Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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The impact of COVID-19 on emerging stock markets

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ABSTRACT

The goal of this study is to investigate the impact of COVID-19 on emerging stock markets over the period March 10 – April 30, 2020. Findings reveal that the negative impact of pandemic on emerging stock markets has gradually fallen and begun to taper off by mid-April. In terms of regional classification, the impact of the outbreak has been the highest in Asian emerging markets whereas emerging markets in Europe have experienced the lowest. We also find that official response time and the size of stimulus package provided by the governments matter in offsetting the effects of the pandemic.

1. Introduction

According to the World Health Organization (WHO, 2020), the coronavirus (COVID-19) outbreak which emerged from central China in late December has spread to 216 countries, areas or territories, and has resulted in over 8.3 million confirmed cases as well as over 450000 deaths across the globe as of June 19, 2020. Given the widespread and ongoing transmission of the novel coronavirus worldwide, the WHO officially declared a pandemic on March 11, 2020.

The pandemic can trigger a number of channels, including for example, labor markets, global supply chains, consumption behaviors, all of which can affect global economy. Among these channels, one of the most important components is definitely the stock markets (see, for example: Ahmar and del Val, 2020; Al-Awadhi et al., 2020; among others). Given the slowest pace of economic growth and lack of capital inflows, emerging markets have relatively limited resources to cope with the impacts of the pandemic and therefore are expected to suffer worst.

Although the overall economic impacts are not yet straight, financial markets have already reacted to COVID-19 by early March. Ramelli and Wagner (2020) assert three phases starting from early January to late March, which ended just before the Federal Reserve's “whatever it takes” announcement. In addition, recent studies indicate that the risk level of all countries increased dramatically in March when COVID-19 spread to more than 200 destinations (Gormsen and Koijen, 2020; Zhang et al., 2020). By late March, however, governments and central banks have adopted a wide range of economic policies (see, for example: Elgin et al., 2020; Nicola et al., 2020; Carlsson-Szlezak et al., 2020; among others) in order to slow down the impact of the lockdown and the sparking fear caused by the pandemic.

Despite of the well-anticipated effects until March 23, we still do not know much about how COVID-19 empirically affects emerging stock markets after the measures taken. In addition, the increasing number of countries brought spread of virus under control by mid-April might lead to an ambiguity as to what effect the pandemic has on emerging stock markets. The goal of this study is therefore to empirically investigate the impact of COVID-19 on emerging stock markets.

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The remainder of this study is as follows: Section 2 presents data, methodology and empirical findings. Section 3 discusses policy implications. Section 4 gives concluding remarks.

2. Data, methodology and findings

In this study, stock market indices are given as a function of exchange rates, oil price shocks, and COVID-19 cases as follows:

$$sm_{it} = \alpha_0 + \sum_{i=1}^{\rho} \alpha_1 exc_{it} + \sum_{i=1}^{\rho} \alpha_2 oil_{it} + \sum_{i=1}^{\rho} \alpha_3 covid_{it} + \varepsilon_{it} \quad (1)$$

where the time period is denoted by the subscript t (t = 1,….,T); countries are denoted by the subscript i (i = 1,….,N); α_0 represents constant term; and ε_{it} is the random error term. Daily data on stock market indices, exchange rates, oil price shocks, and infection rate were obtained for the period March 10, 2020[1] - April 30, 2020[2] for 26 emerging stock markets listed by Morgan Stanley Capital International (MSCI). The emerging markets in the analysis include the following countries: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Qatar, Russia, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey and United Arab Emirates. Stock market returns are represented by daily stock returns relative to a benchmark prior to COVID-19[3]. Exchange rates are described as national currency units per U.S. dollar. To define oil price shocks, we consider Brent crude oil prices in U.S. dollars per barrel[4,5]. COVID-19 is captured by infected population as a share of total population. Data on stock market indices and the exchange rates were obtained from Investing Database (2020) and Yahoo Finance Database (2020), respectively. Data on COVID-19 and population[6] were extracted from Worlddometer Statistics (2020).

