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Does the Covid-19 Pandemic Affect the Stock Market in Indonesia?

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Abstract

This study aimed to analyze the existence and effect of the Covid-19 pandemic on the stock market over the long-term and short-term in Indonesia. The study followed Krugman's (1979) approach stating the pandemic crisis problems have the potential to decrease the performance of the international balance of payments which will ultimately lead to uncertainty in the market. The research method was the Error Correction Model (ECM) with stock markets as an endogenous variable; and exchange rate, inflation, interest rate, foreign stock markets, commodity price, and pandemic as exogenous variables. The pandemic indicator was measured by total accumulative cases of Covid-19 per day in Indonesia. Using ECM, the result showed that foreign interest rates and commodity prices positively affect the stock markets. Conversely, the exchange rate has a negative effect on the stock markets. However, the estimation fails to reflect the significant impact of the Covid-19 pandemic in the short-term, but it has a negative effect on stock markets in the long-term. This result implies that the higher total accumulative cases of Covid-19 has been the source of Indonesia's stock market weakness in the long-term. To the best of the author's knowledge, this study is the first to examine Indonesia's stock market's pandemic impact between the short term and long term.

Keywords:

Covid-19; error correction model; interest rate; pandemic; stock market

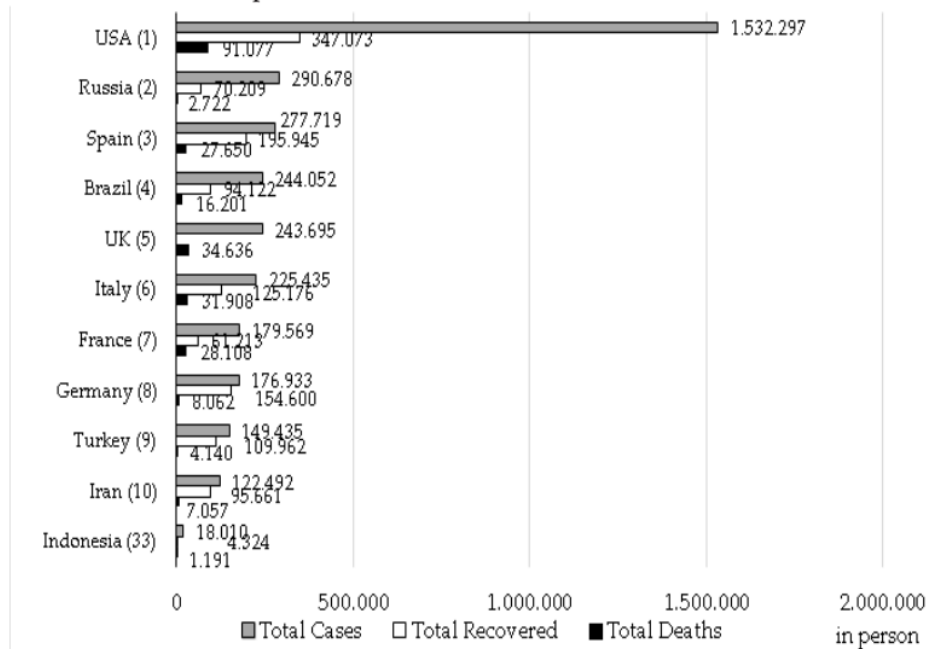
Introduction

Covid-19, Corona Virus Disease-2019, according to the World Health Organization (2020a), is an infectious disease caused by SARS-CoV-2. World Health Organization (WHO) has established the Covid-19 as a global pandemic that affected many countries on March 12th, 2020. WHO (2020b) noticed that Covid-19 spreads between people through direct, indirect (through contaminated objects or surfaces), or close contact with infected people via mouth and nose secretions. These include saliva, respiratory secretions, or secretion droplets. According to Worldometer until May 18th, 2020, Covid-19 has spread in 215 countries, with a total of 4,840,960 cases, 317,367 deaths, 2,648,265 current infected patients, and 1,875,128 recovered. The ten most-affected

countries of Covid-19 per May 18th, 2020 were the United States, Russia, Spain, Brazil, United Kingdom, Italy, France, Germany, Turkey, and Iran. The United States was the first most-affected country of Covid-19 by 1,53 million total cases or contributing to 31,65% of total cases in the world. In contrast, China, where the first cases of Covid-19 were found, was ranked 13th among 215 countries affected, with a total of 82,954 cases.

Indonesia ranked at 33rd of 215 countries with the most number of cases of Covid-19 in the same period. The number of affected Covid-19 in Indonesia per May 18th, 2020, was 18,010 cases, 1,191 deaths, and 4,324 patients recovered. The number of new cases in Indonesia has grown per day rapidly. The average growth of the number of accumulated

Figure 1.
Top Ten Most-Affected Countries of Covid-19



Source: Worldometers, data until Mei 18th, 2020

cases of Covid-19 in Indonesia was 12,55% per day. The average growth of recovered patients was 11,77% per day, while the average increase in the death rate was 9,70% per day. In the same period, Indonesia was ranked 22nd by the highest number of deaths because of those affected by Covid-19. Indonesia's government has responded to announce that Covid-19 is the non-natural disaster category per March 14th, 2020, which needs to be a top priority in various mitigation efforts.

