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Death Infectious: Impact of the Coronavirus Disease (COVID-19) on Stock Returns

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A B S T R A C T

This study examines the Coronavirus disease (COVID-19) on stock returns. The independent variables are daily new deaths and daily new cases. The sample that uses in this study is financial sector, one of the most crucial sectors in an economy. Total sample is 22,930 observations during the period from March to December in 2020. This study uses unbalanced panel data and multiple regression to prove those hypotheses. The result shows that the Coronavirus disease (COVID-19) hurt on stock returns. Investors feel anxious and frightened to hear the news regarding the increasing number of deaths and the number of new cases. Investors prefer to delay investment until the capital market returns to normal. Furthermore, during the pandemic period, Friday's effect may reduce losses from stock returns. The implication of this study is that an increase in the number of deaths and the number of new cases can reduce stock returns. The government needs to suppress bad news circulating in the mass media in order to reduce investor anxiety.

A B S T R A K

Penelitian ini mengkaji penyakit virus Corona (COVID-19) terhadap pengembalian saham. Variabel independent yang digunakan adalah jumlah kasus kematian dan jumlah kasus baru setiap hari. Sampel yang digunakan dalam penelitian ini adalah sector keu-angan, yang merupakan salah satu sektor yang krusial dalam suatu perekonomian. Sampel yang digunakan adalah 22,930 observasi dengan periode Maret – Desember tahun 2020. Penelitian ini menggunakan data panel tidak seimbang (unbalanced) dan regresi berganda untuk membuktikan hipotesis tersebut. Hasil penelitian menunjukkan bahwa peyakit wabah virus Corona (COVID-19) menurunkan tingkat pengembalian saham. Investor merasa cemas dan ketakutan mendengar berita terkait meningkatnya jumlah kematian dan jumlah kasus baru. Investor lebih memilih untuk menunda investasi sampai pasar modal kemnbali normal. Lebih lanjut, selama periode pandemic, efek hari Jumat dapat mengurangi kerugian dari pengembalian saham. Implikasi dari penelitian ini adalah peningkatan jumlah kasus kematian dan jumlah kasus baru dapat merunkan pengembalian saham. Pemerintah perlu meredam berita buruk yang beredar di media masa guna mengurangi kecemasan investor.

1. INTRODUCTION

Stock returns usually following the market events. Previous studies mention several market events, for example, news (Heston & Ranjan Sinha, 2017; Li, 2018), disasters (Bourdeau-Brien & Kryzanowski, 2017; Kowalewski & Śpiewanowski, 2020). Further, the stock market also responds to pandemic disease, for ex-ample, the SARS pandemic disease in 2003 (Nippani & Washer, 2004; Chen et al., 2009) and the Ebola out-breaks in 2008 (Ichev & Marinč, 2018).

Since 31 December 2019, another pandemic disease that causes illness like flu in Wuhan, China. The first report of a death on 11 January 2020. In Indonesia, the first case on 2 March 2020 and the first death case on 11 March 2020. Coronavirus disease (COVID-19) outbreak has affected business and investment. This pandemic is one of the major events that may affect stock returns. Devi, Warasniasih, & Masdiantini (2020) prove that this disease decrease the profitability of financial sectors. Mazur, Dang, & Vega (2021) mention that stock in sectors natural gas, software, healthcare, and food earns higher positive returns. However, stock in sectors petroleum, real estate, entertainment, and

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hospitality drop dramatically. In Indonesia, the financial sector is one of the most crucial sectors. The collapse of the financial sector can lead to a crisis.

The Governor of the Bank of Indonesia mentions at least three factors that cause the crisis in 2018. First, The Federal Reserve (Fed) replace the chairman and one of the new policies is to increase the interest rates between 3 – 4 times. Due to the increase in interest rates, many investors fled to the United States. Second, the unexpected fiscal policy by the President of the U.S. such as the plan to reduce tax rates and increase the import duties on steel imports on Chinese products. Last, a trade war between the United States and China (Hartomo, 2018). Figure 1 shows the financial index is drop in 2018 due to the crisis. In similar cases in 2020, the Coronavirus disease (COVID-19) also drop the financial index.

