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Risk Premium and Volatility Analysis on the Indonesia Stock Exchange

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ABSTRACT

Market risk premium and market volatility are essential in investment decisions. Volatility is a vital variable in derivative securities that measures changes in stock returns. The research focuses on stock return volatility, research that points to a risk premium in emerging markets. This study aims to explain the relationship between market equity premium and volatility using GARCH (1.1) on the Indonesia Stock Exchange. This research uses daily closing price data of the Indonesia Stock Exchange Composite Index (JCI). The result of this study is that there is a relationship between risk premium and volatility in the Indonesian stock market. This study's conclusion is to test whether there is a relationship between the volatility of return and risk premium in the Indonesian stock market. Using the daily trend of the Indonesian stock market (IDX) from January 2010 to September 2023.

Introduction

Uncertainty is a condition that occurs due to high financial fluctuations, thus creating a situation where economic actors cannot predict what will happen in the future. The uncertainty associated with returns can often be observed through levels of volatility. In a financial context, volatility reflects fluctuations or changes in the value of a stock and indicates the risks investors face. High volatility is a characteristic of high risk and high potential returns. Understanding the volatility of an investment asset gives investors the insight to manage their portfolios more closely and achieve optimal investment returns.

Market risk premium and market volatility are essential in investment decisions. Volatility is a vital variable in derivative securities that measures changes in stock returns. Aggregate stock market volatility has been used as an economic indicator by financial economics concerned with government policy. Fund managers usually pay attention to risk premiums and volatility when determining asset allocation through efficient limit estimation (Manurung, 1997). Annin & Falaschetti (1998) define the equity risk premium

as the extra return an investor gets in return for his willingness to bear the risk of a stock investment above the average risk.

Estimating volatility and analysing the relationship with equity risk premiums has become an area of financial research. The observations of Manurung (1997) show that market volatility has a positive relationship with the market risk premium, but there is no significant difference with zero.

Research on volatility has been conducted by previous researchers conducted by Banumathy & Azhagaiah (2015) on the stock market in India (Lin, 2018) tested stock volatility in China using the GARCH model (Nghi & Kieu, 2021) on Japanese and Vietnamese stocks, and (Yahaya et al., 2023) delves into stock volatility in Nigeria (NGX). Meanwhile, research on risk premiums was, among others, conducted by (Morawakage et al., 2019) and (Yue et al.

While many studies have focused on the volatility of stock returns, research on the risk premium in emerging markets has been limited. As such, this research is new and vital in examining emerging markets volatility and risk premiums, which can aid better decision-making for investors. Overall, the study opens up new lines of research to investigate emerging market volatility and risk premiums. This article examines the relationship between market equity premium and volatility using GARCH (1.1) on the Indonesia Stock Exchange (IDX).

Volatility is a statistical measurement that measures price fluctuations of a security or commodity in a certain period. Since volatility can be represented by standard deviation, the public also considers volatility as a form of risk. The higher the level of volatility, the greater the uncertainty associated with the return that can be obtained from stocks. Stocks included in the price index face a dynamic market, considering market participants can quickly enter or leave the market (Mukmin & Firmansyah, 2015).

Thus, we can conclude that volatility is a variation in stock movements that can be measured by standard deviation, reflecting an unstable nature and difficult to predict.

Equity Risk Premium (ERP) has been the focus of attention in asset pricing literature over a long period due to its significant role in determining the expected rate of return on investment. Annin & Falaschetti (1998) focused on ERP by introducing the "ERP puzzle." Their research proved that historical ERP was substantially larger than could be rationalised using United States data from 1889 to 1978. However, studies using more recent data from the United States market show different results with such ERP. Further, the relationship between expected returns and volatility has been shown to have a negative or insignificant correlation. However, the observations of Manurung's (1997) research show that market volatility has a positive relationship with the market risk premium but does not show a significant difference. Meanwhile, (Morawakage et al. show that there is no direct relationship between volatility and risk premium.

Research Methods

This research uses daily closing price data of the Indonesia Stock Exchange Composite Index (JCI). This index has a weighted value and includes all stocks listed on

the IDX. The daily closing price is used to calculate the composite index. Meanwhile, the data sample taken in this study is only the Composite Stock Price Index (JCI) based on time series data per day from January 2, 2010, to September 30, 2023. The effective day of regular market stock trading is five business days in one week. Data collection is done by downloading daily composite stock price index data on the Yahoo Finance website.

ARCH-GARCH

The ARCH model was initially developed by Engle (1982). ARCH expresses that under the random variable y, taken from the conditional density oneuoneconeionononenononone$f(\mathrm{y}/y_1 - 1)$, eestimatedvalueoof todayedependsonpaseperformanceoreeileaan s oallows$Y_t + \xi_t$ ……. (1) Where, thethe E(ξ_t) n oneoneri dari $\xi_t = \sigma_t^2 \sigma_t^2 = \omega + \sum_{i=1}^{i=q} \beta_i \xi_{t-1}^2$ ……. (2)

The above equation is called ARCH(q). This reveals that conditional variance changes over time due to past errors, leaving a constant unconditional variance (W).