Prior to estimation, we utilize the IPS test proposed by Im et al. (2003) for unit root investigation. In the light of the test results reported in Table 1, we reject the null hypothesis of unit root at 5% significance and find that all variables are I(0).

The slope coefficients presented in Eq. (1) will be estimated by a pooled Ordinary Least Squares (OLS) regression method with robust standard errors developed by Driscoll-Kraay (1998). The error structure in this method is robust to heteroskedasticity, serial correlation, and cross-sectional dependence. Driscoll-Kraay standard errors are very useful even when the number of cross-sections is much larger than time dimension.

Regression results based on Driscoll-Kraay procedure are reported in Table 2. We find that an increase in exchange rates and a shock to real oil prices affect stock markets negatively across four sample periods. On the other side, one-unit increase in infection rate decreases stock market performance by 0,153% during the period of March 10 – March 30 while the impact falls to 0,087% when we extend the analysis period to April 10. Although the estimated coefficients are still negative and relatively smaller in terms of absolute values, further period extensions do not provide statistically significant results given the impact that the pandemic has on emerging stock markets.

Due to regional characteristics, the impact of COVID-19 is likely to vary across stock markets so that lumping all countries in a regression might lead to aggregation bias. We therefore estimate the impact of the outbreak on emerging stock markets classified by regions for the first sub-sample[7]. The regression results, reported in Table 3, indicate that the most affected emerging markets by COVID-19 are Asian markets, which is followed by South America and the Middle East. This finding is a bit surprising given the poor stock market performance by South America due to its strict dependence on global economic activity and commodities. On the other hand, Central & Eastern Europe, where the first measures were taken swiftly, is found to be the least affected region.

In order to take the effects of COVID-19 measures into consideration, we also divide emerging markets into two groups. Table 4 reports the regression results by country groups with respect to response time[8] as well as the stimulus packages provided by the governments[9]. In Panel A of Table 4, we find that the impact of COVID-19 is relatively smaller on the stock markets where required measures are implemented promptly. Panel B of Table 4 exhibits that the countries with higher stimulus package are affected by the outbreak less than those with relatively smaller package.

[1] The first day when all countries in the analysis reported at least one positive case.

[2] Data depends on normal business days, Monday through Friday, except holidays.

[3] For benchmark prior to COVID-19, we consider the average of one-month period for each country just before the first confirmed coronavirus case.

[4] Shocks to the real price of oil is measured via GARCH procedure. Real prices were constructed by deflating the crude oil price by each country's monthly consumer price index (CPI, 2010 = 100).

[5] We also obtained oil price shocks for two different oil types (West Texas and Dubai) and estimated the same models to determine the robustness of the results. They are available upon request.

[6] Due to lack of daily data availability, we assume that population did not change over analysis period.

[7] Given the highest impact, subsequent analyses will also focus on the first sub-sample.

[8] As the time dimension of our dataset is homogeneous across cross-sections, we did not find significant results across a country classification with respect to how strict the lockdown measures are implemented. Therefore, we categorized emerging markets with respect to how quick they react in taking required measures, in which we consider the time lag since the 100th confirmed case.

[9] Countries are considered as larger package if the size of the stimulus package (% of GDP) is higher than 10%.

Table 1
Unit root results.

Period	sm	exc	oil	covid
First Sub-sample (March 10 – March 31)	<0.01	<0.01	<0.01	<0.01
Second Sub-sample (March 10 – April 10)	<0.01	<0.01	<0.01	<0.01
Third Sub-sample (March 10 – April 17)	<0.05	<0.01	<0.01	<0.01
Full Sample	<0.01	<0.01	<0.01	<0.01

Note: Probability results are reported.
The lag length is chosen using the SIC.
The maximum number of lags allowed is 5 for the first sub-sample, 6 for the second and third sub-sample, and 7 for full sample.
Tests include a constant.

Table 2
Regression results.