Figure. 1. The financial index (JKFINA). Source: Yahoo Finance

Previous studies argue that the Coronavirus disease (COVID-19) affect negatively the stock market (Al-Awadhi et al., 2020) and cause an asymmetric information stock markets (Xu, 2021). However, Mazur et al. (2021) show that several sectors are earn higher stock return and Narayan et al. (2021) argue governance policy effectively increase stock market. Therefore, it is necessary to re-examine the impact of the COVID-19 pandemic on stock returns, especially in the Indonesian financial sector as one of the most crucial sector in the economy. The urgency of this study include whether the Coronavirus disease (COVID-19) repeats the pattern of the SARS pandemic and the Ebola outbreaks, whether investors fail to earn returns in the era of pan-demic, and whether Friday still relevant for investors. Therefore, there are two main contributions of this re-search. First, it reveals the behavior of capital market investors during the COVID-19 pandemic situation. Second, it provides evidence of Friday's effect on that investor's behavior.

To investigate the effect of the Coronavirus disease (COVID-19) on stock returns in the financial sector in Indonesia Stock Exchange, this study employs two measurements: (1) total number of daily new deaths over million people and (2) total number of daily new cases over million people (Al-Awadhi et al., 2020). To avoid the large value on the variables, both independent variables are converted into natural logarithms. Further, following by Miskolczi (2017), this study employ two measurements: (1) simple returns and (2) logarithm returns. Both calculations can be a comparing on stock return results.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

Coronavirus disease (COVID-19)

According to Al-Awadhi et al. (2020), total cases of death and confirmed cases affect the Chinese stock market. Both total cases of death and confirmed cases caused Coronavirus disease (COVID-19). This major event also responds to negative returns in all firms. Narayan, Phan, & Liu (2021) argue that government policies such as travel bans, lockdowns, and economic stimulus packages effectively increase the G7 stock markets. Further, these government policies had positive returns because mitigate the spread of Coronavirus disease (COVID-19) and reduce panic. Xu (2021) finds the asymmetric is caused by uncertainty Coronavirus disease (COVID-

19) pandemic and reacted negative stock returns in the U.S. However, the responses are dynamic in the Canadian market.

Previous studies found several sectors are triggered by Coronavirus disease (COVID-19). Mazur et al. (2021) mention that stock in sectors natural gas, software, healthcare, and food earns higher positive returns, while stock in sectors petroleum, real estate, entertainment, and hospitality drop dramatically. In addition, Narayan, Gong, & Ahmed (2021) proved that the share price of the financial sector in Australia was negatively affected by COVID-19. The hypothesis is as follows:

H_1: Total cases of death decreases stock returns.

The effect of Friday

Previous studies mention that Friday earns higher returns (Derbali & Hallara, 2016; Gbeda & Peprah, 2018). In psychology literature, investor's mood decreases on Monday and increases on Thursday to Friday (Birru, 2018). Mood has two dimensions, positive and negative effects. During the pandemic, the negative effect could be afraid, scared, distressed, anxious and confused. COVID-19 pandemic has caused a lot of speculation about the future of the stock market. Chiah & Zhong (2019) proves that investors are more pessimistic about the future of speculative stocks on Friday, causing negative stock returns on that day. The hypothesis is as follows:

H_2: Total cases of death decreases stock returns even through Friday.

3. RESEARCH METHOD

The data resources have come from Yahoo Finance (https://finance.yahoo.com/), Oxford COVID-19 Government Response Tracker (https://covidtracker.bsg.ox.ac.uk/), and Our World in Data (https://ourworldindata.org/). This study uses financial sector public firms in Indonesia Stock Exchange (IDX) with 22,930 observations include 106 unique firms. The financial sectors include banks, insurance, investment services, holding companies, venture capital, and consumer financing institutions. The observations period from March to December in 2020 and uses unbalanced panel data to avoid a drastically reduced number of samples (Baltagi, 2021). Hsiao (2014), Al-Awadhi et al. (2020), and Baltagi (2021) mention that panel data reduce multicollinearity and estimation bias, the time-varying relationship between variables, and individual heterogeneity.