The spreading of the Covid-19 has already impacted many sectors, such as economic, social, bilateral, and multilateral relations among countries. The latest domestic economic indicator's publication by Statistic Center Bureau in Indonesia and other institutions shows it. The economic growth of Indonesia in Quarter I-2020 has dropped by 2,97% (Year on Year/YoY), lower than the economic growth in Quarter I-2019 of 5,07% (YoY). Its growth has

also decreased by -2,41% (Quarter to Quarter, Q-to-Q) than Quarter IV-2019, growing by 4,97% (YoY). Then, the stock market that showed by the Jakarta Stock Composite Index (JKSE) price on May 18th, 2020, was IDR 4.511 or decreased around -28,21% (Year to Date/YTD) from January 2nd, 2020 by IDR 6.284. The pandemic of Covid-19 also has affected the depreciation of the exchange rate of Rupiah to United States Dollar (USD). The Rupiah's exchange rate decreased around 6,65% (YTD) to USD in the same period.

In the foreign indicator, the financial market that proxied by the stock market in the United States is getting a shock caused by the pandemic. It shows by the Dow Jones Industrial Average (DJI) reduced price around -14,80% (YTD) per May 18th, 2020. The other global impact is the price of raw oil as Brent oil dropped deeply by -47,46% (YTD) from USD 66,25/barrel on January 2nd, 2020, to USD 34,81/

barrel on May 18th, 2020. It has caused many countries to apply lockdown policies to prevent the spread of coronavirus. It has impacted the oversupply of raw oil stock globally, caused by the low demand from importer countries, then implied dropping of the raw oil price.

Accordingly, Kilian and Park (2009) researched the impact of oil price shocks on the United States' stock market. The results show that the stock return reaction from the oil price shock depends on the oil price change affected by the collapse of demand and supply in the oil market. The model shows that the demand and supply shock driving the global crude oil market joint accounts for 22% of the long-term variation in U.S. real stock returns.

The priority policies should be carried out immediately by all parties, not only the government but also all stakeholders and society. Over the last five years, Indonesia's average economic growth is only 5,03% per year. The economy has grown at a stagnant level at around 5%. The Covid-19 pandemic has created concerns in many countries that they will remain trapped in the recession phase. Indonesia has still depended on foreign investors up to 38% in the stock market, as the amount of IDR 419,4 trillion, per August 4th, 2020. In the same period, the domestic investor has 62%, as the amount of IDR 697,4 trillion contributed to Indonesia's total stock market. Portfolio investment has been driven directly on the performance of multisector in Indonesia. Many investors would sell out the portfolio investment into a safe asset or be replaced into low-risk countries (capital outflow) in uncertain conditions. As an emerging country, Indonesia would have a higher impact if foreign investors left the domestic financial market. There is still limited research to analyze the impact of the Covid-19 pandemic on the stock market, especially in emerging countries.

The economic crisis in this study was approached by Krugman (1979), stating that there would be a potential contagion

to the overall economic indicator, which usually appears at the beginning of the financial performance and banking sectors. The pandemic crisis problems have the potential to decrease the performance of the international balance of payments which will ultimately lead to uncertainty in the market. Some of the studies that refer to this opinion include Abbara & Zevallos (2014); Frankel & Saravelos (2012); Horn et al. (2020), which states that if the uncertainty of a disaster settlement and/or pandemic is unclear, the potential moral hazard market participants will potentially cause market uncertainty and the global economic crisis. The Covid-19, a global pandemic, causes all countries to make an effort to suppress the increase in the number of new cases. The previous global epidemic had occurred in the 20th century, namely the influenza pandemic. This influenza pandemic infected many countries and occurred three times in a century (years 1918, 1957, and 1968). According to a study by Meltzer et al. (1999) hospitalization data, and outpatient visits, we estimated 89,000 to 207,000 deaths; 314,000 to 734,000 hospitalizations; 18 to 42 million outpatient visits; and 20 to 47 million additional illnesses. Patients at high risk (15% of the population, an influenza pandemic's estimated economic impact would range from USD 71-166 billion in the United States.

Wulan & Nurfaiza (2015), using multiple linear regression analysis, results that variable interest rate, money supply, and Rupiah's exchange rate had a significant positive effect on the inflation rate. The other study with the same variables, Yolanda (2017), analyzed the effect of B.I. Rate, foreign exchange rate, money supply, oil price, and gold price on inflation, impact human development index (HDI) and poverty in Indonesia from 1997 up to 2016. The method used was multiple regression analysis. The result of the study indicated that there were significant variables simultaneously at B.I. Rate, Foreign Exchange Rates, Money Supply, oil

price, and gold prices to Indonesia's inflation level. The results also showed a variable B.I. Rate, money supply, oil price, and gold prices partially affect inflation positively and significantly, while the exchange rate variable did not affect inflation.

Although many studies have discussed the pandemic impact on the economy, no study has explored the stock market effects of a new global pandemic, Covid-19, in Indonesia. Therefore, this paper aimed to analyze the existence and effect of the Covid-19 pandemic on Indonesia's stock markets, over the long-term and short-term. This study will answer the following questions: (1) Does foreign stock affect Indonesia's stock market?; (2) Does interest rate, both domestic interest rate (Bank Indonesia 7 Day Repo Rate) and foreign interest rate (Effective Federal Funds Rate) affect Indonesia's stock market?; (3) Does the exchange rate affect Indonesia's stock market?; (4) Does domestic inflation affect Indonesia's stock market?; and (5) Does the global commodity market affect Indonesia's stock market? Although many studies have discussed the stock market, no study was found that explored how the pandemic impacted Indonesia's stock market between the short term and long term. This study contributes to the government's strategy to prevent and mitigate the economy dropping into a deep recession. This study also recommends a strategy for government and stakeholders to (i) cooperate and offer a good value proposition for the foreign investor, (ii) raise the rate of ease of doing business, (iii) use the potential of bonus demography optimally.

Literature Review

The catastrophic impacts of the Covid-19 pandemic cannot be predicted by researchers because this kind of situation is rare and even unprecedented. The use of models that use a fundamental macroeconomic view may be slow to portray the impact that occurs on the

market. Alternatively, some research extracts information from asset price behaviors such as stocks, bonds (Harvey, 1989), and credits (Gilchrist & Zakrajšek, 2012) to identify the market's perspective on the economy due to the Covid-19 pandemic.

