

# “Investor behavior under the Covid-19 pandemic: the case of Indonesia”

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# INVESTOR BEHAVIOR UNDER THE COVID-19 PANDEMIC: THE CASE OF INDONESIA

## Abstract

This study begins with the assumption that the existence of abnormal circumstances will force investors to take measures to protect their investments in the capital market. Recently, the stock index in the Indonesian market has been declining and continued to fall until the end of April 2020 due to the impact of the Covid-19 pandemic. In terms of efficient market theory, prospect theory and signaling theory, this study aims to analyze the relationship between risk and return in the Indonesian capital market during the Covid-19 pandemic as a manifestation of investor behavior. To test hypotheses, the correlation test, the independent sample t-test and the Cohen test for 629 public firms with 52,836 observable data are used. The findings show that for financial sectors and non-financial sectors, the fourth period differs from previous periods when the relationship between systematic risk and stock returns is positive, although only non-financial sectors have a significant effect. The results show that efficient market theory, prospect theory and signaling theory are consistent with the phenomena around the Covid-19 pandemic in Indonesia. In addition, Cohen's test results suggest that government policies in the face of the pandemic are successful in stimulating the market.

## Keywords

stock returns, risks, efficient market, prospect, signaling

## JEL Classification

G11, G18, G41

## INTRODUCTION

The ideal paradigm is that investors should consider risks and returns when developing a portfolio in order to make better investment decisions (Markowitz, 1952; Wolski, 2017; Stålnacke, 2019; Vo et al., 2019). In this view, it can be assumed that investors will take protective measures or react as the psychological impact in the capital market if abnormal circumstances occur, which is called the "trigger events" (Dreman & Lufkin, 2000). Based on this assumption, the investor behaviors in relation to risk and return trade-off are the efforts to keep the limit of target returns (Dreman & Lufkin, 2000; Beal et al., 2005).

Recently, the world, including the Republic of Indonesia, is under attack from the Covid-19 pandemic. In these conditions, the economy is a field that gets a severe impact, especially in the capital market. In this case, capital market conditions as reflected by the stock index or Indonesia Composite Index tend to be associated with some important trigger events from the World Health Organization's timeline and situation report of Covid-19 and the situation reports supported with daily statistics from the National Disaster Management Authority of the Republic of Indonesia.

The first event starts at the end of December 2019 when the first case of Covid-19 was reported to the World Health Organization. After this event, the Indonesian capital market, during January 2020, is generally in a normal condition with the average stock index at IDR 6,225.77

compared to December 2019 with the stock index at IDR 6,217.98. The event continued when, on January 28, 2020, the National Disaster Management Authority announced that the Republic of Indonesia was in an emergency condition, followed by an international warning from the World Health Organization. Since those announcements, at the beginning of February 2020, the stock index in the Indonesian capital market started to decline and fell to IDR 5,855.49 on average at the end of the month.

The further event is the second National Disaster Management Authority's announcement on February 29, 2020 to extend an emergency condition in the Republic of Indonesia. In March 2020, the Indonesian government took many recovery actions not only in the health field but also in economics, especially in monetary and fiscal policies. However, till the end of March 2020, the capital market tended to show panic conditions, which resulted in the stock index drop to IDR 4,786.92 on average.

On April 2020, the tax incentive regulation, as fiscal policy runs effectively, improved during the month. Moreover, as the monetary policy, the Central Bank of Indonesia decided to keep the rate at 4.5%. In April 2020, the stock index tended to move more steadily, although its average was only IDR 4,600.98. The aim of this study is to analyze the impact of the Covid-19 pandemic on the risk-return relationship in the Indonesian capital market between January 2020 and April 2020 as a manifestation of investor behavior in accordance with efficient market theory, prospect theory and signaling theory.

## 1. LITERATURE REVIEW

### 1.1. Efficient market theory

Markowitz (1952) shows that the relationship between beliefs and choice in the context of a portfolio follows the relation of expected returns and its variance (or risk), which will lead to the creation of an efficient portfolio by investors on the assumption that the efficient line begins with minimum risk. Markowitz (1952) assumes that returns vary with risks, which means that it is impossible for investors to set the portfolio based on expectations of maximum return and minimum variance, since diversification cannot eliminate all variance. Lintner (1965) assumes that uncertainty is the basic condition for investors in preferences for optimal investment portfolios. Under this assumption, investors face the risk of assets while setting up the portfolio with optimum returns, which means that the higher the expected return, the higher the risk (Lintner, 1965).

Fama (1970, 1998) defines that an efficient market is a market whose stock prices fully reflect available information that investors need. Given this definition, Fama (1970) emphasizes that the basic concept of this theory is expected return roles as a function of its risk, which means that the higher the return, the higher the risk. Fama (1970) confirms that expected returns as the fair game

efficient market model will depend on information that is given as weak form, semi-strong form, and strong form. Lintner (1965), and Fama (1970, 1991) suggest testing the efficient market theory using an equilibrium model such as an asset pricing model. Markowitz (1952), Fama and MacBeth (1973), Harvey (1989), Frazzini and Pedersen (2014), Mollik and Bepari (2015), Aliu et al. (2017), Wolski (2017), Stålnacke (2019), Budiarto and Pontoh (2019), and Vo et al. (2019) report that risk and return are correlated positively. According to these reviews, the hypothesis is an efficient market as the explanation of the phenomenon under the Covid-19 pandemic, where stock returns are positively associated with systematic risk.