Coronavirus disease (COVID-19) measurement

Following by Al-Awadhi et al. (2020) and Hale et al. (2020), the Coronavirus disease (COVID-19) variable is measured in two ways. (1) New_Deaths_{t-1} is the one plus natural logarithm of a total number of daily new deaths over million people. (2) New_Cases_{t-1} is the one plus natural logarithm of a total number of daily new cases over million people. Both of the variables are lagged one day (t-1) following by Narayan et al. (2021).

Stock returns measurement

The dependent variable is the firm's stock returns. Following Miskolczi (2017), simple and logarithm returns are close to each other. However, both calculations can be a comparing on stock return results. (1) the simple return is $Return_t = \frac{\text{Price}_t - \text{Price}_{t-1}}{\text{Price}_{t-1}}$ and (2) the logarithm return is $Ln\_Return_t = Ln\ \frac{\text{Price}_t}{\text{Price}_{t-1}}$.

Control variables

Previous studies also control several variables include stock trading volume ($Volume_{t-1}$), previous stock returns ($Return_{t-1}$), Indonesia Composite Index (IDX Composite)/ *Indeks Harga Saham Gabungan* ($IHSG_{t-1}$), and New York Stock Exchange Composite Index ($NYSE_{t-1}$). All the control variables are lagged one day. $Volume_{t-1}$ is the one plus natural logarithm of the total daily stock trading volume. $Return_{t-1}$ is the one previous day of stock returns. $IHSG_{t-1}$ is the daily market return of Indonesia composite index. $NYSE_{t-1}$ is the daily market return of the New York Stock Exchange composite index. Chiang & Zheng (2010) mention that US market play a significant role in non-US market's herding activity. Stock return in each national market are following the US market. Neaime (2012) mentions that MENA emerging stock markets are highly correlated with the US market. Al Nasser & Hajilee (2016) argue that emerging stock markets and the develop market are integration.

4. DATA ANALYSIS AND DISCUSSION

It presents the analysis of the related results, The statistic descriptive is shows in Table 1. The variables of stock returns, previous stock returns, IHSG, and NYSE are winsorized at 1% and 99%. The average value of new deaths per million (New_Deaths_{t-1}) is 0.2214 (1.2478 per million in natural logarithm). The average value of new cases per million (New_cases_{t-1}) is 1.8821 (6.5673 per million in natural logarithm). The average stock return ($Return_t$) is 0.08%.

Table 1. Statistic descriptive

Variables	N	Mean	Min	Max	Std.Dev
New_Deaths_{t-1}	22,933	0.2214	0.0000	0.6513	0.1426
New_Cases_{t-1}	22,933	1.8821	0.0000	3.3976	0.9622
$Return_t$	22,930	0.0008	-0.0690	0.1676	0.0337
$Volume_{t-1}$	22,930	8.8786	0.0000	21.4894	6.1078
$Return_{t-1}$	22,927	0.0008	-0.0690	0.1682	0.0338
$IHSG_{t-1}$	20,941	0.0005	-0.0501	0.0408	0.0165
$NYSE_{t-1}$	22,195	0.0008	-0.0853	0.0642	0.0213

All of the variable is winsorized at 1% and 99%.

Coronavirus disease (COVID-19) on stock returns

Table 2 provides the coefficient of a total number of daily new deaths per million is significant on stock returns. The coefficient of -0.0234 means that a total number of daily new deaths per million is negative significant on stock returns. Increasing the total number of daily new deaths decreases stock returns. Investors feel anxious and confused with the situation and everyday hear news about the increasing number of new deaths and new cases in this disease. Investors prefer to wait and see until the market is return to normal. Similar to pandemic disease in 2003, the Severe Acute Respiratory Syndrome (SARS) also decreases stock market returns (Chen et al., 2009). Al-Awadhi et al. (2020) found that daily growth in total deaths in the pandemic disease hurt the stock market returns.