Many studies also explored the pandemic's impact on the economy in several countries. In Sweden, Karlsson et al. (2014) analyzed the Spanish flu epidemic's impact in 1918 between short and medium terms economic performance. The study reported that pandemic leads to a significant increase in poor-home levels. The pandemic has also negatively influenced the return of capital. For capital incomes, the pandemic has a strong negative impact, and this impact seems to be a combination of short- and medium-term responses. The pandemic was causing a significant reduction in the quality of life of the average worker. The impact of the Covid-19 pandemic creates a rising unemployment rate in many affected countries. On March 18th, 2020, International Labor Organization (ILO) issued a policy framework consisting of three main pillars to fight the Covid-19 pandemic based on the International Labor Standards. The three components include (i) protecting workers in the workplace, (ii) stimulating the economy and labor demand, and (iii) supporting employment and incomes (ILO, 2020).

Jordà et al. (2020) analyze the long-term economic effects of the pandemic. Significant macroeconomic after-effects of the epidemics persist for about 40 years, with real return rates substantially depressed. In contrast, the finding that wars have no such effect, was indeed the opposite. The result is consistent with the destruction of capital that happens in wars, but not in pandemics. Using more sparse data shows the real wages are somewhat elevated in subsequent epidemics. The findings are consistent with pandemics inducing labor scarcity and a shift to more significant precautionary savings.

The Covid-19 has spread rapidly in 215 affected countries in the world. Ozili & Arun (2020) researched the spillover of Covid-19 on the economy globally. Empirically, this study explains the effects of social distancing policies on economic activity and stock market indices. The findings reveal that the increasing number of lockdown days, monetary policy decisions, and international travel restrictions severely affected economic activities and the closing, opening, lowest, and highest stock price of major stock market indices. The opening, the lowest, and the highest stock price was the major stock market indices. In contrast, the imposed restriction on internal movement and higher fiscal policy spending positively impacted economic activities. However, the increasing number of confirmed coronavirus cases did not significantly affect the level of economic activities.

McKibbin & Fernando (2020) this paper explores seven different scenarios of how COVID-19 might evolve in the coming year using a modelling technique developed by Lee and McKibbin (2003) have explored seven scenarios of how the Covid-19 flourished early in the year. The study described the impact of various macroeconomic outcomes and the financial market in a global hybrid DSGE/CGE general equilibrium model. The paper's scenes demonstrate that even a contained outbreak could significantly impact the global economy in the short-term. These scenarios illustrate the scale of costs that might be avoided by more significant investment in public health systems in all economies, particularly in less developed economies where health care systems are less developed, and population density is high.

Research Methods

Data

This paper used the secondary database from Indonesia Statistics Central Bureau, Bank Indonesia, Ministry of the Health Republic Indonesia, Yahoo Finance, Investing, and the

Fed. This study uses daily market price data indicated by the endogenous and exogenous variables analyzed. This paper used Stock Markets as an endogenous variable proxied by Jakarta Stock Exchange Composite (JKSE) in Rupiah. On the other side, exogenous variables for this paper used exchange rate (in USD/IDR), interest rate (B.I. 7 Day Repo Rate and Effective Federal Funds Rate/EFRR), inflation (in%, YoY), foreign stock markets (Dow Jones Industrial Average/DJI in USD), commodity price (raw oil price, i.e., Brent oil in USD/barrel), and pandemic (total cases accumulative of Covid-19 per day in Indonesia). The data set relative to Indonesia, United States, and World with time-series data daily from January 2nd, 2020 to October 27th, 2020. This paper used an error correction model (ECM) to show the short-term's effect of the Covid-19 pandemic on the Indonesian stock market.

Empirical and Econometric Model

First, this paper approached the model from Yolanda (2017) as:

$$INF = f(BI, MS, FR, OIL, GOLD) \quad (1)$$

$$INF = \beta_0 + \beta_1 INF + \beta_2 MS + \beta_3 FR + \beta_4 OIL + \beta_5 GOLD + e \quad (2)$$

where: *INF* is inflation, *B.I.* is Rate of Bank Indonesia, *MS* is Money Supply, *F.R.* is Foreign Exchange Rates, *OIL* is oil price world, and *GOLD* is the gold price. This study was then combined with Krugman's (1979) approach stating the pandemic crisis problems have the potential to decrease the performance of the international balance of payments which will ultimately lead to uncertainty in the market. So, the model was modified with derived the empirical model as:

$$Y = f(ER, IRD, IRF, INF, FS, CP, PDC) \quad (3)$$

Then, write down as:

$$Y = \beta_1 ER + \beta_2 IRD + \beta_3 IRF + \beta_4 INF + \beta_5 FS + \beta_6 CP + \beta_7 PDC \quad (4)$$

This paper used an error correction model (ECM) to show the pandemic's short-term effect on stock markets. From equation 4, the econometric model in long-term with ordinary least-squares (OLS) write down as:

$$\ln Y_t = \alpha + \beta_1 \ln ER_t + \beta_2 IRD_t + \beta_3 IRF_t + \beta_4 INF_t + \beta_5 \ln FS_t + \beta_6 \ln CP_t + \beta_7 PDC_t + e_t \quad (4)$$

Then, to show the short-term effect used error correction model (ECM), equation 3 derived as:

$$\Delta \ln Y_t = \alpha_0 + \beta_1 \Delta \ln ER_t + \beta_2 \Delta IRD_t + \beta_3 \Delta IRF_t + \beta_4 \Delta INF_t + \beta_5 \Delta \ln FS_t + \beta_6 \Delta \ln CP_t + \beta_7 \Delta PDC_t + \gamma e_{t-1} + v_t \quad (5)$$