### 1.2. Prospect theory

The utility function is the constraints of efficient market theory, especially in the concept of behavioral finance (Lintner, 1965; Fama, 1970). This concept is deeply developed by Kahneman and Tversky (1979) into prospect theory, which emphasizes that investors set and decide the portfolio under risk. Kahneman and Tversky (1979) prove that investors will behave to avoid risk if they prefer investments with certain risk prospects in certain expected value or, in other words, utility function is concave. Barberis (2013) confirms that prospect theory contains elements such as reference dependence, loss aversion, diminishing sen-

sitivity, and probability weighting. Malkiel (2003) argues that psychological factor plays a significant role in market prices and not rational investors, which makes the market ineffective. Malkiel (2003) confirms that as long as investor judgments still contain mistakes, pricing irregularities and predictable patterns in stock returns in the capital market may appear in the long or short term.

Lintner (1965) explains that under utility function, the behavior of rational investors will set in concave while selecting optimum portfolios, which means they are more averse to risk if anomalies exist. On this point, Lintner (1965) shows that the anomalies in investors' investment decisions are a problem to the efficient market concept. Similar to Lintner (1965), Fama (1970) states that the problem for testing efficient market theory is that investment decisions are based on the assumption that prices fully reflect the available information and that investors are risk averse. Fama (1998) confirms that anomalies, such as over-reaction or under-reaction of investors, are still consistent with the efficient market theory. Prospect theory is based on risk-averse investors and anomalies, which results in a negative relationship between risk and return, as confirmed by Beal et al. (2005), and Barberis et al. (2016). Grinblatt and Han (2005) call this behavior mental accounting. Fiegenbaum and Thomas (1988), Shen and Chih (2005), and Daniel and Hirshleifer (2015) also confirm that consistent with prospect theory, investors with higher earnings have a positive relationship of risk and return and are riskaverse as target of earnings is above the level, whereas investors with low earnings have a negative relationship of risk and return and are risk lovers as target of earnings is below level. According to these reviews, the hypothesis is prospect theory as the explanation for the phenomenon over the Covid-19 pandemic where stock returns are negatively associated with systematic risk.

### 1.3. Signaling theory

According to Ross (1977), the risk class has been recently viewed as a consequence of perfection and competition in financial markets. Ross (1977) defines signals as valid financial information by firms entering the market. Fama (1970, 1998), and Malkiel (2003) confirm that any information

by firms directly affects the trade-off of risk and return in the capital market. Shubiri and Jamil (2018) demonstrate that the other information in the market, which is considered as risk that sourced from the firms besides systematic risk, is unsystematic risk or idiosyncratic risk. OuYang et al. (2017) suggest that the information about stock reaction during crisis by media with good reputation serves as a valid signal to investors while evaluating the firm quality.

Shubiri and Jamil (2018) confirm that idiosyncratic risk is positively correlated with stock returns, while investors require performance improvements by firms. Liu and Di Iorio (2016) prove that idiosyncratic risk is positively correlated with stock returns if investors do not diversify their portfolios because of lack of information. Bozhkov et al. (2018) confirm that idiosyncratic risk is positively correlated with stock returns, especially during the recession period. Bali and Cakici (2008) confirm that there is an insignificant relationship between idiosyncratic risk and expected returns. On the other hand, Bouslah et al. (2018) demonstrate that the negative relationship between idiosyncratic risk and stock returns reflects the market tendency to allow the firm to increase their performance during the recession period in terms of changing the investors' perceptions. Similarly, Lee and Faff (2009) confirm that a negative relationship between idiosyncratic risk and stock returns shows that investors are informed that firms have better financial performance. Under those reviews, the hypothesis is signaling theory as the explanation for the phenomenon over the Covid-19 pandemic, where stock returns are associated with unsystematic/idiosyncratic risk.

