p-ISSN: 2723-660 e-ISSN: 2745-5254
Vol. 5, No. 11, November 2024
JIST
http://jist.publikasiindonesia.id/

Comparative Analysis of Risk Premium and Stock Market Returns in Indonesia: A Case Study of Normal and COVID-19 Pandemic Periods

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Keywords: Risk Premium; Return Pasar; COVID-19; GARCH (1,1)

ABSTRACT

This research examines the effect of market risk premium (risk premium) on market returns (JCI). In addition, this study aims to see the effect of premium risk on market returns during the COVID-19 Pandemic. The data used in this study is secondary (JCI data and Deposit Interest Rates) for the period January 2010 – September 2023. The method used in this study is the GARCH method (1.1). The results of this study show a positive and significant influence of risk premium on market returns (JCI). During the COVID-19 Pandemic, risk premiums negatively and significantly affected JCI returns or the Indonesian stock market.

Introduction

Volatility is a measure that describes the degree of variation or fluctuation in a value, usually in the context of the price of a financial asset such as stocks, bonds, or currencies. Volatility also reflects changes in the value of stocks, often used to measure the uncertainty associated with returns. In the financial world, a high level of volatility indicates excellent risk but also opens up opportunities for high returns (Firmansyah, 2006; Mukmin & Firmansyah, 2020). Understanding asset volatility is critical for investors aiming to manage portfolios effectively and achieve optimal investment returns.

In addition to volatility, the concept of risk premium is central to financial decision-making. Risk premium represents the additional compensation investors expect for taking on higher risks compared to risk-free assets. This metric becomes even more vital during periods of economic uncertainty, such as the COVID-19 pandemic. In Indonesia, the pandemic caused unprecedented market volatility, which highlighted the critical importance of risk premium in guiding investment strategies.

In the financial economy, aggregate stock market volatility is used as an economic indicator of government policy. Fund managers often consider risk premiums and volatility when determining asset allocation, using efficient limit estimation (Manurung, 1997). Annin and Dominic (1998) explained that the equity risk premium is an additional return investors receive as compensation for their willingness to take on higher stock investments than the average risk.

Estimating volatility and analysing its relationship to equity risk premiums has become the focus of research in the financial sector. *The Capital Asset Pricing Model* (CAPM), as expressed by Sharpe (1964), Lintner (1965), and Black (1976), highlights the positive relationship between risk or volatility and the expected return of a security. Manurung's (1997) research found a positive relationship between market volatility and market risk premiums, although the difference was insignificant from zero.

Research on volatility has been widely conducted by previous researchers, such as Banumathy & Azhagaiah (2015), who examined the stock market in India; Lin (2018), who examined stock volatility in China using the GARCH model; Nghi & Kieu (2021) who analysed stocks in Japan and Vietnam, and Yahaya et al. (2023) who investigated stock volatility in Nigeria (NGX). Meanwhile, research on risk premiums has been conducted by Morawakage et al. (2019) and Yue et al. (2023)

However, research specifically addressing risk premiums in emerging markets remains limited. The current study fills this gap by examining the relationship between market equity premiums and volatility in Indonesia, particularly during the pandemic period. This focus provides valuable insights into how emerging markets respond to global crises and informs investment strategies in similar contexts.

Moreover, the urgency to understand the role of risk premiums in Indonesia is underscored by the need to stabilize financial markets amidst heightened uncertainty. Risk premiums offer a lens through which investors can evaluate the trade-offs between potential returns and associated risks. The insights from this study aim to contribute to more resilient market strategies, enabling stakeholders to navigate both current and future economic challenges effectively.

In this article, we employ the GARCH (1,1) model to analyze the relationship between market risk premiums and volatility in the Indonesia Stock Exchange (IDX). By doing so, the study seeks to provide a comprehensive understanding of how these variables interact under normal and crisis conditions, with implications for broader economic resilience and investor confidence.