Noted that: $\gamma e_{t-1} = e_{t-1} = ECT$ (6)

where: Y is the stock market in Indonesia as an endogenous variable. The exogenous variable was E.R., IRD, IRF, INF, F.S., CP, and PDC. E.R. is the exchange rate, IRD is the domestic interest rate, IRF is the foreign interest rate, INF is domestic inflation, F.S. is foreign stock markets, C.P. is commodity price, and PDC is pandemic, is constant, $\beta_1, \beta_2, \dots, \beta_7$, is the elasticity of exogenous variable, t is period in day-t, e is an error in the long-term, v is an error in the short-term, and ECT is error correction term and is the first difference of each variable.

The stock market (Y) was proxied by the Jakarta Stock Exchange Composite (JKSE) in Rupiah. Then, E.R. was proxied by the exchange rate of USD/IDR; IRD was proxied by Bank Indonesia (B.I.) 7-Day Repo Rate; IRF was proxied by Effective Federal Funds Rate (EFFR); INF was proxied by headline inflation in Indonesia (in percent, YoY); F.S. was proxied by Dow Jones Industrial Average (DJI) in USD; commodity price was proxied by raw oil price, i.e., Brent oil in USD/barrel; and the pandemic was proxied by total cases accumulative of Covid-19 per day in Indonesia.

Finally, this paper's last result was identified as the robustness estimates referred to as the Best Linear Unbiased Estimator (BLUE) by the Gauss-Markov Theorem. A study can explain good modeling if there were not some classic assumption problems with the "BLUE" approach. The result of running the data should avoid classic assumption problems such as multicollinearity, autocorrelation, and heteroscedasticity. The first result for the long-term equation with Ordinary Least Squared (OLS) has to get a problem with the autocorrelation and heteroscedasticity. Then to resolve those problems, this research used the covariance method with HAC (Newey-West). The second equation in the short-term with Error Correction Model (ECM) has no problem with classic assumption problems, so it has a robustness model.

Results

Indonesia reported the first case of Covid-19 in Depok City on March 2nd, 2020. Initially, the Covid-19 pandemic was poorly noticed by many parties in Indonesia. However, in the first three months, the growth of new cases of people with Covid-19 increased exponentially. The Covid-19 pandemic has caused many sectors to be affected in some countries, both developed and developing countries, including Indonesia. Table. 1, it shows a descriptive statistical summary of some components in the real and financial markets affected by the Covid-19 pandemic.

The first component is stock markets, proxied by Jakarta Stock Exchange Composite (JKSE) and Dow Jones Average Industrial (DJI). The average of JKSE was IDR 5147,43 from January 2nd, 2020, to October 27th, 2020. The peak position of JKSE was achieved to IDR 6325,41, and the lowest point was IDR 3937,63 on March 24th, 2020. It means that the first cases found in early March 2020 impacted decreasing the stock market. At the same time, DJI also dropped USD18.591,93 on March 23rd, 2020. In contrast, DJI achieved a peak point of

Table 1.
Summary Statistic Descriptive

	JKSE	Exchange Rate (USD/IDR)	B.I. 7 Repo	EFFR	Inflation	DJI	Brent Oil	Total Cases Covid-19 Accumulation in Indonesia
Mean	5147.426	14660.61	4.406566	0.439747	2.058154	26387.64	42.60313	83929.04
Median	5067.504	14697.00	4.500000	0.090000	1.948810	26855.25	42.45500	27244.50
Maximum	6325.410	16741.00	5.000000	1.600000	2.978616	29551.42	68.91000	392934.0
Minimum	3937.630	13612.00	4.000000	0.040000	1.320000	18591.93	19.33000	0.000000
Std. Dev.	539.1148	710.4900	0.363440	0.620147	0.634469	2400.633	11.07900	111599.4
Skewness	0.653280	0.792054	0.309981	1.190842	0.268896	-0.942226	0.265964	1.309084
Kurtosis	2.835123	3.620538	1.821871	2.487901	1.381411	3.332045	2.892653	3.490293
Jarque-Bera Probability	14.30783 0.000782	23.87931 0.000007	14.62181 0.000668	48.96100 0.000000	23.99967 0.000006	30.20664 0.000000	2.429385 0.296801	58.53533 0.000000
Sum	1019190.	2902801.	872.5000	87.07000	407.5144	5224753.	8435.420	16617950
Sum Sq. Dev.	57257010	99444809	26.02146	75.76269	79.30252	1.14E+09	24180.62	2.45E+12
Observations	198	198	198	198	198	198	198	198

Source: obtained from secondary data processed, 2020

USD 29.551,42 on February 12th, 2020, around a month before dropping to the deepest point on March 23rd 2020.

Then, the exchange rate of some countries is also recorded as the depreciation caused by Covid-19. The average exchange rate of Rupiah to United States Dollar (USD) was IDR 14.660,61 in the period from January 2nd, 2020, to October 27th, 2020. The highest appreciation of the exchange rate (USD/IDR) was IDR 13.612,00, and the deepest depreciation was IDR 16.741,00 on April 2nd, 2020. The economy being paralyzed has also affected the lower inflation in August 2020 to 1,32%. It might cause many employees be fired by firms resulting in lower take-home pay. The global impact of massive layoffs dropped the purchasing power of the consumer.