Ow: $Siga\sigma_t^2 = \omega + \sum_{i=1}^{p} \beta_i \sigma_{t-1}^2 + \sum_{i=1}^{q} \alpha_1 \xi_{t-1}^2 + \delta_t$ ……. (3)

This context is the conditional variance that changes over time as a function of past error and past conditional variance. et al. (1986) Note that alpha sub one and beta sub, i., end subscript must be positive in the GARCH process (1,1) (to produce that all sigma sub t squared is positive.

The risk premium is the difference between market returns and risk-free interest rates and led: $CR_{mt} - R_{it} = \gamma\sigma_t^2 + e_t$ ……. (4)

Where,

R_{mt} = Stock returns for the i period

R_{it} = Risk-free interest rate (3-month term deposit rate at the beginning of the month t)

σ_t^2 = Monthly volatility

Interest rate data is based on the current 3-month term deposits from Bank Indonesia. *Return* is the total gain or loss from an investment over time. *Monthly returns* are chosen to calculate volatility based on daily data. Marke returns are calculated as follows: $CapR_mL(\frac{I}{I_{t-1}})$ ……. (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

Natural logs are used to determine continuously *coupled returns.*

Monthly volatility is calculated from daily stock returns. The standard deviation of the sample I used to measure historical volatility. The formula for standard deviation volatility measured from sampl n observations of the variable R (*return*) is calculated as follows (Manurung, 1997)$CapVolatilooneas = \sqrt{\frac{\sum_{t-1}^{n}(R_i - \bar{\mathrm{R}})^2}{n-1}}$ ……. (6)

Where,

R_i = Stock returns for the i period

R = Average stock returns over a period

n = Number of Observations

Results and Discussion

Table 1 shows the lowest and highest daily returns during the sample period. September saw the lowest daily return, and March showed the highest return. A significant correction in JCI had occurred in 2011. The potential default on debt of European countries such as Greece, Portugal, and Spain is said to cause investor anxiety.

In addition, the highest daily returns occurred twice in March 2020. The most crucial factor is the policy stimulus implemented by the government and central bank during the Covid-19 pandemic. In the context of monetary policy, the central bank conducts quantitative easing by buying securities issued by the government. This easing can affect the performance of a country's capital market. The government's fiscal stimulus policy on the economy is in the form of business assistance. These two stimuli can ultimately support capital market performance.

Table 1
Twenty Daily Return Lows and Highs
From January 2010 to September 2023

	Lowest Daily Return (%)		Highest Daily Return (%)	
1	22 September 2011	-8,88	March 26, 2020	10,19
2	09 March 2020	-6,58	26 From 2010	7,27
3	03 October 2011	-5,64	March 27, 2020	4,76
4	August 19, 2013	-5,58	27 September 2011	4,76
5	March 19, 2020	-5,20	19 September 2013	4,65
6	March 12, 2020	-5,01	27 August 2015	4,55
7	10 September 2020	-5,01	06 October 2011	4,55
8	March 17, 2020	-4,99	06 April 2020	4,07
9	March 23, 2020	-4,90	10 of 2010	4,06
10	05 August 2011	-4,86	10 September 2013	3,98
11	August 19th, 2011	-4,43	15 September 2010	3,90
12	March 16, 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

	Lowest Daily Return (%)		Highest Daily Return (%)	
16	24 August 2015	-3,97	August 10th, 2011	3,44
17	04 June 2012	-3,82	16 September 2013	3,35
18	05 From 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: Processed Data, 2024

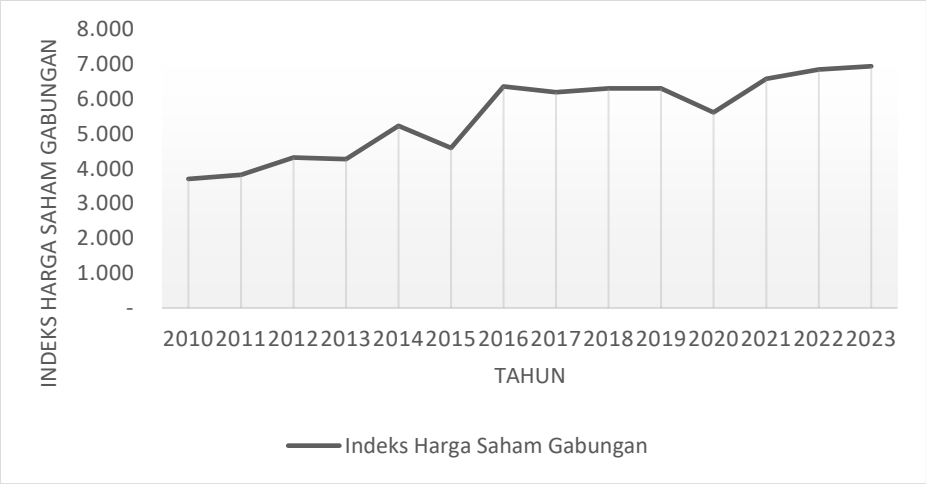

Figure 1
Composite Stock Price Index 2010 – 2023 (September)

