is level stationary and hence the regression controls for the variable as is.

<sup>18</sup> See Panel A of Table A.4 for the classification of countries. We thank one of the reviewers for this insight and for the monetary framework classification.

<sup>19</sup> See Panel B of Table A.4 for this classification. Data on market capitalization and turnover ratios are obtained from the Global Financial Development database of the World Bank at <https://databank.worldbank.org/source/global-financial-development/>. The data are available up to 2020. The five-year averaging allows us to smooth the data and ensure non-bias ranking of these countries, as compared to choosing a particular year.

<sup>20</sup> See Panel C of Table A.4 for this classification.

#### 4. Conclusion

Prior studies have shown that the COVID-19 pandemic has severely and negatively impacted financial markets, and this has forced policymakers to devise various policies to prevent a financial crisis. However, at present, we have little understanding regarding how monetary policy prevented further damage to the financial markets. Focusing on emerging markets, we examine whether the pandemic has adversely impacted stock markets and whether monetary policy—specifically, conventional monetary policy—has moderated this impact. Using daily historical data, we show that the pandemic has negatively impacted emerging stock markets by reducing stock returns. Then, we demonstrate that conventional monetary policy alone may not be effective because it does not appear to moderate the negative impact of the pandemic on these stock markets. We subject our findings to robustness checks by considering alternative COVID-19 indicators, fixed effects, controlling for serial correlation, heteroskedasticity, cross-sectional dependence, and cointegrating dynamics, considering external factors (monetary policy stance, economic policy uncertainty, and geopolitical risk), the nature of countries' monetary policy frameworks (flexible inflation targeters vs. others), the level of stock market development, and whether countries have Islamic stock markets. We demonstrate that our findings remain robust to these checks.

Our findings suggest that, although conventional monetary policy is important, it may not be an effective tool if implemented alone during the ongoing pandemic. To steer stock markets back to their pre-crisis level, unconventional monetary policy and other policies are necessary. Looking ahead, for economies unconstrained by the zero-lower bound of policy rates, small but significant interest rate cuts to ease the cost of borrowing should be coordinated with other policies (like forward guidance and quantitative easing) to restore stock markets to at least their pre-shock levels and to prevent a full-blown financial crisis. Emerging stock markets still have substantial diversification benefits and hence our exploits reveal that conventional monetary policy is not effective, but together with existing policy responses (unconventional monetary policy, social distancing, fiscal stimulus packages, lockdowns, etc.), policymakers may stand a chance to revamp these stock markets. In this sense, our exploits complete the evidence regarding how fiscal, monetary, and other policy responses help to mitigate the negative ramifications of the pandemic.

Our study broadly enriches the literature on the policy interventions required to overturn crises. We believe that simulated general equilibrium models incorporating COVID-19 and monetary policy will produce a clearer picture regarding how the central bank responses can stabilize financial markets and should be the focus of future studies. In addition, we believe reduced-form analysis that extends our models to consider unconventional monetary policy would be useful to understanding the general effectiveness of monetary policies during the pandemic.

#### Author statement

We have no conflicts of interest to disclose.

#### Appendix A. Appendix

**Table A.1**

Variables and data sources.

Variables	Full name / Construction	Source
<i>ND</i>	New COVID-19 deaths	Datastream
<i>NC</i>	New COVID-19 cases	Datastream
<i>lnND</i>	Natural logarithm of new COVID-19 deaths	Datastream
<i>lnNC</i>	Natural logarithm of new COVID-19 cases	Datastream
<i>ND_GROW</i>	Growth rate of new COVID-19 deaths calculated as $ND\_GROW_{it} = \ln(ND_{it}/ND_{it-1}) * 100$ , where <i>i</i> and <i>t</i> denote, respectively, country and time.	Datastream
<i>NC_GROW</i>	Growth rate of new COVID-19 cases calculated as $NC\_GROW_{it} = \ln(NC_{it}/NC_{it-1}) * 100$ , where <i>i</i> and <i>t</i> denote, respectively, country and time.	Datastream
<i>SP_RET</i>	Stock returns calculated as $SP\_RET_{it} = \ln(SP_{it}/SP_{it-1}) * 100$ , where <i>SP</i> , <i>i</i> and <i>t</i> denote, respectively, stock price index, country, and time. See table notes for the stock price indices.	Datastream
<i>PR</i>	Policy rate. We use the monetary policy rates where available or various short-term rates	Datastream
<i>EX_RET</i>	Exchange rate returns calculated as $EX\_RET_{it} = \ln(EX_{it}/EX_{it-1}) * 100$ , where <i>EX</i> , <i>i</i> and <i>t</i> denote, respectively, local currency per US dollar, country, and time.	Datastream
<i>OIL_RET</i>	Oil returns calculated as $OIL\_RET_{it} = \ln(OIL_{it}/OIL_{it-1}) * 100$ , where <i>OIL</i> , <i>i</i> and <i>t</i> denote, respectively, Brent crude oil price, country, and time.	Datastream
<i>EPU_RET</i>	Economic policy uncertainty growth calculated as $EPU\_RET_{it} = \ln(EPU_{it}/EPU_{it-1}) * 100$ , where <i>EPU</i> and <i>t</i> denote, respectively, US economic policy uncertainty index and time.	<a href="https://www.policyuncertainty.com/">https://www.policyuncertainty.com/</a>
<i>GPR_RET</i>	Geopolitical risk growth calculated as $GPR\_RET_{it} = \ln(GPR_{it}/GPR_{it-1}) * 100$ , where <i>GPR</i> and <i>t</i> denote, respectively, global geopolitical risk index and time.	<a href="https://www.matteoiacoviello.com/gpr.htm">https://www.matteoiacoviello.com/gpr.htm</a>
<i>FFR</i>	External monetary policy stance proxied by US daily federal funds effective rate.	FRED database