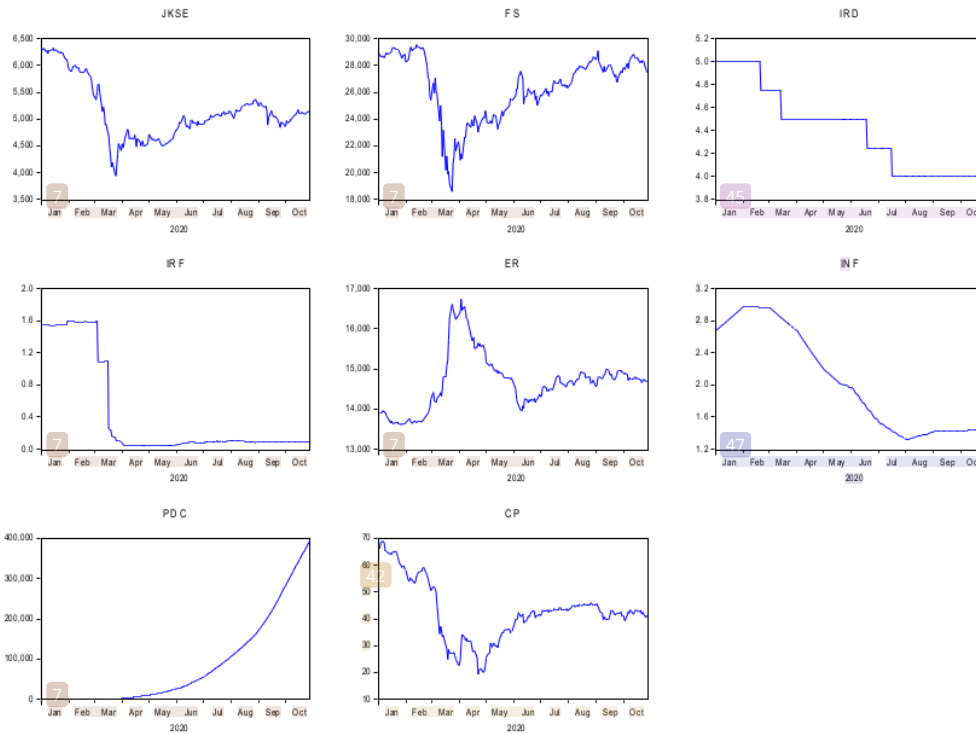
The commodity price proxied by Brent oil dropped in the first quarter of the pandemic phase. The average of Brent oil was USD 42,60 per barrel, and the highest rate was USD 68,91 per barrel on January 6th, 2020. The Brent oil price dropped deeply as the pandemic spread

rapidly. The lowest price of Brent oil was USD 19,33 per barrel on April 21th, 2020. It was caused by many countries using a lockdown policy to prevent the spreading of pandemic broadly. It impacted an oversupply of raw oil that caused limited mobility by lockdown policy and dropped demand globally. However, Figure 1 shows that the oil price rebounded quickly, despite being still below the year 2019.

Third, the domestic interest rate proxied by B.I. 7-Day Repo Rate has an average of 5,4%. The highest interest rate was 6%, and the lowest interest rate was 4,4%. As a central bank in Indonesia, Bank Indonesia has a fast response to keeping the economy growing stable by boosting money's liquidity and the purchasing power of consumers. Bank Indonesia has decreased the interest rate of 100 basis points (bps) from 5% on January 2nd, 2020, to 4,0% since July 16th 2020. Bank Indonesia has followed the Fed's policy responsively to decrease the interest rate at the same time. The Covid-19 pandemic has caused economic paralysis in many countries, including the



Figure 1.
Economic Indicator



Note: Jakarta Stock Exchange Composite (JKSE), Exchange Rate (E.R.), Interest Rate Domestic (IRD)/B.I. 7 Day Repo Rate, Interest Rate Foreign (IRF)/EFFR, Foreign Stock (F.S.)/DJJ, Commodity Price (C.P.)/Brent Oil, Pandemic (PDC)/Total Cases Accumulation in Indonesia.

Source: data processed with Eviews-10, 2020

United States. The Fed reduced the effective federal funds rate (EFFR) of 146 bps, from 1,55% in January 2020 to 0,09% until October 2020.

This paper aimed to analyze the effect of the Covid-19 pandemic on the stock market between the long-term and short-term. First, the last result of this study was a robust result, proved with no found classic assumption problem. The result of running the data should avoid classic assumption problems such as multicollinearity, autocorrelation, and heteroscedasticity. Table 3 showed the classical assumption of linear regression for using the time series data in this paper. The first result for the long-term equation

with *Ordinary Least Squared* (OLS) has a problem with the heteroscedasticity, autocorrelation, and multicollinearity. To resolve those problems and get the robustness result in the long-term, this research used the covariance method with HAC (Newey-West).

Second, a unit root test is needed to check the stationary level of each variable. Table 4 showed that almost all variables are stationary at the first difference with the Phillips-Perron test, except for Effective Federal Funds Rate (EFFR) and Total Cases Covid-19 Accumulative in Indonesia (PDC). All variables are significant at a 99% level of confidence.