## 2. METHOD AND HYPOTHESES

The sample drawn from a targeted sample of public firms listed on the Indonesia Stock Exchange from January 2, 2020 to April 30, 2020, gives 629 public firms comprising 89 financial firms and 540 non-financial firms, a total of 52,836 according to data observed. In terms of sampling, the firms should not be delisting firms, under suspend or new listing firms during the observation period. Based on trigger events in Indonesia, the peri-

ods of observation are divided into four periods as follows: (1) January 2, 2020 until January 30, 2020 with total of 21 days and called as the first period (Period 1); (2) January 31, 2020 until February 28, 2020 with total of 21 days, which is called the second period (Period 2); (3) March 2, 2020 until March 31, 2020 with total of 21 days, which is called the third period (Period 3); and (4) April 1, 2020 until April 30, 2020 with total of 21 days, which is called the fourth period (Period 4). The hypotheses of this study are as follows:

*Ha1: Stock returns are positively associated with systematic risk.*

*Ha2: Stock returns are negatively associated with systematic risk.*

*Ha3: Stock returns are associated with unsystematic/idiosyncratic risk.*

The Pearson correlation test (Equation (1)) is performed to test the hypothesis as follows:

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}} \quad (1)$$

To explain the phenomena of the Covid-19 pandemic, the independent sample *t*-test as the mean difference test (Equation (2)) is performed to support the results of the correlation test implying that the equal variances are assumed and the standard deviation (Equation (3)) calculated based on the degree of freedom is  $n_1 + n_2 - 2$ . According to this test, the four periods are grouped into three pairs: (1) Period 1 and Period 2 as Pair 1; (2) Period 2 and Period 3 as Pair 2; and (3) Period 3 and Period 4 as Pair 3.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{sp \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}, \quad (2)$$

$$sp = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}} \quad (3)$$

Otherwise, if equal variances not assumed, the independent sample *t*-test (Equation (4)) is performed based on the degree of freedom in Equation (5).

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}, \quad (4)$$

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{1}{n_1 - 1} \left(\frac{s_1^2}{n_1}\right)^2 + \frac{1}{n_2 - 1} \left(\frac{s_2^2}{n_2}\right)^2} \quad (5)$$

To detect variances, Equation (6) is used with the hypotheses as follows:

$$H_0: \sigma_1^2 = \sigma_2^2.$$

$$H_1: \sigma_1^2 \neq \sigma_2^2.$$

$$w = \frac{(N - k) \sum_{i=1}^k N_i (Z_{i.} - Z_{..})^2}{(k - 1) \sum_{i=1}^k \sum_{j=1}^{N_i} (Z_{ij} - Z_{i.})^2} \quad (6)$$

In Equation (6),  $Z_{ij} = |Y_{ij} - \bar{Y}_i|$ , where  $\bar{Y}_i$  is the mean of the subgroup,

$$Z_{i.} = \frac{1}{N_i} \sum_{j=1}^{N_i} Z_{ij}, \text{ and } Z_{..} = \frac{1}{N} \sum_{i=1}^k \sum_{j=1}^{N_i} Z_{ij}.$$

Besides, the Cohen test, or the effect size test (Equation (7)), is performed to determine the size effect to support the results of independent sample *t*-test (Equation (2)).

$$D = \frac{x_1 - x_2}{sp} \quad (7)$$

The variables of this study are stock returns (SR), systematic risk (R1 and R2), and unsystematic/idiosyncratic risk (R3), based on the capital asset pricing model or CAPM (Equation (8)). Daily stock returns of public firms are the difference of the current price to the previous price divided by the previous price ( $R_{it}$ ) and the risk-free rate ( $RF_t$ ) from the Central Bank of Indonesia. The market return ( $RM_t$ ) is a stock index or Indonesia Composite Index drawn from the Indonesia Stock Exchange. The daily systematic risks (Equation (9) and Equation (10)) and the daily unsystematic or idiosyncratic risk (Equation (11)) are estimated based on CAPM since November 1, 2019.

$$R_{it} - RF_t = \alpha_i + \beta_{RM_t - RF_t} + \varepsilon_{it}, \quad (8)$$

$$\beta = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}, \quad (9)$$

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}, \quad (10)$$

$$\varepsilon_{it} = \sqrt{\frac{1}{(n-2)} \left[ \sum(y - \bar{y})^2 - \frac{[\sum(x - \bar{x})(y - \bar{y})]^2}{\sum(x - \bar{x})^2} \right]}. \quad (11)$$

### 3. RESULTS

Table 1 presents the descriptive statistic results. The means of stock returns for all firms in the first period (Period 1), the second period (Period 2) and the third period (Period 3) are negative. Similarly, the means on those periods are also negative when the industrial sector is categorized into the financial sector and the non-financial sector. Otherwise, the risks (systematic and unsystematic) for firms during this period are positive, and they remain

consistent if the firms are divided into the financial sector and the non-financial sector. In particular, the stock beta (R1) for firms in this period is below one, which indicates that the capital market condition is more risky and leads to a decrease in all stock prices during this period.

In Period 4, the means of stock returns and risks for all sectors (or even after dividing into the financial sectors and the non-financial sectors) are positive. These results indicate that the risk return trade-off in this period is linear, which indicates that high risk will lead to high returns. Although the stock returns have only experienced a small increase, however, in this period, the policies pursued by the Indonesian government, such as monetary policy and fiscal policy, have tendency to succeed to stimulate economic stability. As a result, the market or investors respond positively to this condition.

