Letter to the Editor

UDC 33

COVID-19 Infection and Mortality Rates Effect on Asian Stock Markets Returns

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Abstract
COVID-19 pandemic, which first appeared in China, had a huge impact on the world economy. This negative effect was translated into an unprecedented losses in financial markets all around the world. Literature shows that there is a strong negative relation between stock markets returns and pandemic outbreaks. With number of confirmed infection cases exceeding 13.95 million and 593 thousands death cases, as of July 17th 2020, this study is set to examine the effect of confirmed infection and death cases related to COVID-19 on the financial performance of Asia largest five stock markets. The research is based on the daily returns of Shanghai S.E., Nikkei 225, Bombay S.E., Hang Seng Index, and South Korea KOSPI Composite Index over the period Jan 23rd to May 27th, 2020. Using a panel date analysis to examine the effect of both infection and death rates, as independent variables, and the average markets returns of the five markets under study. Results show that there was a statistically significant inverse relation between infection and death rates related to COVID-19 and Asian stock markets returns. But despite of that, this relation was unable to explain stock markets returns indicating that negative returns in these markets was related to other factors.
Keywords: COVID-19, asian stock markets, Panel OLS Regression, pandemic, stock markets returns.

1. Introduction
The coronavirus was first reported in Wuhan, China in December 2019 and since then started spreading around the world. The first death case related to the coronavirus was reported on 11 January 2020 (WHO, 2020). On March 11th, 2020 the World Health Organization (WHO) declared COVID-19 as a global pandemic. As of July 17th, 2020, has was 13.95 million confirmed cases and 593 thousands deaths related to the virus. Figure 1, illustrates the percentage change in daily cases for both confirmed infection and death related to COVID-19.

It has been well documented in the literature that there is a strong relation between stock market returns and pandemic outbreaks (Park et al., 2008; Pendell, Cho, 2013; Ichev, Marinč, 2018; AlAli, 2020). Mazur et al. (2020) concluded that COVID-19 pandemic and government's dramatic response to it were the main reasons for the U.S. DJIA crash in March 2020 where the index lost almost 26 % of its value in just four days. Liu et al. (2020) examined the short-term effect of COVID-19 pandemic on major stock markets. Using the data of 21 stock markets, they found an adverse effect of COVID-19 confirmed cases on stock indices abnormal returns and they

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contributed these negative effects to investors' pessimistic sentiment on future returns and fears of uncertainties. They also found that Asian stock markets showed more negative abnormal returns as compared to other countries. On the other hand, AlAli (2020) examined the risk velocity of 11 major stock markets pre and post COVID-19 first confirmed case announcement in these countries and showed that Asian market had a higher negative returns during the first 14 trading days but after 30 trading days American and European stock markets showed a much higher negative returns. Al-Awadhi et al. (2020) examined the effect of daily growth in total confirmed cases and in total cases of death caused by COVID-19 on Chinese companies and found a significant negative effects on stock returns across all companies in all market sectors.
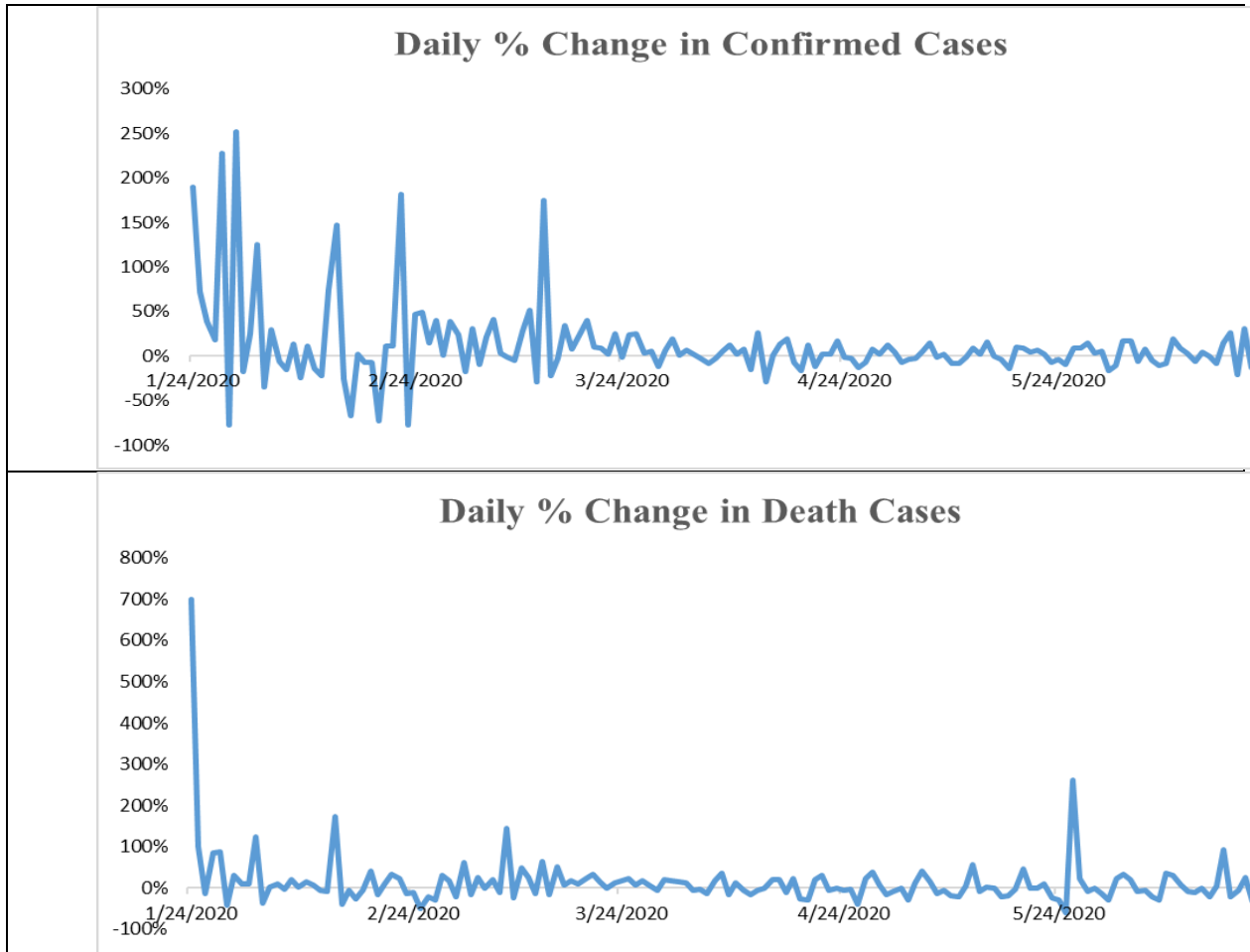
Fig. 1. Infection and Death Daily Percentage Changes