This table shows the variables used in our study and the data sources. Where applicable, we show how variables are calculated from the data. We use the following stock price indices: Argentina (MERVAL Index), Bangladesh (DSEX Index), Bulgaria (BGREIT Index), Brazil (IBOV Index), Chile (IPSA Index), China (SHCOMP Index), Colombia (COLCAP Index), Hungary (BUX Index), India (NIFTY Index), Indonesia (JCI Index), Morocco (MOSENEW Index), Mexico (MEXBOL Index), Malaysia (FBMKLIC Index), Peru (SPBPLPGT Index), Philippines (PCOMP Index), Pakistan (KSE100 Index), Poland

(WIG Index), Romania (BET Index), Russia (IMOEX Index), Thailand (SET Index), Turkey (XU100 Index), South Africa (JALSH Index), and United Arab Emirates (ADSMI Index).

**Table A.2**  
The role of external factors.

Variable	(1)	(2)	(3)
Constant	0.0738 (0.0278)	0.0739 (0.0277)	0.0887 (0.0318)
$\Delta ND\_GROW_{it}$	-0.0003 (0.0601)	-0.0003 (0.0588)	-0.0003 (0.0577)
$PR_{it}$	0.0067 (0.1030)	0.0067 (0.1033)	0.0066 (0.1081)
$\Delta ND\_GROW_{it} * PR_{it}$	-0.0000 (0.6032)	-0.0000 (0.6077)	-0.0000 (0.6086)
$EX\_RET_{it}$	-0.4563 (0.0000)	-0.4561 (0.0000)	-0.4557 (0.0000)
$OIL\_RET_{it}$	0.0626 (0.0000)	0.0626 (0.0000)	0.0624 (0.0000)
$EPU\_RET_{it}$	-0.0004 (0.5361)	-0.0005 (0.5134)	-0.0005 (0.5162)
$GPR\_RET_{it}$		0.0003 (0.6369)	0.0003 (0.6364)
$FFR_{it}$			-0.1690 (0.5043)
R <sup>2</sup>	0.0841	0.0842	0.0844

This table shows the results obtained by estimating Eq. (2) using the pooled OLS estimator with Driscoll and Kraay (1998) standard errors. This equation regresses  $SP\_RET$  on  $\Delta ND\_GROW$ ,  $PR$ , and  $\Delta ND\_GROW * PR$ . In addition to  $EX\_RET$  and  $OIL\_RET$ , we control economic policy uncertainty ( $EPU\_RET$ ) in Column (1),  $EPU\_RET$  and geopolitical risk ( $GPR\_RET$ ) in Column (2), and  $EPU\_RET$ ,  $GPR\_RET$  and external monetary policy stance ( $FFR$ ) in Column (3). The symbol  $\Delta$  denotes the first difference operator. Table A.3 The role of monetary policy frameworks and stock market characteristics.