Table 2 presents correlation analysis results for the financial sector and the non-financial sector where systematic risk (R1) is the stock beta. In the first period, both sectors have negative stock returns and positive systematic risks, which lead to significantly negative relationships. Also, increased

**Table 1.** Descriptive statistics

Variables	All sectors			Financial sectors			Non-financial sectors		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
<b>Period 1</b>									
SR	-0.35	0.35	-0.0030	-0.35	0.35	-0.0026	-0.35	0.35	-0.0031
R1	-6.38	8.88	0.4550	-6.38	3.66	0.2793	-4.33	8.88	0.4840
R2	0.00	0.49	0.0468	0.00	0.49	0.0579	0.00	0.48	0.0449
R3	0.00	0.16	0.0365	0.00	0.13	0.0336	0.00	0.16	0.0369
<b>Period 2</b>									
SR	-0.35	0.35	-0.0047	-0.31	0.35	-0.0029	-0.35	0.35	-0.0050
R1	-3.46	5.60	0.5039	-3.46	2.63	0.3285	-2.90	5.60	0.5328
R2	0.00	0.54	0.0508	0.00	0.54	0.0575	0.00	0.53	0.0497
R3	0.00	0.16	0.0367	0.00	0.13	0.0336	0.00	0.16	0.0372
<b>Period 3</b>									
SR	-0.81	0.35	-0.0047	-0.81	0.35	-0.0044	-0.35	0.35	-0.0047
R1	-2.15	4.63	0.5156	-2.15	3.32	0.4374	-1.96	4.63	0.5285
R2	0.00	0.81	0.1066	0.00	0.81	0.1218	0.00	0.78	0.1041
R3	0.00	0.14	0.0379	0.00	0.13	0.0351	0.00	0.14	0.0384
<b>Period 4</b>									
SR	-0.11	0.35	0.0015	-0.11	0.35	0.0015	-0.07	0.35	0.0015
R1	-1.39	2.44	0.4616	-0.59	1.88	0.4089	-1.39	2.44	0.4703
R2	0.00	0.78	0.1251	0.00	0.78	0.1400	0.00	0.78	0.1227
R3	0.00	0.13	0.0395	0.00	0.13	0.0369	0.00	0.13	0.0399

Note: SR is  $R_{it} - R_{ft}$  or stock returns of firms  $i$  on day  $t$  minus risk free of day  $t$ . R1 is systematic risk measured by equation (9). R2 is systematic risk measured by equation (10). R3 is unsystematic risk or idiosyncratic risk measured by equation (11).

prices in the capital market have a significant impact on reducing unsystematic risk (firm risk) for financial sectors, but insignificant for non-financial sectors. In the second period, the relationship between stock returns and systematic risk for both sectors is similar to the first period. In this period, the increasing prices in the capital market are significant to reduce the firm risk for the non-financial sector.

In the third period, the relationship between stock returns and systematic risk for both sectors is still consistent with previous periods. The results also show that the relationship between stock returns and unsystematic risks for both sectors is significantly positive, which indicates that increasing market prices are significant to increase the firm risk for both sectors. In the fourth period, the relationship between stock returns and systematic risk is positive, but significant only for non-financial sectors.

Table 3 presents the correlation analysis results for financial sectors and non-financial sectors, where systematic risk (R2) is the determination coefficient. The results show that the relationships between stock returns and systematic risks are consistently negative and significant for non-financial sectors from the first period until the third pe-

riod, but differ in the fourth period. The results also show that the negative relationship between stock returns and systematic risks is significant for financial sectors, but only for the third period. Consistent with the previous results, both sectors have a positive relationship between stock returns and unsystematic risks in the third period, which indicates that increasing market prices significantly increase a firm's risk.

Table 4 presents the results of the independent sample t-test or the mean difference test to extend the analysis in order to examine whether each period has a significant difference compared to other periods. The difference between the third period and the fourth period (Pair 3) for stock returns of financial sectors is significant, which is consistent with descriptive statistics that the fourth period has higher returns. In financial sectors, systematic risk (R2) captures the picture more clearly, which shows that systematic risks are high in the third period and higher in the fourth period. Moreover, unsystematic risks of financial sectors are significant for Pair 2 and Pair 3, which indicates that firm risks are also higher in the third and fourth periods. The results also show that stock returns of non-financial sectors decline in the second period, but are higher in the fourth period. R2 for non-financial sectors captures that systematic risks are high in the sec-

**Table 2.** Correlation analysis (systematic risk is stock beta)

Variables	All sectors			Financial sectors			Non-financial sectors		
	SR	R1	R3	SR	R1	R3	SR	R1	R3
<b>Period 1</b>									
SR	1	-0.044***	-0.013	1	-0.047**	-0.051**	1	-0.044***	-0.007
R1		1	-0.032***		1	-0.239***		1	0.004
R3			1			1			1
<b>Period 2</b>									
SR	1	-0.085***	-0.022**	1	-0.068***	0.023	1	-0.087***	-0.028***
R1		1	0.006		1	-0.199***		1	0.037***
R3			1			1			1
<b>Period 3</b>									
SR	1	-0.051***	0.049***	1	-0.050**	0.046**	1	-0.052***	0.049***
R1		1	-0.047***		1	-0.187***		1	-0.027***
R3			1			1			1
<b>Period 4</b>									
SR	1	0.076***	0.004	1	0.043	0.039	1	0.081***	-0.003
R1		1	-0.060***		1	-0.198***		1	-0.038***
R3			1			1			1

Note: SR is  $R_{it} - R_{ft}$  or stock returns of firms  $i$  on day  $t$  minus risk free of day  $t$ . R1 is systematic risk measured by equation (9). R3 is unsystematic risk or idiosyncratic risk measured by equation (11). \*\*\*, \*\* and \* denote significance at 0.01, 0.05 and 0.10, respectively.