Variables	March 10 – March 31	March 10 – April 10	March 10 – April 17	Full Sample
exc	-0.118[a]	-0.105[a]	-0.109[a]	-0.103[a]
oil	-0.275[a]	-0.285[a]	-0.292[a]	-0.292[a]
covid	-0.153[a]	-0.087[b]	-0.074	-0.041

Note: The maximum number of lags to be considered in the serial correlation structure is 5 for the first sub-sample, 6 for the second and third sub-sample, and 7 for full sample.
[a] and [b] indicate significance at 1% and 5%, respectively.
Regressions include a constant.
VIF values for each sub-period do not indicate multicollinearity problem.

Table 3
Results grouped by regions.

Regions	exc	oil	covid
South America	-0.453[a]	-0.145[a]	-0.136[a]
Middle East	-1.346[a]	-0.297[a]	-0.136[b]
Europe	0.608[a]	0.120[a]	-0.068[c]
Asia	-0.029[a]	-0.182[a]	-0.300[a]

Note: The maximum number of lags to be considered in the serial correlation structure is 5.
[a,b]and [c] indicate significance at 1%, 5% and 10%, respectively.
Regressions include a constant.
VIF values for each sub-group do not indicate multicollinearity problem.

Table 4
Panel A: Results grouped by response time. **Panel B:** Results grouped by the size of stimulus packages.

Panels	Country Groups	exc	oil	covid
Panel A	*Early Response*	-0.270[a]	-0.455[a]	-0.258[a]
	Late Response	-0.130[a]	-0.440[a]	-0.306[a]
Panel B	*Larger Package*	0.111[a]	-0.385[a]	-0.288[a]
	Smaller Package	-0.208[a]	-0.427[a]	-0.329[b]

Note: The maximum number of lags to be considered in the serial correlation structure is 5.
[a] and [b] indicate significance at 1% and 5%, respectively.
VIF values for each sub-group do not indicate multicollinearity problem.

3. Policy discussions

Stringent public health measures taken by the emerging countries impeded economic activity by restricting mobility, supply chains and commercial activities, etc. in the early phases of the outbreak (Eichenbaum et al., 2020; Elgin et al., 2020), which, in turn, quickly spread to financial markets and led to a free fall (Zhang et al., 2020).

A great number of monetary policy authorities, Federal Reserve ranking the top[10], have adopted extensive policy measures in order to boost the markets. Our empirical results reveal that the outcomes of these policies have begun to offset the distorting impact of COVID-19 on the emerging stock markets by mid-April.

Zhang et al. (2020) argue that predetermined policies in order to slow down the spread of the virus might work in the short-term by stopping the panic of investors. Furthermore, Gormsen and Koijen (2020) assert that these policies might lead to an inconsistency between investors' short- and long-term expectations. Therefore, future researchers should test whether the results remain insignificant over a longer time horizon. During these unprecedented times of high uncertainty, running some simulations will also assist policymakers to deal with the economic and financial aftermath of COVID-19.

4. Conclusion

The aim of this study is to examine the impact of COVID-19 on emerging stock markets over the period March 10 – April 30, 2020. In order to understand the changing impact of the pandemic over time, we divide sample period into three sub-samples: (i) March 10 - 31, (ii) March 10 – April 10, and (iii) March 10 – April 17 alongside the full sample. Using Driscoll-Kraay estimator, we find a negative and statistically significant impact of the coronavirus on emerging stock markets until April 10, with a relatively higher magnitude during March. However, when we extend the period to April 17, the impact turns out to be insignificant, which is the case for the full sample as well. Overall, the findings reveal that the negative impact of the outbreak on emerging stock markets has gradually fallen and begun to taper off by mid-April. When the countries are considered with respect to regions, Asian emerging markets are found to be affected the worst whereas the impact is the modest in Europe. We also find that the impact of the outbreak is relatively smaller in emerging markets where governments took required measures in time and announced larger stimulus packages.

CRediT authorship contribution statement

Mert Topcu: Conceptualization, Methodology, Software, Resources, Data curation, Writing - original draft. **Omer Serkan Gulal:** Conceptualization, Methodology, Software, Resources, Data curation, Writing - review & editing.

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[10] Due to the dominance of the U.S. in global markets, spillover effect from FED to the emerging markets is very significant (see, for example: Chen et al., 2014; Tillman, 2014; among others).