2. Data and methodology

This research is based on the daily returns over the period Jan 23rd to May 27th, 2020 for the five largest Asian stock exchange markets which are Shanghai S.E., Nikkei 225, Bombay S.E., Hang Seng Index, and South Korea KOSPI Composite Index. Data for this research were obtained from yahoo-finance for stock market indices and github.com for the daily infection and death data.

In examining the effect of daily change in infection and death rates on the mean return of the stock markets, daily change in infection and death rates were set as independent variables while mean return of the stock markets was set as a dependent variable. Using a panel data OLS regression, the equation will be as follows;

$$MR_t = \alpha + DIR_{t-1} + DR_{t-1} + \varepsilon_t \tag{1}$$

Where MR_t is the average markets return at time t, DIR_{t-1} is the daily infection rate at time t-1, DR_{t-1} is the daily death rate at time t-1, and ε_t is the error term at time t.

3. Results

Descriptive analysis is presented in table 1. In terms of mean returns, it can be seen that 3 out of the 5 markets under study showed a negative daily mean returns during the study period while

Shanghai S.E. and South Korea S.E. had a positive mean returns and for the mean return for the five markets it can be seen that it had a negative mean return over the study period. In terms of skewness, the barriers should be between -2 and 2, by looking at the table it can be seen that the skewness of the stock markets were between -0.5 and 0.5 indicating an approximately symmetric shape, except for Shanghai S.E. which had a value of -1.07 which is still within the acceptable range. By looking at the skewness of the infection and death rates it can be seen that they are highly skewed. When looking at the kurtosis, the barriers here are -10 to 10, it can be seen from the table that all variables are within this range except for the death rates which indicates leptokurtic distribution suggesting a presence of extreme outlier values.

Table 1. Descriptive Statistics

	Infection cases	Death Cases	Nikkei 225	Bombay S.E.	Shanghai S.E.	S. Korea S.E.	Hang Seng S.E.	Asia 5 Mean
Mean	13.715 %	16.450 %	-0.014 %	-0.018 %	0.072 %	0.003 %	-0.073 %	-0.006 %
Standard Deviation	0.490	0.741	0.021	0.031	0.015	0.023	0.018	0.017
Kurtosis	9.444	59.662	2.710	1.286	7.055	3.401	1.246	0.837
Skewness	2.680	6.852	0.416	0.054	-1.070	0.124	-0.283	-0.141
Count	125	125	125	125	125	125	125	125

Pearson correlation is set to examine the relation between the variables, it indicates the direction and the strength of the relation between the variables. The strength of the relation is measured by a number that is between -1 and 1. The correlation matrix is used to identify multicollinearity in the data, the threshold of ±0.70 is used for that matter. By looking at Pearson matrix in Table 2, it can be seen that there is no multicollinearity in the data.

Table 2. Pearson Correlation Matrix

	Asia 5 Mean	Infection cases	Death
Asia 5 Mean	1		
Infection cases	-0.027	1	
Death Cases	-0.056	0.474	1

From the OLS panel regression output presented in Table 3, it can be seen that the model has a very low insignificant adjusted R^2 indicating an extremely low explanation power of the model. It can also be seen that both infection cases and death rates variables had a statistically significant negative relation with market returns. This would indicate that both infection cases and death rates are correlated with markets returns but they do not explain much of the variability in markets returns.

Table 3. OLS Panel Regression output

Adj R^2	-0.010
Sig F	0.659
Obs	125
Intercept	-0.0000468*** (-0.0296)
Infection cases	-0.00237*** (-0.673)
Death Cases	-0.00201*** (-0.864)

*, **, *** represent the confidence level at the 90 %, 95, and 99 % levels respectively

3. Conclusion

This study was aimed to examine the effect of confirmed infection and death cases related to COVID-19 on the financial performance of Asia largest five stock exchange markets. Results show that while there is a statistically significant inverse relation between both infection cases and death rates with market returns, this relation was unable to explain the variation in stock markets returns in Asia.

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