Table 3.
The Gauss-Markov Test for Long-Term Modeling

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	6.284872	Prob. F(7,190)	0.0000
Obs*R-squared	37.22672	Prob. Chi-Square(7)	0.0000
Scaled explained SS	71.39378	Prob. Chi-Square(7)	0.0000
Breusch-Godfrey Serial Correlation L.M. Test:			
F-statistic	36.20746	Prob. F(2,188)	0.0000
Obs*R-squared	55.05888	Prob. Chi-Square(2)	0.0000
Variance Inflation Factors			
Variable	Coefficient	Uncentered	Centered
	Variance	VIF	VIF
LOG(ER)	0.008387	275291.7	6.770802
IRD	0.000459	3199.640	21.50987
IRF	0.000191	39.18727	26.03151
INF	0.000271	447.6073	38.66583
LOG(FS)	0.002092	77308.45	6.848054
LOG(CP)	0.000279	1381.996	7.398021
PDC	9.14E-16	6.337602	4.040655
C	1.072393	382584.3	NA

Source: data processed with Eviews-10, 2020

Table 4.
Unit Root Test

Variable	Proxy	Adj. t-Stat	Prob.	Stationary at
Y	Jakarta Stock Exchange Composite (JKSE)	-9.946812	0,0000	1 st Difference
ER	Exchange Rate of USD/IDR	-5.925132	0,0000	1 st Difference
IRD	BI 7 Day Repo Rate	-14.32689	0,0000	1 st Difference
IRF	Effective Federal Funds Rate (EFFR)	-14.15166	0,0000	2 nd Difference
INF	Indonesia's inflation	-13.70866	0,0000	1 st Difference
FS	Dow Jones Industrial Average (DJI)	-13.33907	0,0000	1 st Difference
CP	Brent Oil Price	-9.873752	0,0000	1 st Difference
PDC	Total Cases Covid-19 Accumulative in Indonesia	-8.535248	0,0000	2 nd Difference

Note: unit root test using the Phillips-Perron test.

Source: data processed by Eviews-10, 2020

Then, Table 5 shows the result obtained using ordinary least squared (OLS) to analyze the long-term effect. First, as can be seen, the interest rate foreign proxied by the Effective Federal Funds Rate (EFFR), the foreign stock proxied by Dow Jones Industrial Average (DJI), and commodity price proxied by Brent oil's price, have positive significance to Indonesia's stock market (JKSE). On the other hand, pandemic (PDC) proxied by total cases accumulative of Covid-19 per day in Indonesia negatively affects Indonesia's stock market (JKSE). Then,

the other variable has no significant effect on an endogenous variable, i.e., JKSE.

The interpretation in the long-term modeling would be explained for only the variables that have a significant effect. First, EFFR, DJI's price, and Brent oil's price have a significant positive effect. The interpretation for EFFR was, on average, a 1% increase in the EFFR would raise Indonesia's stock market (JKSE) by 0,088 in Rupiah. At the same time, on average, a 1% increase in DJI's price would increase Indonesia's stock market (JKSE) by 0,473 in

Table 5.
Robustness Estimates of Indonesia’s Stock Markets in Long-Term Endogenous
Variable: Log JKSE

Variable	Proxy	Coefficient	Standard Error	t-Statistic	Prob.
ER	Log ER	0.221823	0.181382	1.222963	0.2229
IRD	BI 7 DRR	0.005667	0.035454	0.159844	0.8732
IRF	EFFR	0.088761***	0.021915	4.050320	0.0001
INF	Inflation	-0.016654	0.026335	-0.632409	0.5279
FS	Log DJI	0.473449***	0.068118	6.950380	0.0000
CP	Log Brent	0.106838***	0.026810	3.985042	0.0001
PDC	Total Cases Accumulative	-1.01E-07***	3.88E-08	-2.600844	0.0100
Constant		1.177059	1.971299	0.597098	0.5512
R ²		0.948932	F-statistic		504.3602
R ² -Adj		0.947050	Prop (F-statistic)		0.000000

Note: * means significant at a 90% level of confidence, ** means significance at a 95% level of confidence, *** means significance at a 99% confidence level.

Source: Data processed with Eviews-10, 2020

Rupiah. Then, for Brent oil’s price means that on average, a 1% increase in the Brent oil’s price would raise Indonesia’s stock market (JKSE) by 0,106 in Rupiah.

Second, the pandemic that proxied by total cases accumulated Covid-19 in Indonesia has negative significance to Indonesia’s stock market (JKSE) in the long-term. On average, 1 unit increased in the number of cases accumulated. Covid-19 in Indonesia would decrease JKSE by -1.01E-07 in Rupiah. The result indicated that it was consistent with the results obtained in Karlsson et al. (2014) that a pandemic leads to a significant increase in poor-home levels. There is also evidence that the epidemic negatively influences the return of capital. For capital incomes, the pandemic has a strong negative impact, and this impact seems to be a combination of short and medium-term responses. This result also showed that the Covid-19 pandemic would cause economic weakness in the long-term, especially in the stock market sector. The government should have prevented the pandemic, which is spreading rapidly. It also might make the economy paralyzed in the long-term. As an emerging country, Indonesia needs hard work to solve the trade-off between economic stability and health crisis at the same time.

Table 6.
Cointegration Test

	Adj. t-Stat	Prob.	Stationary at Level
Phillips-Perron test statistic	-6.490111	0.0000	
Test critical values:			
1% level	-3.473672		
5% level	-2.880463		
10% level	-2.576939		

Note: unit root test using the Phillips-Perron test.

Source: data processed by Eviews-10, 2020

Table 5, the long-term model, has the robustness estimates with HAC (Newest-West) standard errors & covariance method. Both processes are used to solve the autocorrelation and heteroskedasticity problems. The goodness of fit model in the long-term showed by R²-Adj of 94,70%. It means that the exogenous variables explained the endogenous variable by 94,70% in the long-term. F-statistic was also significant at a 99% level of confidence. It means reject H0, or all exogenous variables proved to influence the endogenous variable.