Table 2. Daily new deaths on stock returns

	(1)	(2)	(3)	(4)
New_Deaths_{t-1}	-0.0226***	-0.0229***	-0.0232***	-0.0234***
	(-5.35)	(-5.44)	(-4.92)	(-4.97)
$Volume_{t-1}$		0.0001***		0.0001**
		(2.96)		(2.30)
$Return_{t-1}$		0.0093		0.0080
		(0.78)		(0.61)
$IHSG_{t-1}$			-0.0403**	-0.0438**
			(-2.18)	(-2.31)
$NYSE_{t-1}$			0.0853***	0.0857***
			(5.75)	(5.78)
Constant	-0.0044***	-0.0051***	-0.0041***	-0.0047***
	(-4.15)	(-4.78)	(-3.61)	(-4.12)
Control for:				
Day-FE	Yes	Yes	Yes	Yes
Month-FE	Yes	Yes	Yes	Yes
N	22.930	22.927	20.620	20.617
Adjusted. R^2	0.0069	0.0074	0.0096	0.0099

Where $Return_t$ is the dependent variable and New_Deaths_{t-1} is the independent variable. Control for day and month fixed effects. Superscripts ***, **, and * represent the levels of significance at the 1%, 5%, and 10%.

Sensitivity analysis: Omitted variable bias

Omitted variable bias occurs when a model leaves relevant independent variables. This study uses a firm fixed effect to eliminate the unobservable variables. After controls the firm fixed effect, the coefficient of a total number of daily new deaths per million is -0.0233 on stock returns. Table 3 shows that the result supports the previous hypothesis.

Table 3. The firm fixed effect

	(1)	(2)	(3)	(4)
New_Deaths_{t-1}	-0.0226***	-0.0228***	-0.0232***	-0.0233***
	(-5.36)	(-5.41)	(-4.93)	(-4.96)
$Volume_{t-1}$		0.0000		0.0000
		(0.77)		(0.01)
$Return_{t-1}$		0.0053		0.0034
		(0.44)		(0.26)
$IHSG_{t-1}$			-0.0402**	-0.0413**
			(-2.18)	(-2.18)
$NYSE_{t-1}$			0.0853***	0.0859***
			(5.73)	(5.78)
Constant	-0.0040*	-0.0043**	-0.0036	-0.0036
	(-1.96)	(-2.04)	(-1.61)	(-1.55)
Control for:				
Day-FE	Yes	Yes	Yes	Yes
Month-FE	Yes	Yes	Yes	Yes
Firm-FE	Yes	Yes	Yes	Yes
Adjusted. R^2	0.0072	0.0072	0.0097	0.0097

Where $Return_t$ is the dependent variable and New_Deaths_{t-1} is the independent variable. Control for day, month, and firm fixed effects. Superscripts ***, **, and * represent the levels of significance at the 1%, 5%, and 10%.

Simple and logarithm return

There are two ways to calculation stock returns. Miskolczi (2017) mentions that both calculations are close to each other. (1) the simple return is $Return_t = \frac{\text{Price}_t - \text{Price}_{t-1}}{\text{Price}_{t-1}}$ and (2) the logarithm return is $Ln\_Return_t = Ln\ \frac{\text{Price}_t}{\text{Price}_{t-1}}$. Table 4 shows the total number of daily new deaths per million is negative and significant on stock returns.

Table 4. Daily new deaths on logarithm stock returns

	(1)	(2)
New_Deaths_{t-1}	-0.0278***	-0.0277***
	(-4.65)	(-4.64)
$Volume_{t-1}$	0.0000	-0.0001
	(0.84)	(-0.87)
$Return_{t-1}$	0.0249	0.0208
	(1.44)	(1.20)
$IHSG_{t-1}$	-0.0703**	-0.0677**
	(-2.29)	(-2.19)
$NYSE_{t-1}$	0.0949***	0.0951***
	(5.24)	(5.24)
Constant	-0.0070***	-0.0054**
	(-4.02)	(-1.97)
Control for:		
Day-FE	Yes	Yes
Month-FE	Yes	Yes
Firm-FE	No	Yes
Adjusted. R^2	0.0091	0.0075

Where Ln_Return_t is the dependent variable and New_Deaths_{t-1} is the independent variable. Control for day, month, and firm fixed effects. Superscripts ***, **, and * represent the levels of significance at the 1%, 5%, and 10%.