**Table 3.** Correlation analysis (systematic risk is the coefficient of determination)

Variables	All sectors			Financial sectors			Non-financial sectors		
	SR	R2	R3	SR	R2	R3	SR	R2	R3
<b>Period 1</b>									
SR	1	-0.021**	-0.013	1	0.003	-0.051**	1	-0.027***	-0.007
R2		1	-0.183***		1	-0.190***		1	-0.180***
R3			1			1			1
<b>Period 2</b>									
SR	1	-0.054***	-0.022**	1	-0.041	0.023	1	-0.057***	-0.028***
R2		1	-0.252***		1	-0.266***		1	-0.248***
R3			1			1			1
<b>Period 3</b>									
SR	1	-0.055***	0.049***	1	-0.090***	0.046**	1	-0.049***	0.049***
R2		1	-0.356***		1	-0.374***		1	-0.351***
R3			1			1			1
<b>Period 4</b>									
SR	1	0.057***	0.004	1	0.024	0.039	1	0.064***	-0.003
R2		1	-0.272***		1	-0.293***		1	-0.267***
R3			1			1			1

Note: SR is  $R_{it}-R_{ft}$  or stock returns of firms  $i$  on day  $t$  minus risk free of day  $t$ . R2 is systematic risk measured by equation (10). R3 is unsystematic risk or idiosyncratic risk measured by equation (11). \*\*\*, \*\* and \* denote significance at 0.01, 0.05 and 0.10, respectively.

ond period, higher in the third, and highest in the fourth period. Similar to financial sectors, non-financial sectors also have higher idiosyncratic risk in the third period and highest in the fourth period.

Table 5 presents the results of the Cohen test or the effect size test to support the result of the inde-

pendent sample  $t$ -test or the mean difference test. As for the results for all firms (financial sectors and non-financial sectors), the difference of systematic risks (R2) between period 2 and period 3 (Pair 2) has a moderate effect (-0.444), while other variables have a small effect. Specifically, the systematic risk (R2) for financial sectors and non-fi-

**Table 4.** Independent sample  $t$ -test

Var	All sectors			Financial sectors			Non-financial sectors		
	Pair 1	Pair 2	Pair 3	Pair 1	Pair 2	Pair 3	Pair 1	Pair 2	Pair 3
SR	0.00166***	0.00000	-0.00618***	0.00031	0.00148	-0.00590***	0.00188***	-0.00024	-0.00623***
R1	-0.04891***	-0.01171	0.05399***	-0.04929	-0.10883***	0.02842	-0.04885***	0.00429	0.05820***
R2	-0.00406***	-0.05583***	-0.01849***	0.00038	-0.06433***	-0.01824***	-0.00479***	-0.05443***	-0.01853***
R3	-0.00024	-0.00121***	-0.00155***	0.00000	-0.00156*	-0.00174**	-0.00028	-0.00115***	-0.00152***

Note: Pair 1 is a group of period 1 and period 2. Pair 2 is a group of period 2 and period 3. Pair 3 is a group of period 3 and period 4. SR is  $R_{it}-R_{ft}$  or stock returns of firms  $i$  on day  $t$  minus risk free of day  $t$ . R1 is systematic risk measured by equation (9). R2 is systematic risk measured by equation (10). R3 is unsystematic risk or idiosyncratic risk measured by equation (11). \*\*\*, \*\* and \* denote significance at 0.01, 0.05 and 0.10, respectively.

**Table 5.** Effect size test

Variables	All sectors			Financial sectors			Non-financial sectors		
	Pair 1	Pair 2	Pair 3	Pair 1	Pair 2	Pair 3	Pair 1	Pair 2	Pair 3
SR	0.038	1.380e-5	-0.123	0.007	0.030	-0.118	0.042	-0.005	-0.123
R1	-0.046	-0.014	0.087	-0.045	-0.139	0.048	-0.046	0.005	0.093
R2	-0.051	-0.444	-0.107	0.004	-0.433	-0.092	-0.064	-0.448	-0.110
R3	-0.009	-0.046	-0.064	4.166e-6	-0.056	-0.066	-0.010	-0.044	-0.063

Note: Pair 1 is a group of period 1 and period 2. Pair 2 is a group of period 2 and period 3. Pair 3 is a group of period 3 and period 4. SR is  $R_{it}-R_{ft}$  or stock returns of firms  $i$  on day  $t$  minus risk free of day  $t$ . R1 is systematic risk measured by equation (9). R2 is systematic risk measured by equation (10). R3 is unsystematic risk or idiosyncratic risk measured by equation (11).

financial sectors between period 2 and period 3 (Pair 2) have a moderate effect ( $-0.433$  and  $-0.448$ , respectively). These results indicate that the events in the third period have a higher impact compared to the second period. In other words, government policies in the third period give better condition in the capital market rather compared to the second period.