Methods

This research uses daily closing price data from the Jakarta Composite Stock Price Index (JCI) listed on the Indonesia Stock Exchange. The index is weighted and includes all stocks listed on the IDX, with the daily closing price used to calculate the composite index. The data sample used in this study includes JCI with daily time series data from January 1, 2010, to December 31, 2023. Stock trading on the regular market is done five working days a week. Data is collected by downloading daily composite stock price index price index information from *the Yahoo Finance website*.

Data

Composite Stock Price Index (JCI)

The Jakarta Composite Stock Price Index (JCI) is an indicator that describes the movement of stock prices (Gumanti, 2011). The index also functions as an indicator of market trends, meaning that the movement of the index describes the condition of the market at a particular time, whether the market is active or sluggish (Mukmin, 2015). JCI can be calculated by the following formula (Tobing and Manurung 2008)

$$IHSG_t = \frac{\sum_{i=1}^{n} Q_{0,i} P_{t,i}}{\sum_{i=1}^{n} Q_{0,i} P_{t,i}}$$

In this case:
$IHSG_t$ = Composite Stock Price Index in the period t.
$Q_{0,i}$ = Number of Shares Listed for the ith share in the basis period (0)
$P_{t,i}$ = Stock price to 1 in the period t.
$P_{t-1,i}$ = Stock price to 1 in the period t-1.

Return of the Composite Stock Price Index (JCI)

Return is the total profit or loss from an investment over time. Monthly *returns* are chosen to calculate volatility based on daily data. Market *returns* are calculated as follows (Manurung, 1997) :

$$R_m = Ln(\frac{I_t}{I_{t-1}}) \quad (5)$$

Where:
I_t = Market indices at the end of the month t
I_{t-1} = Pasae index at the end of the month t-1

The natural log is used to determine the continuously combined returns.

Risk Premium

The risk premium is the difference between the market yield and the risk-free interest rate and is calculated as follows (Manurung, 1997)

$$R_{mt} - R_{it} = \gamma\sigma_t^2 + e_t \quad (4)$$

Where,
R_{mt} = Stock yield for the period i
R_{it} = Risk-free interest rate (3-month term deposit rate at the beginning of the month t)
σ_t^2 = Monthly volatility

The interest rate data is based on the current 3-month deposits from Bank Indonesia.

Volatility

The calculation of monthly volatility is based on the daily stock returns. The standard deviation of the sample is employed to quantify historical volatility. The formula for the standard deviation or volatility, derived from the sample of n observations of the R (return) variable, is as follows: (Manurung, 1997)

$$Volatilitas = \sqrt{\frac{\sum_{t-1}^{n}(R_i - \bar{R})^2}{n-1}} \quad (6)$$

Where
Ri = Stock yield for period i
R = Average stock yield over a period
n = Number of Observations

COVID-19 Pandemic

The COVID-19 pandemic in Indonesia officially began on March 2, 2020, and ended on June 21, 2023. So, in this study, the COVID-19 pandemic data starts from March 2022 and ends in June 2023 by providing the number 1 for the months of the COVID-19 Pandemic and the number 0 for the months that are not the COVID-19 Pandemic.

ARCH-GARCH

Heteroscedasticity describes the change in volatility over a time horizon. One of the models to overcome heteroscedasticity is the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) proposed by Bollerslev (1986)

The ARCH model was initially developed by (Engle, 1982). ARCH Declare under the random variable Y, taken from the conditional density function $f(y/y_1 - 1)$, Then the estimated value of today depends on past performance, for example, as follows:

$$Y_t = \gamma\, y_{t-1} + \xi_t \quad (1)$$

Where,
E(ξ_t) = 0
and variants of ξ_t = σ_t^2

$$\sigma_t^2 = \omega + \sum_{i=1}^{i=q} \beta_i\, \xi_{t-1}^2 \quad (2)$$

The above equation is called ARCH (q). This reveals that the conditional variance changes the time siring as a function of past errors, leaving a constant unconditional variance (W).