The moderating effect of Friday

Various papers have pointed out that Friday increases stock returns (Derbali & Hallara, 2016; Birru, 2018; Gbeda & Peprah, 2018). However, Chiah & Zhong (2019) mention that investors are more pessimistic on Friday compares to other days. Following the previous studies that use Friday as a dummy variable and it equals one if the day is Friday and zero otherwise.

Table 5 shows that investors loss fewer negative stock returns on Friday. In the normal situation, Friday is an opportunity for investors to earn higher stock returns. However, in a pandemic situation, investors losses their investment in stocks on every day including Friday. Nevertheless, losses on Friday is lower compared to other days, thus confirming the second hypothesis.

Table 5. The moderating effect on Friday

	(1) $Return_t$	(2) Ln_Return_t
New_Deaths_{t-1}	-0.0193***	-0.0222***
	(-3.99)	(-3.63)
$Friday_t$	0.0051***	0.0060***
	(3.64)	(3.80)
New_Deaths_{t-1} X $Friday_t$	-0.0126***	-0.0176***
	(-2.64)	(-2.88)
$Volume_{t-1}$	-0.0000	-0.0001
	(-0.08)	(-0.89)
$Return_{t-1}$	0.0029	0.0205
	(0.22)	(1.18)
$IHSG_{t-1}$	-0.0494***	-0.0768**
	(-2.62)	(-2.48)
$NYSE_{t-1}$	0.0887***	0.0983***
	(5.96)	(5.41)
Constant	-0.0042*	-0.0059**
	(-1.86)	(-2.24)
Control for:		
Day-FE	Yes	Yes
Month-FE	Yes	Yes
Firm-FE	Yes	Yes
Adjusted. R^2	0.0086	0.0069

Where $Return_t$ is the dependent variable and New_Deaths_{t-1} is the independent variable. The New_Deaths_{t-1} *X* $Friday_t$ is the moderating variable. Control for day, month, and firm fixed effects. Superscripts ***, **, and * represent the levels of significance at the 1%, 5%, and 10%.

Robustness tests I: The Coronavirus disease (COVID-19) proxy

To avoid the bias variable measurement of the Coronavirus disease (COVID-19) uses daily cases as a proxy. New_Cases_{t-1} is the one plus natural logarithm of a total number of daily new cases over million people. Table 6 replaces the New_Deaths_{t-1} with New_Cases_{t-1} as an independent variable, thus the coefficients are negative and significant on stock returns.

Table 6. Daily new cases on stock returns

	(1)	(2)
New_Cases_{t-1}	-0.0037**	-0.0034*
	(-1.99)	(-1.86)
$Volume_{t-1}$	0.0001**	0.0000
	(2.40)	(0.14)
$Return_{t-1}$	0.0074	0.0028
	(0.56)	(0.21)
$IHSG_{t-1}$	-0.0477**	-0.0451**
	(-2.52)	(-2.38)

	(1)	(2)
$NYSE_{t-1}$	0.0915***	0.0916***
	(6.19)	(6.18)
Constant	-0.0041***	-0.0030
	(-3.41)	(-1.29)
Control for:		
Day-FE	Yes	Yes
Month-FE	Yes	Yes
Firm-FE	No	Yes
Adjusted. R^2	0.0090	0.0088

Where $Return_t$ is the dependent variable and New_Cases_{t-1} is the independent variable. Control for day, month, and firm fixed effects. Superscripts ***, **, and * represent the levels of significance at the 1%, 5%, and 10%.