## 4. DISCUSSION

### 4.1. Risk and return under the Covid-19 pandemic in Indonesia

After the first case of Covid-19 reported to the World Health Organization (WHO), the capital market in Indonesia reflects high uncertainty for investors. The relationship of risks and stock returns is more clearly as the results for the second measurement of systematic risk show more favorable correlation rather than the first measurement of systematic risk. From January 2, 2020 to January 30, 2020, or the first period, most of public firms start to show negative stock returns with positive risks. Given the correlation results, the negative relationship of systematic risks and stock returns is only significant for non-financial sector firms. In accordance with the concept of Lintner (1965) and Fama (1970), the condition in the first period shows that utility function plays a significant role as the constraint of the efficient market. The finding for the first period supports the prospect theory by Kahneman and Tversky (1979), Grinblatt and Han (2005), and Barberis (2013), which indicates that most of investors in firms of non-financial sectors tend to hold or sell the assets, or have little demand for less risky assets, as they begin to behave in risk-averse or mental accounting manner. Given this finding, the hypothesis for prospect theory is accepted for firms of the non-financial sector, but rejected for firms of the financial sector. Furthermore, the correlation result of the first period shows that firms of financial sectors have more impact on firm risk as they have a negative and significant relationship between stock returns and unsystematic risk, which is in line with Lee and Faff (2009), and Bouslah et al. (2018). Consistent with Ross (1977), Fama (1970, 1998) and Malkiel (2003), this result indicates that most of investors still have positive responding for

financial sectors, indicating that these firms still provide positive information to the market. Based on this finding, the study accepts the hypothesis that signaling concept is more applicable to explain the phenomena in the first period for financial sectors, but rejects it for non-financial sectors.

From January 31, 2020 to February 28, 2020, or the second period, investors in financial sectors behave more steadily similar to the first period as the efficient market theory, prospect theory, and the signaling concept are not applicable. Moreover, the relationship of systematic risks and stock returns for firms of non-financial sectors still at the same condition as the first period. Consistent with Ross (1977), Fama (1970, 1998), Malkiel (2003), Lee and Faff (2009), and Bouslah et al. (2018), the firms of non-financial sectors start to improve their information and performances, which leads to positive responding by investors and a decrease in their firm risk (unsystematic risk). Based on this finding, the hypotheses of prospect theory and signaling concept are accepted for firms of non-financial sectors.

The period from March 2, 2020 to March 31, 2020, or the third period, is such of the peak of market uncertainty, when the first case of Covid-19 is announced. But the third period is also the starting point towards market stability as the Indonesian government takes many recovery actions in economics, especially monetary policy and fiscal policy. The correlation result shows that the relationship between systematic risks and stock returns is negative and significant both for financial and non-financial sectors. This indicates that most investors are uniformly risk averse, which is consistent with prospect theory of Fiegenbaum and Thomas (1988), Beal et al. (2005), Grinblatt and Han (2005), Shen and Chih (2005), Daniel and Hirshleifer (2015), and Barberis et al. (2016). This finding also indicates that since stock returns in the descriptive statistics are negative for financial sectors and non-financial sectors, then low earning investors are less likely to catch the target earnings in this period. Based on this finding, the prospect theory hypothesis is accepted both for financial and non-financial sectors. In addition, the relationship between stock returns

and idiosyncratic risk is positive and significant both for financial and non-financial sectors. Based on this result, the findings are consistent with the signaling theory of Ross (1977), Fama (1970, 1998), and Malkiel (2003), both for financial and non-financial sectors with two assumptions. The first follows Shubiri and Jamil (2018), where most investors require firms to improve their performances, the second follows Liu and Di Iorio (2016) that investors do not diversify their portfolios well enough due to lack of information. The third period is interesting, where two important triggers, such as the Covid-19 issue and government regulations, play the main role in the capital market. Around this period, the Indonesian media intensively serve the information about stock price fluctuations related to those triggers as suggested by OuYang et al. (2017). Thus, the second assumption can be accepted if investors do not diversify well their portfolios with given information. Overall, the finding on the third period follows Bozhkov et al. (2018) that positive correlation of idiosyncratic risk and stock returns normally exists under abnormal conditions.