Bollerslev (1986) extended the ARCH(q) model to what is called GARCH(p,q). GARCH (p,q) is formulated as follows:

$$\sigma_t^2 = \omega + \sum_{i=1}^{p} \beta_i\, \sigma_{t-1}^2 + \sum_{i=1}^{q} \alpha_1 \xi_{t-1}^2 + \delta_t \quad (3)$$

This context is a conditional variance that changes over time as a function of past errors and past conditional variances. (Bollerslev, 1986) notes that α_1 and β_i must be positive in the GARCH (1,1) process (to produce that all σ_t^2Is positive.

Results and Discussion

Table 1 illustrates the twenty lowest and highest daily rates of return over the specified sample period. The lowest daily rate of return was observed in September, while the highest was observed in March. In 2011, JCI experienced a significant correction due to investor concerns about the potential for debt defaults in European countries, including Greece, Portugal, and Spain.

Table 1. Twenty Lowest and Highest Daily Returns From January 2010 to September 2023

	Lowest Daily Return (%)		Highest Daily Return (%)	
1	22 September 2011	-8,88	26 March 2020	10,19
2	09 March 2020	-6,58	26 May 2010	7,27
3	03 October 2011	-5,64	27 March 2020	4,76
4	19 August 2013	-5,58	27 September 2011	4,76
5	19 March 2020	-5,20	19 September 2013	4,65
6	12 March 2020	-5,01	27 August 2015	4,55
7	10 September 2020	-5,01	06 October 2011	4,55
8	17 March 2020	-4,99	06 April 2020	4,07
9	23 March 2020	-4,90	10 May 2010	4,06
10	05 August 2011	-4,86	10 September 2013	3,98
11	19 August 2011	-4,43	15 September 2010	3,90
12	16 March 2020	-4,42	26 June 2013	3,82
13	09 May 2022	-4,42	16 June 2020	3,53
14	10 January 2011	-4,21	01 February 2021	3,50
15	11 November 2016	-4,01	17 April 2020	3,44
16	24 August 2015	-3,97	10 August 2011	3,44
17	04 June 2012	-3,82	16 September 2013	3,35
18	05 May 2010	-3,81	14 June 2013	3,32
19	05 September 2018	-3,76	06 June 2012	3,32
20	27 August 2013	-3,71	30 April 2020	3,26

Source: Yahoo Finance, Data processed, 2024

In March 2020, the highest daily returns were recorded on two occasions. This can be attributed to the policy stimulus implemented by the government and central banks in response to the global health crisis caused by the COVID-19 pandemic. In monetary policy, the central bank engages in quantitative easing by purchasing government securities, which exerts an influence on capital market performance. Furthermore, government fiscal stimulus in the form of assistance to businesses also contributes to supporting capital market performance.

Figure 1. Composite Stock Price Index 2010 – 2023

Source: Indo Premier Sekuritas, 2024

Figure 1 shows the movement of the Composite Stock Price Index (JCI). It can be seen that the JCI from 2010 to 2023 shows an upward trend. Although it shows an upward trend, the JCI has volatility in the short term, which can be seen in several periods of JCI experiencing weakness or correction quite deeply, especially during the COVID-19 Pandemic period, namely 2020-2021. Then, JCI was able to recover again in the next period.