Robustness tests II: Control for LQ45 and IDX30

In this sub-section, the regression included the dummy variable of LQ45 and IDX30. LQ45 is the index that included 45 firm's performances with fundamental, larger market capitalization, and liquid stocks. IDX30 is the index that included 30 firm's performances with fundamental, larger market capitalization, and liquid stock. Both LQ45 and IDX30 are dummy variables and equals to one of the firm's stock fulfills the criteria on that period and zero is otherwise. Table 7, results-proven that firm's performance with fundamental, larger market capitalization, and liquid stocks is insignificant during the pandemic period. Furthermore, the daily new deaths are negative and significant on stock returns, thus supporting the hypothesis.

Table 7. Control LQ45 and IDX30

	LQ45		IDX30	
	(1)	(2)	(3)	(4)
New_Deaths_{t-1}	-0.0234***	-0.0233***	-0.0234***	-0.0233***
	(-4.97)	(-4.96)	(-4.97)	(-4.96)
$Volume_{t-1}$	0.0001**	0.0000	0.0001**	0.0000
	(2.42)	(0.01)	(2.42)	(0.01)
$Return_{t-1}$	0.0074	0.0030	0.0074	0.0030
	(0.57)	(0.23)	(0.57)	(0.23)
$IHSG_{t-1}$	-0.0437**	-0.0411**	-0.0437**	-0.0411**
	(-2.31)	(-2.17)	(-2.31)	(-2.17)
$NYSE_{t-1}$	0.0857***	0.0859***	0.0857***	0.0859***
	(5.78)	(5.78)	(5.78)	(5.78)
$LQ45_t$	-0.0010	-0.0012		
	(-0.85)	(-0.38)		
$IDX30_t$			-0.0010	-0.0012
			(-0.85)	(-0.38)
Constant	-0.0048***	-0.0036	-0.0048***	-0.0036
	(-4.15)	(-1.55)	(-4.15)	(-1.55)
Control for:				
Day-FE	Yes	Yes	Yes	Yes
Month-FE	Yes	Yes	Yes	Yes
Firm-FE	No	Yes	No	Yes
Adjusted. R^2	0.0099	0.0097	0.0099	0.0097

Where $Return_t$ is the dependent variable and New_Deaths_{t-1} is the independent variable. Control for day, month, and firm fixed effects. Superscripts ***, **, and * represent the levels of significance at the 1%, 5%, and 10%.

Robustness tests III: Subsample analysis

Finally, the daily new deaths variable was divided into three and four groups. For three groups take top 33% and bottom 33% and for four groups take 25% top and 25% bottom as a sample. Further, the sample is reduced because of the top and bottom groups. Following the equation model in Appendix B, Table 8 presents similar results that daily new deaths are negative and significant on stock returns.

Table 8. Subsample analysis

	3 Groups		4 Groups	
	(1)	(2)	(3)	(4)
New_Deaths_{t-1}	-0.0462***	-0.0464***	-0.0735***	-0.0734***
	(-6.20)	(-6.23)	(-8.07)	(-8.07)
$Volume_{t-1}$	-0.0001	-0.0002*	-0.0001	-0.0001
	(-1.03)	(-1.96)	(-1.12)	(-1.26)
$Return_{t-1}$	0.0161	0.0117	0.0163	0.0095
	(1.00)	(0.73)	(0.90)	(0.52)
$IHSG_{t-1}$	-0.0307	-0.0284	-0.0076	-0.0041
	(-1.44)	(-1.33)	(-0.34)	(-0.18)
$NYSE_{t-1}$	0.0744***	0.0742***	0.0779***	0.0774***
	(4.81)	(4.78)	(4.40)	(4.38)
Constant	-0.0033***	-0.0026	-0.0046***	-0.0040
	(-2.71)	(-0.87)	(-3.60)	(-1.04)
Control for:				
Day-FE	Yes	Yes	Yes	Yes
Month-FE	Yes	Yes	Yes	Yes
Firm-FE	No	Yes	No	Yes
Adjusted. R^2	0.0131	0.0116	0.0154	0.0147