From April 1, 2020 to April 30, 2020, or the fourth period, the relationship between systematic risk and stock returns is positive and significant only for firms of non-financial sectors, which is consistent with efficient market theory. These findings are in line with Markowitz (1952), Fama and MacBeth (1973), Harvey (1989), Frazzini and Pedersen (2014), Mollik and Bepari (2015), Aliu et al. (2017), Wolski (2017), Stålnacke (2019), Budiarto and

Pontoh (2019), and Vo et al. (2019), which means that the hypothesis of efficient market theory in case of non-financial sectors is accepted. Attention should be paid to the argument of Malkiel (2003); this study assumes that psychological factor plays a significant role in the capital market and holds in the short run. Descriptive statistics shows that the mean of stock returns in the fourth period is positive, which reflects that the economic stimulation by monetary policy and fiscal policy work effectively to increase optimism of investors about market certainty. In addition, the insignificant relationship between unsystematic (idiosyncratic) risk and stock returns for this period supports the assumption about investor's optimism about firm risk.

#### 4.2. The effect of trigger events

This study provides comparisons to complement the explanation on each period in relation to other periods. For financial sectors, the results show that the fourth period has higher stock returns and risks (both systematic and unsystematic). The findings show that the impact of the Covid-19 pandemic on stock returns and unsystematic risk in the capital market for inter-periods such as pair 1 is small indeed. But after the second period, government policies to offset the pandemic issue are actually successful to stimulate the market and lead to moderate effect for systematic risk in the capital market in the third period. Similarly, the findings show that trigger events also have a moderate effect on systematic risk of non-financial sector firms in the third period.

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## CONCLUSION

The relationship between systematic risk and stock returns during the Covid-19 pandemic is changing. This study shows that investors are beginning to be wary of Covid-19 from January 2020 to the end of February 2020. During this period, the capital market becomes more risky when the mental accounting arises for most investors. As a result, negative and significant relationships between systematic risks and stock returns occurs mostly non-financial sectors as suggested by prospect theory. The circumstance continues until the end of March 2020, as in previous periods, and the Indonesian government takes measures such as monetary policy and fiscal policy. Indonesian government policies have a greater impact on the capital market as investors have stable conditions in April 2020. As a result, a positive and significant relationship between systematic risk and stock return is observed primarily in non-financial sectors as suggested by efficient market theory. This study also reports that investors are more stable firms in financial sectors except for the third period.

Other results suggest that the relationship between unsystematic risk and stock return implies that signaling theory is also able to explain the phenomena during the Covid-19 pandemic in financial sectors and non-financial sectors, especially in the third period. During the third period, the Covid-19 pandemic increased the firm risk, which indicates that each increase in share prices reflects the investors' demand for firms to increase their performance. This study limits discussions to stock returns, systematic and unsystematic risk during the Covid-19 pandemic. The study also does not sort the sample by sub-specific industry, assuming that investor responses to public firms in capital markets are homogeneous. Further research may expand more variables to complement explanations for the relationship between risk (systematic and unsystematic) and stock returns.

## AUTHOR CONTRIBUTIONS

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## REFERENCES

1. Aliu, F., Pavelkova, D., & Dehning, B. (2017). Portfolio risk-return analysis: The case of the automotive industry in the Czech Republic. *Journal of International Studies*, 10(4), 72-83. <https://doi.org/10.14254/2071-8330.2017/10-4/5>
2. Bali, T., & Cakici, N. (2008). Idiosyncratic volatility and the cross section of expected returns. *Journal of Financial and Quantitative Analysis*, 43(1), 29-58. <https://doi.org/10.1017/S00221090000274X>
3. Barberis, N. C. (2013). Thirty years of prospect theory in economics: A review and assessment. *Journal of Economic Perspectives*, 27(1), 173-96. <https://doi.org/10.1257/jep.27.1.173>
4. Barberis, N., Mukherjee, A., & Wang, B. (2016). Prospect theory and stock returns: An empirical test. *The Review of Financial Studies*, 29(11), 3068-3107. <https://doi.org/10.1093/rfs/hhw049>
5. Beal, D. J., Goyen, M., & Philips, P. (2005). Why do we invest ethically? *The Journal of Investing*, 14(3), 66-78. <https://doi.org/10.3905/joi.2005.580551>
6. Bouslah, K., Kryzanowski, L., & M'Zali, B. (2018). Social performance and firm risk: Impact of the financial crisis. *Journal of Business Ethics*, 149, 643-669. <https://doi.org/10.1007/s10551-016-3017-x>
7. Bozhkov, S., Lee, H., Sivarajah, U., Despoudi, S., & Nandy, M. (2018). Idiosyncratic risk and the cross-section of stock returns: The role of mean-reverting idiosyncratic volatility. *Annals of Operations Research*, 1-34. <https://doi.org/10.1007/s10479-018-2846-7>
8. Budiarmo, N., & Pontoh, W. (2019). Does maturity signals high risk and high return? *Indonesia Accounting Journal*, 1(1), 1-5. <https://doi.org/10.32400/iaj.25404>
9. Daniel, K., & Hirshleifer, D. (2015). Overconfident investors, predictable returns, and excessive trading. *Journal of Economic Perspectives*, 29(4), 61-88. <https://doi.org/10.1257/jep.29.4.61>
10. Dreman, D. N., & Lufkin, E.A. (2000). Investor overreaction: Evidence that its basis is psychological. *The Journal of Psychology and Financial Markets*, 1(1), 61-75. [https://doi.org/10.1207/S15327760JPFM0101\\_06](https://doi.org/10.1207/S15327760JPFM0101_06)
11. Fama, E. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), 383-417. <https://doi.org/10.2307/2325486>