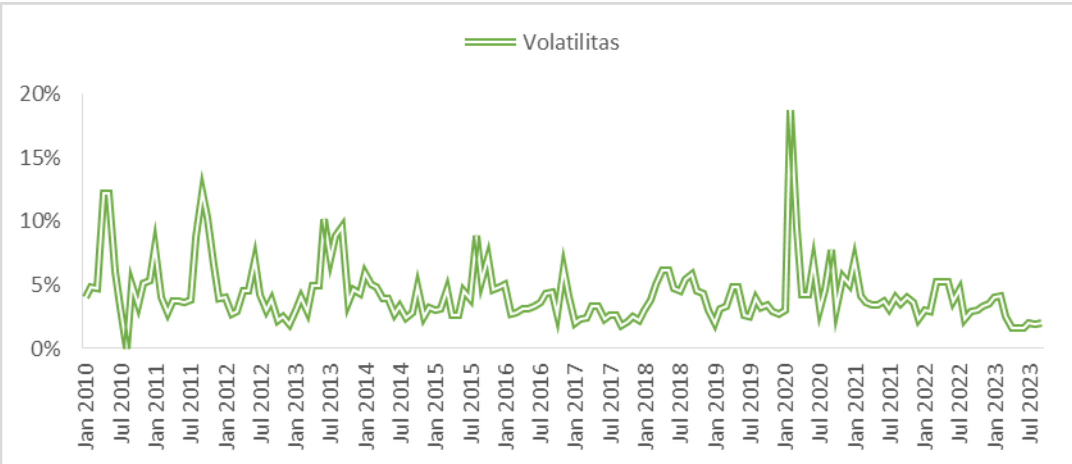

Figure 2. Monthly Volatility of the Indonesia Stock Exchange 2010 – 2023

Source: Yahoo Finance, Data processed 2024

Figure 2 illustrates the monthly volatility pattern of daily market returns from 2010 to 2023. The figure depicts a pronounced peak in March 2020, indicating that the market index exhibited a significant decline and subsequent doubling in that month. After

March 2020, volatility demonstrated a relatively modest decline, persisting until the conclusion of the research period in April 2021.

Descriptive Statistics

Table 2 depicts the descriptive statistics of the calculated risk premium for the Indonesian market and presents the results corresponding to the Jarque-Bera test for normality.

Table 2. Descriptive Statistics,

Mean	0.11%
Median	-0.34%
Maximum	24.01%
Minimum	-13,54%
Std. Deviasi	5.67%
Skewness	0.663
Kurtosis	4.86
Jarque-Bera	35.77
Probability	0.000
Statistik Uji ADF	-18.675***
Uji ARCH LM F-Stat	55.67***

Note: *** is significant at the 5% level

The mean daily risk premium in Indonesia is positive at 0.11%. The risk premium in Indonesia suggests a relatively greater degree of unconditional volatility, as indicated by standard deviations. The Indonesian market (IDX) exhibited positive skewness and leptokurtosis during the sample period, indicating a departure from the normal distribution. The Jarque-Bera test also corroborates the presence of an anomalous stimulus in risk premiums. A notable kurtosis coefficient signifies a leptokurtic risk premium within the market. Each risk premium evinces stationarity based on the outcomes of the ADF test in Table 2. Moreover, the ARCH LM test indicates a substantial heteroscedasticity in the risk premium. Therefore, there is conditional volatility that fluctuates over time.

Data Stationary Test Results

Before modelling the relationship between risk premium and JCI returns, testing the stationarity of each variable is necessary. Stationery testing can be carried out using *the Unit Root Test* using Augmented Dickey-Fuller (ADF), by using JCI and Risk Premium Retun data; the ADF test can be seen as follows:

Table 3. Test Augmented Dickey-Fuller (ADF) Data Return IHSG

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.97451	0.0000
Test critical values:	1% level	-3.470427	

	5% level	-2.879045	
	10% level	-2.576182	

Source: Eviews 2010

From the table above, it can be seen that the JCI Return has been stationary at the level level. The probability value of JCI Return is 0.0000 < 0.05, which is significant to the real level of 5%.

While the premium risk data shows stationary at the First Difference level, here is the ADF test on premium risk data:

Table 4. Test Augmented Dickey-Fuller (ADF) Data Risk Premium

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.428832	0.0000
Test critical values:	1% level	-3.470679	
	5% level	-2.879155	
	10% level	-2.576241	

Source: Eviews 2010

Dari table 4 di atas dapat dilihat bahwasanya data risk premium stasioner pada first difference, dimana probabilitas risk premium sebesar 0.0000 < 0.05 yang signifikan terhadap taraf nyata 5%.