Where $Return_t$ is the dependent variable and New_Deaths_{t-1} is the independent variable. Control for day, month, and firm fixed effects. Superscripts ***, **, and * represent the levels of significance at the 1%, 5%, and 10%.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

Prior studies discuss the effect of Coronavirus disease (Covid-19). The proxy for the Coronavirus disease (COVID-19) is: (1) the one plus natural logarithm of a total number of daily new deaths over million people and (2) the one plus natural logarithm of a total number of daily new cases over million people. The results show that increases of daily new deaths and daily new cases decreases stock returns. Furthermore, during the pandemic period, investors still lose fewer negative stock returns when trading on Friday. In addition, the results are consistent when controlling the firm fixed effect and subsample analysis. Overall, the Coronavirus disease (COVID-19) harms the stock market returns in Indonesia.

This study implies that the stock market is responding negatively to pandemic disease. In 2003, the SARS pandemic disease decreases the stock return market. Later in 2008, the Ebola outbreaks also decrease the stock return market. Furthermore, the Coronavirus disease (COVID-19) continues to crash the stock return market. Increasing the number of death cases and the number of new cases decreases the stock returns.

The limitation of this study includes the sample is limited to the financial sector and the case only in Indonesia Stock Exchange. Further, this study suggests that include all the firm that listed in the Indonesia Stock Exchange (IDX) that make the result more generalizable. Besides, comparison between countries also interesting. By comparison between countries, the effect of the Coronavirus disease (COVID-19) more clearly.

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APPENDICES

Appendix A: Variable definition

Variable	Definition	Data source
Independent variable		
New_Death	The one plus the natural logarithm of a total number of daily new deaths over million people.	Oxford COVID-19
New_Cases	The one plus the natural logarithm of a total number of daily new cases over million people.	Oxford COVID-19
Dependent variables		
Return	The current stock price minus the previous stock price and over the previous stock price.	Yahoo Finance
Ln_Return	The natural logarithm of the current stock price over previous stock price.	Yahoo Finance
Control variables		
Volume	The one plus the natural logarithm of a total daily stock trading volume.	Yahoo Finance
Return	The previous day of stock returns.	Yahoo Finance
IHSG	The daily market return of Indonesia composite index.	Yahoo Finance
NYSE	The daily market return of the New York Stock Exchange composite index.	Yahoo Finance
Other variables		
Friday	A dummy variable and equals one if the day is Friday and zero otherwise.	Calendar
LQ45	The index that included 45 firm's performances with fundamental, larger market capitalization, and liquid stocks	Indonesia Stock Exchange
IDX30	The index that included 30 firm's performances with fundamental, larger market capitalization, and liquid stocks	Indonesia Stock Exchange

Appendix B

$$Return_{i,t} = \alpha_0 + \alpha_1 New\_Deaths_{i,t-1} + \boldsymbol{\theta}'\boldsymbol{X}_{i,t-1} + \gamma_i + \mu_t + \varepsilon_{i,t}, \quad (1)$$

$$Return_{i,t,j} = \alpha_0 + \alpha_1 New\_Deaths_{i,t-1,j} + \boldsymbol{X}'\boldsymbol{Z}_{i,t-1,j} + \gamma_i + \mu_t + \delta_j + \varepsilon_{i,t,j}, \quad (2)$$

Notes:

$Return_{i,t}$ / $Return_{i,t,j}$ = the current stock price minus the previous stock price and over previous stock price.

$New\_deaths_{i,t-1}$ / $New\_deaths_{i,t-1,j}$ = the one plus natural logarithm of a total number of daily new deaths over million people.

$X_{i,t-1}$ / $X_{i,t-1,j}$ = the control variables that include trading volume, previous stock return, Indonesia Composite Index, and NYSE Composite Index.

γ_i = the day fixed effect.

μ_t = the month fixed effect.

δ_j = the firm fixed effect.

$\varepsilon_{i,t}$ / $\varepsilon_{i,t,j}$ = the error of the regression.