12. Fama, E. (1991). Efficient capital markets: II. *The Journal of Finance*, 46(5), 1575-1617. <https://doi.org/10.2307/2328565>
13. Fama, E. (1998). Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics*, 49(3), 283-306. [https://doi.org/10.1016/S0304-405X\(98\)00026-9](https://doi.org/10.1016/S0304-405X(98)00026-9)
14. Fama, E., & MacBeth, J. (1973). Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy*, 81(3), 607-636. <https://doi.org/10.1086/260061>
15. Fiegenbaum, A., & Thomas, H. (1988). Attitudes toward risk and the risk-return paradox: Prospect theory explanations. *The Academy of Management Journal*, 31(1), 85-106. <https://doi.org/10.5465/256499>
16. Frazzini, A., & Pedersen, L. H. (2014). Betting against beta. *Journal of Financial Economics*, 111(1), 1-25. <https://doi.org/10.1016/j.jfineco.2013.10.005>
17. Grinblatt, M., & Han, B. (2005). Prospect theory, mental accounting, and momentum. *Journal of Financial Economics*, 78(2), 311-339. <https://doi.org/10.1016/j.jfineco.2004.10.006>
18. Harvey, C. (1989). Time-varying conditional covariances in tests of asset pricing models. *Journal of Financial Economics*, 24(2), 289-317. [https://doi.org/10.1016/0304-405X\(89\)90049-4](https://doi.org/10.1016/0304-405X(89)90049-4)
19. Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263-291. <https://doi.org/10.2307/1914185>
20. Lee, D., & Faff, R. (2009). Corporate sustainability performance and idiosyncratic risk: A global perspective. *The Financial Review*, 44(2), 213-237. <https://doi.org/10.1111/j.1540-6288.2009.00216.x>
21. Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistics*, 47(1), 13-37. <https://doi.org/10.2307/1924119>
22. Liu, B., & Di Iorio, A. (2016). The pricing of idiosyncratic volatility: An Australian study. *Australian Journal of Management*, 41(2), 353-375. <https://doi.org/10.1177/0312896214541554>
23. Malkiel, B. G. (2003). The efficient market hypothesis and its critics. *Journal of Economic Perspectives*, 17(1), 59-82. <https://doi.org/10.1257/089533003321164958>
24. Markowitz, H. (1952). Portfolio selection. *The Journal of Finance*, 7(1), 77-91. <https://doi.org/10.2307/2975974>
25. Mollik, A., & Bepari, M. (2015). Risk-return trade-off in emerging markets: Evidence from Dhaka Stock Exchange Bangladesh. *Australasian Accounting, Business and Finance Journal*, 9(1), 71-88. <http://dx.doi.org/10.14453/aabfj.v9i1.6>
26. OuYang, Z., Xu, J., Wei, J., & Liu, Y. (2017). Information asymmetry and investor reaction to corporate crisis: Media reputation as a stock market signal. *Journal of Media Economics*, 30(2), 82-95. <http://dx.doi.org/10.1080/08997764.2017.1364256>
27. Ross, S. (1977). The determination of financial structure: The incentive-signalling approach. *The Bell Journal of Economics*, 8(1), 23-40. <https://doi.org/10.2307/3003485>
28. Shen, C., & Chih, H. (2005). Investor protection, prospect theory, and earnings management: An international comparison of the banking industry. *Journal of Banking & Finance*, 29(10), 2675-2697. <https://doi.org/10.1016/j.jbankfin.2004.10.004>
29. Shubiri, F., & Jamil, S. (2018). The impact of idiosyncratic risk of banking sector on oil, stock market, and fiscal indicators of Sultanate of Oman. *International Journal of Engineering Business Management*, 10, 1-8. <https://doi.org/10.1177/1847979017749043>
30. Stålnacke, O. (2019). Individual investors' information use, subjective expectations, and portfolio risk and return. *The European Journal of Finance*, 25(15), 1351-1376. <https://doi.org/10.1080/1351847X.2019.1592769>
31. Vo, D. H., Pham, T. N., Pham, T. T. V., Truong, L. M., & Nguyen, T. C. (2019). Risk, return and portfolio optimization for various industries in the ASEAN region. *Borsa Istanbul Review*, 19(2), 132-138. <https://doi.org/10.1016/j.bir.2018.09.003>
32. Wolski, R. (2017). Risk and return in the real estate, bond and stock markets. *Real Estate Management and Valuation*, 25(3), 15-22. <https://doi.org/10.1515/remav-2017-0018>