GARCH Analysis (1.1)

Before estimating the GARCH model, there is a need to determine whether the ARCH effect in the risk premium and JCI return characterizes the series. (Engle, 1982) has introduced the concept that variance depends on the square of the error of the period left by one period. The volatility of the data indicates that the estimated results are affected by the symptoms of the ARCH effect. The following are the results of the JCI risk premium and return heteroscedasticity test:

Table 5. ARCH Heteroscedasticity Test

Heteroskedasticity Test: ARCH			
F-statistic	0.002019	Prob. F(1,161)	0.9642
Obs*R-Squared	0.002045	Prob. Chi-Square (1)	0,9639

Source: Eviews 2010

Using the ARCH LM Test, Prob was obtained. With a Chi-Square of 0.9639 > 0.05 at a confidence level of 5%, it can be said that the model does not have an ARCH *effect*. Thus, the GARCH model estimation (1,1) can be used.

There is no ARCH effect after the JCI return data and *risk premium* are stationary and the GARCH model (1,1). The GARCH (1,1) model can already be interpreted. The following is a table of the results of the GARCH (1.1) model for JCI return data and *risk premium* for the 2010-2023 period:

Table 6. GARCH Model Results (1.1) JCI Return Data and Premium Risk

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.004263	0.003036	1.403898	0.1603
D(RISK_PREMIUM)	0.038322	0.014643	2.616993	0.0089
(PANDEMI)	-0.080907	0.014014	-5.773494	0.0000
Variance Equation				
C	8.16E-05	5.84E-05	1.396608	0.1625
RESID (-1)^2	0.063108	0.037987	1.661326	0.0966
GARCH (-1)	0.864729	0.062818	13.76555	0.0000
R-squared	0.118688	Mean dependent var		0.006798
Adjusted R-squared	0.107740	S.D. dependent var		0.040312
S.E. of regression	0.038079	Akaike info criterion		-3.724669
Sum squared resid	0.233449	Schwarz criterion		-3.611260
Log-likelihood	311.4229	Hannan-Quinn critter.		-3.678629
Durbin-Watson stat	1.906381			

Source: Eviews 2010

Table 5 shows the GARCH model (1.1) with an R-squared of 0.118688 and an AIC of -3.724669. The table shows that the risk premium variable has a positive and significant effect on the JCI return with a coefficient of 0.038322 and a prob of 0.0089 < 0.05 with a confidence level of 5%. Meanwhile, the effect of the risk premium during the COVID-19 pandemic on JCI returns had a negative and significant effect with a coefficient of -0.080907 and a prob of 0.0000 < 0.05 with a confidence level of 5%. This research aligns with several studies on the influence of premium risk on market returns. (Banumathy & Azhagaiah, 2015) on the stock market in India (Lin, 2018) testing stock volatility in China (Nghi & Kieu, 2021) on Japanese and Vietnamese stocks, Prameswari and Manurung (2024) on the Indonesian stock market and (Ahmed Yahaya et al., 2023) investigate on the volatility of stocks in Nigeria (NGX). Meanwhile, research on risk premiums was carried out by (Morawakage et al., 2019) and (Yue et al., 2023).

Conclusion

This study aims to determine the effect of premium risk on market returns (JCI) and also to examine how the effect of premium risk on JCI returns during the COVID-19 Pandemic. The method used in this study is GARCH (1,1). Based on the study's results, there is a positive and significant influence between risk premium and JCI return with a coefficient of 0.038322 and a prob of 0.0089 < 0.05 with a confidence level of 5%. Meanwhile, during the Pandemic, the risk premium had a negative and significant effect on the JCI return of -0.080907 and the prob of 0.0000 < 0.05 with a confidence level of 5%.

The following suggestion is that further research needs to be conducted to examine the relationship between risk premium and JCI return by adding other variables that influence JCI returns. Then, it is necessary to do the same using methods different from the author's. The researcher should compare several methods to see the influence of various methods on the relationship between risk premium and JCI return.

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