Next step, the cointegration test is needed to continue using the error correction model (ECM). The condition to continue to use

Table 7.
Robustness Estimates of Indonesia’s Stock Markets in Short-Term
Endogenous Variable: D (Log JKSE)

Variable	Proxy	Coefficient	Standard Error	t-Statistic	Prob.
D (E.R.)	D (Log ER)	-0.493615***	0.157925	-3.125635	0.0023
D (IRD)	D (BI 7 DRR)	0.006738	0.029935	0.225074	0.8224
D (IRF)	D (EFFR)	-0.040365	0.025840	-1.562120	0.1215
D (INF)	D (Inflation)	0.016133	0.141882	0.113707	0.9097
D (F.S.)	D (Log DJI)	0.214273***	0.062492	3.428800	0.0009
D (C.P.)	D (Log Brent)	0.057685*	0.032789	1.759273	0.0817
D (PDC)	D (Total Cases Accumulative)	6.32E-07	8.45E-07	0.748371	0.4560
ECT	Error Correction Term	-0.351827***	0.082176	-4.281390	0.0000
Constant		-0.002074	0.002017	-1.028106	0.3064
R ²		0.348466	F-statistic		6.551775
R ² -Adj		0.295279	Prop (F-statistic)		0.000001

Note: *means significant at a 90% level of confidence, ** indicates significance at a 95% level of confidence, *** indicates significance at a 99% level of confidence.

Source: Data processed with Eviews-10, 2020

¹⁵ the error correction model (ECM) is that the long-term residual was stationary at the unit root level. Table 6 shows the cointegration test of residual from the model in the long-term. It showed that the residual was stationary at the unit root level. It means that the model is valid to continue in the error correction model (ECM).

The short-term effect of the pandemic is shown in Table 7. The result showed that DJI and Brent oil have a significant positive impact on Indonesia’s stock market. Both variables are consistent with the long-term model, which positively affects the stock market in Indonesia. The average DJI price increase of 1% will affect JKSE’s price- rise of 0,214% in the short-term. However, the case is the rise of the Brent oil price by 1% would only raise the price of JKSE on average by 0,058%. It means that DJI’s effects are higher than that of the Brent oil price against JKSE prices. The results of this study follow the implications of the price theory of asset (assets pricing theories), which believes that there is economic shock causing the price of the moving asset, although some research

states it is challenging to know which asset price is the first to be influential (Cutler et al., 1989; Gormsen & Lazarus, 2020).

On the other hand, the exchange rate of Rupiah (USD/IDR) and error correction term (ECT) has negative significance to Indonesia’s stock market. It means that, on average, a 1% increase in the exchange rate of Rupiah would decrease JKSE by -0,494%. The ECT was measured by residual in the lag-1 (*previous period*) for a long-term model. The Error Correction Term value (ECT) on the short-term equation indicates significant ($\alpha = 5\%$) with a coefficient of -0,352. It means that the endogenous variable will adjust its exogenous variable by 35,18% at one period and reach 100% in the 2,84 period. A negatively marked value of the ECT coefficient means the primary balance indicates adjustments to instability in the short term. When the ECT coefficient is statistically significant (p-value = 0.0000), it stated that the model specifications used in the study are valid. The Error Correction Model (ECM) will correct the next period if, in the short term, there is an imbalance in one period.

The short-term model has a different result from a long-term model for the pandemic variable. The total cases accumulated of Covid-19 in Indonesia have no significant effect on Indonesia's stock market in the short-term. In other words, the pandemic has not been economically paralyzed in the short-term, but it will affect the long-term. The other result in the short term is that both the Effective Federal Funds Rate (EFFR) and Brent oil price have no significant effect on Indonesia's stock market.

Table 7, the short-term model, has robustness estimates with no problem in the Gauss-Markov assumption. The goodness of fit model in the short-term showed by R²-Adj of 0,2953. It means that the exogenous variables can explain the endogenous variable by 29,53% in the short-term. F-statistic has significance at a 99% level of confidence. It means reject H₀, or all exogenous variables proved to influence the endogenous variable. Table 8, the Gauss-Markov test for short-term modeling has proved that the result was the robustness finding with no classical problem indeed. The result of both Heteroskedasticity Test: Breusch-

Pagan-Godfrey and Breusch-Godfrey Serial Correlation L.M. Test were H₁ rejected, means that there were no heteroscedasticity and autocorrelation problems. The same condition in the Variance Inflation Factors test showed that VIF in every variable less than 10. It means there was no multicollinearity in short-term modeling.

This paper showed that the Covid-19 pandemic has no significant effect on the stock market in the short-term but has a negative effect on the long-term. For the first Quarter of 2020, some macro-economic indicator has still shown-up, but lower than the fourth quarter of 2019. Economic growth in Q-I/2020 grew up to 2,97%, lower than in Q-IV/2020 of 4,97%. Indonesia was trapped in the recession phase in the year 2020. The National Statistic Center Bureau has released the negative economic growth in a two-quarter sequence, i.e., in QII/2020 (-5,32%) and QIII/2020 (-3,49%).

The government must apply a policy to prevent and mitigate the economic decline and deep recession, especially on the financial market. First, the government must find ways

Table 8.
The Gauss-Markov Test for Short-Term Modeling

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.226814	Prob. F(8,98)	0.2916
Obs*R-squared	9.740363	Prob. Chi-Square(8)	0.2837
Scaled explained SS	22.57627	Prob. Chi-Square(8)	0.0040
Breusch-Godfrey Serial Correlation L.M. Test:			
F-statistic	0.879108	Prob. F(2,96)	0.4185
Obs*R-squared	1.924432	Prob. Chi-Square(2)	0.3820
Variance Inflation Factors			
Variable	Coefficient	Uncentered	Centered
	Variance	VIF	VIF
D(LOG(ER))	0.024940	1.035819	1.004541
D(IRD)	0.000896	1.045760	1.016440
D(IRF)	0.000668	1.079236	1.066618
D(INF)	0.020131	1.495576	1.140144
D(LOG(FS))	0.003905	1.363230	1.349101
D(LOG(CP))	0.001075	1.345526	1.341938
D((PDC))	7.14E-13	2.080002	1.112546
RES(-1)	0.006753	1.083797	1.083779
C	4.07E-06	2.709061	NA

Source: data processed with Eviews-10, 2020

to cooperate and offer a good value proposition for foreign investors. The government has to reduce some regulations at all department levels, especially for investment. Second, it is essential to raise the ease of doing business to give a strong signal to the foreign investor. Third, the pandemic is changing how investors make supply chain decisions, so make sure to use the potential of bonus demography optimally. The government has to make sure foreign investors can replace and build their factory in Indonesia to have more capacity and capability in labor, capital, and other resources.