**Table A.3**  
The role of monetary policy frameworks and stock market characteristics

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.3424 (0.1929)	0.0602 (0.1315)	0.0928 (0.0800)	0.1435 (0.4509)	0.1046 (0.5246)	0.0811 (0.0912)
$\Delta ND\_GROW_{it}$	-0.0003 (0.2577)	-0.0004 (0.1097)	-0.0004 (0.1561)	-0.0004 (0.1919)	-0.0002 (0.6293)	-0.0004 (0.0503)
$PR_{it}$	0.0062 (0.1375)	0.0135 (0.1683)	0.0056 (0.3265)	0.0063 (0.2181)	0.0066 (0.2027)	0.0066 (0.1758)
$\Delta ND\_GROW_{it} * PR_{it}$	-0.0000 (0.5961)	-0.0000 (0.9530)	0.0001 (0.7966)	-0.0000 (0.7041)	0.0000 (0.8394)	-0.0000 (0.5950)
$EX\_RET_{it}$	-0.5165 (0.0000)	-0.2470 (0.0000)	-0.5239 (0.0000)	-0.3904 (0.0000)	-0.5851 (0.0000)	-0.4142 (0.0000)
$OIL\_RET_{it}$	0.0673 (0.0000)	0.0532 (0.0000)	0.0603 (0.0002)	0.0633 (0.0000)	0.0313 (0.0028)	0.0774 (0.0000)
$EPU\_RET_{it}$	-0.0003 (0.7591)	-0.0008 (0.1700)	-0.0009 (0.3425)	-0.0000 (0.9482)	-0.0002 (0.7311)	-0.0005 (0.5412)
$GPR\_RET_{it}$	0.0003 (0.7507)	0.0004 (0.3822)	0.0002 (0.7485)	0.0003 (0.6004)	-0.0004 (0.4446)	0.0006 (0.4050)
$FFR_{it}$	-3.3740 (0.2984)	-0.1257 (0.6193)	-0.1575 (0.5267)	-0.9220 (0.6965)	-0.1626 (0.9377)	-0.1493 (0.5522)
R <sup>2</sup>	0.0954	0.0632	0.1082	0.0679	0.0937	0.0876

This table shows the results obtained by estimating Eq. (2) using the pooled OLS estimator with Driscoll and Kraay (1998) standard errors. This equation regresses  $SP\_RET$  on  $\Delta ND\_GROW$ ,  $PR$ , and  $\Delta ND\_GROW * PR$ , and controls  $EX\_RET$ ,  $OIL\_RET$ ,  $EPU\_RET$ ,  $GPR\_RET$ , and  $FFR$  (see Table A.1 for details on these variables). The symbol  $\Delta$  denotes the first difference operator. Columns (1) and (2) report the regression results flexible inflation targeting countries and other countries, respectively. Columns (3) and (4) report the results for the more developed and the less developed stock markets, respectively. Finally, Columns (5) and (6) report, respectively, the results for the countries with Islamic and those without Islamic stock markets.

**Table A.4**  
Classification of countries by monetary frameworks and stock market characteristics.

Panel A: Flexible inflation targeting countries vs. others	
Flexible inflation targeters	Others

(continued on next page)

Table A.4 (continued)

Panel A: Flexible inflation targeting countries vs. others	
Flexible inflation targeters	Others
Argentina	Bangladesh
Brazil	Bulgaria
Chile	China
Colombia	Morocco
Hungary	Malaysia
India	Pakistan
Indonesia	Russia
Mexico	South Africa
Peru	United Arab Emirates
Philippines	
Poland	
Romania	
Thailand	
Turkey	
Panel B: More developed vs. less developed stock markets	
More developed stock markets	Less developed stock markets
Brazil	Argentina
Chile	Bangladesh
China	Bulgaria
India	Colombia
Malaysia	Hungary
Philippines	Indonesia
Poland	Morocco
Thailand	Mexico
Turkey	Peru
South Africa	Romania
United Arab Emirates	Russia
Panel C: Countries with Islamic stock markets vs. without Islamic stock markets	
Dual stock markets (i.e. Islamic and conventional)	Conventional stock markets
Bangladesh	Argentina
Indonesia	Bulgaria
Morocco	Brazil
Malaysia	Chile
Pakistan	China
Turkey	Colombia
United Arab Emirates	Hungary
	India
	Mexico
	Peru
	Philippines
	Poland
	Romania
	Russia
	Thailand
	South Africa

This table classifies countries by monetary frameworks and stock market characteristics. Panel A classifies countries into flexible inflation targeting countries and others. One of the reviewers supplied this monetary framework classification, which we verified from the websites of the respective central banks considered in our sample. Panel B classifies countries into more and less developed stock markets. Here, we ranked the countries by a five-year average (i.e. 2016–2020) of market capitalization to gross domestic product ratio and turnover ratio and placed the top 11 into more developed stock markets and the bottom 11 into less developed stock markets. Pakistan is excluded from this classification because it does not have the required data. Data on market capitalization and turnover ratios are obtained from the Global Financial Development database of the World Bank at <https://databank.worldbank.org/source/global-financial-development/>. The data are available up to 2020. The five-year averaging allows us to smooth the data and ensure non-bias ranking of these countries, as compared to choosing a specific year. Finally, Panel C classifies countries into those with and those without Islamic stock markets. We classified countries by Islamic dominance using data from <https://worldpopulationreview.com/country-rankings/muslim-majority-countries>. This data ranks countries by Muslim majority and hence allow us to uniquely identify their Islamic orientation.

## Appendix B. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pacfin.2022.101883>.

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