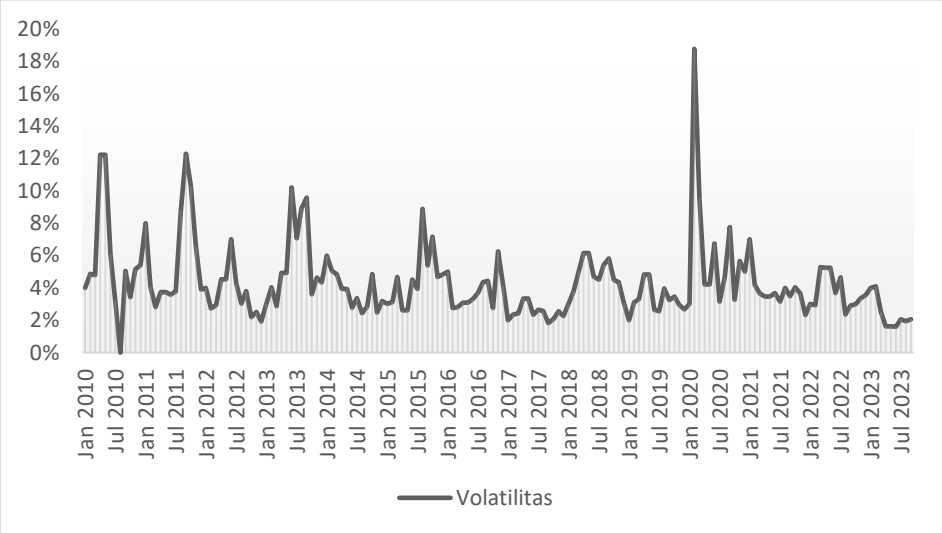

Figure 2
Indonesia Stock Exchange Monthly Volatility 2010 – 2023 (September)

Figure 2 presents the volatility pattern of daily market monthly returns from 2010 to September 2023. The figure shows a high peak in March 2020, reflecting that the market index fell dramatically and sharply doubled in the month. After March 2020, volatility tended to decline, relatively small from April 2021 until the end of the study period.

Descriptive Statistics

Table 2 illustrates the descriptive statistics of the calculated risk premium for the Indonesian market. Results corresponding to the Jarque-Bera test for normality are also presented in Table 2.

Table 2
Descriptive Statistics

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

The average daily risk premium is positive in Indonesia at 0.11%. Indonesia's risk premium indicates relatively greater unconditional volatility based on standard deviation. The Indonesian market (IDX) indicated positive skewness and leptokurtosis during the sample period, which indicated deviations from normal distribution. The Jarque-Bera test also justifies abnormal distribution in the risk premium. A significant kurtosis coefficient indicates a leptokurtic risk premium in the market. Each risk premium indicates stationarity based on the ADF test results in Table 2. In addition, the ARCH LM test indicates a significant heteroscedasticity in the risk premium; thus, conditional volatility varies with time.

model GARCH (1,1): $\sigma_t^2 = \omega + \beta_i \sigma_{t-1}^2 + \alpha_1 \xi_{t-1}^2 + \delta_t$ ……. (7a)$\boldsymbol{r_t} = \mu_{\boldsymbol{t-1}} + \xi_t$

neere, $\mu_{\boldsymbol{t-1}}$ = Cumulative *average monthly returnone*again t-$oneneSig\sigma_t^2 = 0018 + 0.87717\xi_{t-1} + \delta_t$ ……. (7b)

Equation (7b) reveals that the coefficient at the lag of the squared error is positive. The lag of the conditional *variance* of this term is very significantly different from zero, but the lag of the squared error is not significantly different from zero.

Risk is significant in the Capital Asset Pricing Model (CAPM). These results can help decision-makers for investors predict market risk using last month's market risk. If the market becomes more volatile this month, risk-averse investors can enter it. However,

more risk-averse investors will not enter the market and will wait until the market has performed well. Risk can also help securities companies, especially finance or investment banking companies, create new products.

Volatility and Risk Premium

The estimated risk premium of Indonesia Stock Exchange (IDX) aggregate sha ow Cap$R_{mt} - R_{it} = 105.1379\ \sigma_t^2$ ……. (8)

Equation (8) shows that the volatility coefficient is a significant positive value or differs significantly from zero. These results will help decision-makers estimate the risk premium. These results indicate that market volatility is essential in determining a stock's risk premium. Equation (8) can be used to estimate the risk-free rate, which is often difficult to find, especially in emerging markets such as the IDX. With quantifiable market returns, investors can estimate the cost of equity and further assist in making decisions.

Conclusion

This study's conclusion is to test whether there is a relationship between the volatility of return and risk premium in the Indonesian stock market. Using the daily trend of the Indonesian stock market (IDX) from January 2010 to September 2023. We use the GARCH model (1,1). The methodology used here differs from previous studies that mainly used the usual least squares time series (OLS) method to estimate the GARCH coefficient and risk premium. It was found that there is a relationship between risk premium and volatility in the Indonesian stock market.

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