The novelty of this study is using daily market price data indicated by those variables analyzed. This research shows empirical results that Indonesia could potentially experience periods of economic and financial difficulties caused by the Covid-19 pandemic.

Discussion

This paper aimed to analyze the existence and effect of the Covid-19 pandemic on the stock market in Indonesia between the long-term and short-term. The result of this study finds that in the long-term, the foreign interest rate (EFFR), foreign stock markets (DJI), and commodity price (Brent oil) has a significant positive effect on the stock market in Indonesia (JKSE). On the contrary, domestic inflation and the pandemic (total cases accumulative in Indonesia) have a significant negative effect on Indonesia's stock market. The result indicated that it is consistent with the results obtained in previous studies.

The economic crisis in this study was approached by Krugman (1979), stating that there would be a potential contagion to the overall economic indicator, which usually appears at the beginning of the financial performance and banking sectors. The pandemic crisis problems have the potential to decrease the performance of the international balance of payments which will ultimately lead to uncertainty in the market. Some of

the studies that refer to this opinion include Abbara & Zevallos (2014); Frankel & Saravelos (2012); Horn et al. (2020), which states that if the uncertainty of a disaster settlement and or pandemic is unclear, the potential moral hazard market participants will potentially cause market uncertainty and the global economic crisis.

This result showed that the Covid-19 pandemic would cause economic weakness in the long-term, especially in the stock market sector. However, the short-term model has a different result from a long-term model for the pandemic variable. The total cases accumulated of Covid-19 in Indonesia have no significant effect on Indonesia's stock market in the short-term. In other words, the economy has not been paralyzed by the pandemic in the short-term, but it affects the long-term. The other difference from the long-term model was that both the foreign interest rate and domestic inflation has no significant effect on Indonesia's stock market. While there was a new variable that has a significant negative impact on the stock market in Indonesia, i.e., the exchange rate (USD/IDR), then, both the foreign stock (DJI) and commodity price (Brent oil) were the same in the long-term model that has a significant positive effect on Indonesia's stock market.

The government should have prevented the pandemic, which is spreading rapidly. It might make the economy paralyzed in the long-term. Indonesia needs hard work to solve the trade-off between economic stability and health crisis as an emerging country. The government has to apply policy to prevent and mitigate the economic impact and deep recession, especially on the financial market. First, the government must find ways to cooperate and offer a good value proposition for foreign investors. The government has to reduce some regulations at all level departments, especially for investment. Second, it is essential to raise the ease of doing business to give a strong signal to the foreign investor. The third,

pandemic is changing how investors make supply chain decisions, so make sure to use the potential of bonus demography optimally. The government has to make sure foreign investors can replace and build their factory in Indonesia to have more capacity and capability in labor, capital, and other resources.

Conclusion

This paper aimed to analyze the existence and effect of the Covid-19 pandemic on the stock market in Indonesia between the long-term and short-term. This study also answered the following questions: (1) Do foreign stocks affect Indonesia's stock market?; (2) Do interest rates, both domestic interest rate (Bank Indonesia 7 Day Repo Rate) and foreign interest rate (Effective Federal Funds Rate) affect Indonesia's stock market?; (3) Does the exchange rate affect Indonesia's stock market?; (4) Does domestic inflation affect Indonesia's stock market?; and (5) Does the global commodity market affect Indonesia's stock market?

Using ECM, the result in the short-term showed that both foreign stock market (DJI) and global commodity price (Brent oil) has a significant positive effect on Indonesia's stock market (JKSE). On the contrary, the exchange rate has a significant negative effect on Indonesia's stock market. The other variables, like domestic and foreign interest rate, inflation, and total cases accumulative of Covid-19, have no significant effect on Indonesia's stock market in the short-term. In the long term, foreign interest rate (EFFR), foreign stock (DJI), and global commodity price (Brent oil) have a significant positive effect on Indonesia's stock market. On the contrary, the only total cases accumulative of Covid-19 has a significant negative effect on Indonesia's stock market. Then the others, exchange rate, domestic interest rate (BI 7 DRR), and inflation have no significant effect on Indonesia's stock market.

However, the estimation fails to reflect the significant impact of the Covid-19 pandemic

in the short-term, but it has a negative effect on stock markets in the long-term. This result implies that given higher total accumulative cases of Covid-19 has been the source of Indonesia's stock market weakness in the long-term, especially in the stock market sector. The short-term model has a different result from a long-term model for the pandemic variable. The total cases accumulated of Covid-19 in Indonesia have no significant effect on Indonesia's stock market in the short-term. In other words, the economy has not been paralyzed in the short-term, but it affects the long-term.

However, the limitation of this study is the cases of Covid-19 are still happening beyond when this paper was finished. The impact of the Covid-19 pandemic on Indonesia's stock market was not covered for all periods. This study considers the contribution to give a strategy for the government to prevent and mitigate the economy from dropping into a deep recession. The recommendation from this study is to give a strategy for government and stakeholders to (i) cooperate and offer a good value proposition for the foreign investor, (ii) raise the rate of ease of doing business, (iii) use the potential of bonus demography optimally.

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