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Market Efficiency and Volatility Dynamics in the Jakarta Islamic Index: Evidence from Efficient Market Hypothesis (EMH) Anomalies

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Abstract

Purpose *- This study examines the efficiency of the Jakarta Islamic Index (JII) by testing for anomalies such as the Day of the Week Effect, Monday Effect, Friday Effect, and Week-Four Effect, both under normal conditions and during the Covid-19 crisis. This study seeks to determine whether JII adheres to the Efficient Market Hypothesis (EMH) or exhibits predictable patterns in stock returns.*

Methodology *- The study utilizes daily return data from JII, covering periods before (January 2008–February 2020), during (March 2020–December 2022), and combined before and during the Covid-19 crisis. Stationarity tests (Augmented Dickey-Fuller and Philips–Perron) were conducted, followed by ARMA/ARIMA modeling to address autocorrelation and heteroscedasticity. ARCH-GARCH models, including EGARCH, TARCH, and PARCH, were employed to analyze the volatility and leverage effects. Dummy variables for trading days and weeks are used to test for anomalies.*

Findings *- The results confirm the presence of the day of the week, Monday, and Week four effects in JII returns, indicating market inefficiency. However, the Covid-19 crisis did not significantly alter return patterns, suggesting resilience in the Islamic stock market. The study also identifies asymmetric volatility responses, with EGARCH (1,1) being the most suitable model, following a non-normal distribution (GED). These findings align with some prior research but contrast with others, highlighting mixed evidence on market anomalies in Islamic indices.*

Implication *- This study contributes to Islamic capital market literature by empirically testing behavioral and volatility-based anomalies in a major emerging Islamic index, using advanced econometric models*

Keywords*: Jakarta Islamic Index (JII), Volatility model, crisis, The Day of Week Effect, Monday Effect, Friday Effect.*

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1. INTRODUCTION

The Islamic stock index is a statistical measure that reflects the price movement of a group of Islamic stocks selected based on certain criteria. These criteria are based on the fatwa of the Indonesian Ulema Council (MUI) regarding the Financial Services Authority (OJK) issuing a List of Sharia Securities (DES), based on this fatwa, the IDX conducts a selection of stocks on the stock exchange that belong to the sharia group (BEI, 2023). Sharia stocks are stocks of companies which in carrying out their business follow sharia principles (Nasution, 2015). The DSN-MUI (National Shariah Council, Mejelis Ulana Indonesia) has so far issued 17 fatwas used by the IDX to classify stocks on the stock exchange into sharia stocks (BEI, 2023). It is hoped that this will make the Islamic stock market efficient in the sense that price movements are only influenced by relevant information (Nasution, 2015).

Justifying reality on the ground, like that? This study intends to determine whether the Islamic stock index, represented by Jakarta Islamic Index (JII), is truly efficient, as hypothesized by the Efficient Market Hypothesis (EMH). Efficient in this case is that the pattern of stock movements is only influenced by the movement of the previous period, so it does not have a daily return movement pattern.

Actually, there have been many studies conducted by experts regarding the existence of EMH and its volatility in the national and international stock markets, but the analysis techniques and results vary. Research by Iswadi et all., (2022) on the return of 30 company shares consistently including JII in the period before and during Covid-19 (June 2019 – Nov 2021) using the t-student test does not support the EMH theory, because the average return on Monday both before and during Covid-19 is significantly negative (Monday Effect) and Friday is significant positive (Friday Effect). Sidik et all., (2024) used a longer period, namely 2019 – 2023 with the same statistical analysis, namely t-student, confirming that the returns of stocks in JII are efficient in semi-strong form. Research by Faisal and Soepriyono (2024) on the JII stock index during Cxovid-19, namely March 2020 and end in June 2023, using the ARMA/AREMA model, the results show that the return index of JII shares during the Covid-19 period supports the EMH theory. These results are strengthened by Widodo's research (2024) using the ARCH-GARCH asymmetric method to conclude that the JII return index is efficient.

The research conducted by Hasan et all., (2022) analyzed seven calendar anomalies in both the conventional and Islamic stock indices of Bangladesh. Also, the authors examine whether these anomalies differ between the two indices. Meanwhile, the stock indices used are the Dhaka Stock Exchange Sharia Index (DSES) and Dhaka Stock Exchage (DSE) with observation time from January 25, 2011, to March 25, 2020 while the analysis used is the GARCH model. The results of the study showed that in both sharia and conventional indexes, both sharia and conventional, they rejected the EMH hypothesis because it was proven that there was a day of the week, weekend, the month of the year, January, the turn of the month. The same results are the research of Adam at all., (2023) using the 10 leading Islamic stock markets in the world for the period September 25, 2000, to September 24, 2020 using the ARCH-GARCH asymmetric method concludes that the Islamic stock market is not efficient because it is found that the day of the week effect (DOW) is found, especially in the Dow Jones Islamic Market World Index, Indonesia and Pakistan.

In addition, many researchers are interested in knowing the impact of economic crises on stock return patterns. Susianti and Rahmawati (2020), using the JII index before and during Covid-19, found that there was no change in the pattern of JII returns either before or during Covid-19.. Kafou and Chakir (2015) examined the change in the pattern of daily returns of the

Dow Jones Islamic Market Index (DJIMI). The results show that no changes were seen in the pattern of daily returns before, during, or after the subprime crisis. Widodo (2022) used the daily JII return for the period from March 1, 2020 to the period April 30, 2022, the results showed that Covid-19 did not change the daily return pattern.

Based on the results of research conducted by experts on the identification of EMH on the return pattern of the JII index and stocks included in the JII group in a certain period as well as Sharia stock indices in other countries, it provides various results and analytical tools. The difference in this study compared to other studies is the use of research intervals. This study wants to see if the return of the JII index is in accordance with what is hypothesized by EMH, which is that it will move randomly according to the theory of random walk, only moving according to the information it has. The interval is then divided into 3, namely before Covid-19, during Covid-19 and before – during Covid 19. Another difference is the data analysis used. Initially, research on EMH used a linear regression model. The linear regression model used is to create dummy variables (Monday, Tuesday, Wednesday, Thursday, and Friday) to determine whether there are certain days that have returns that are statistically different from zero. Some researchers who used OLS to test for EMH anomalies include Cross (1973), Solnik and Bousquet (1990), Ho (1990) and Agrawal and Tandon (1994), Abdala (2012).

However, the use of OLS, especially in the analysis of dummy independent variables, has several problems, several specific problems may arise while using this approach: (i) the returns are likely to be autocorrelated; (ii) the residuals are possibly non-normal; (iii) the issue of heteroscedasticity may arise; and (iv) outliers with high/low value of return may distort the overall picture (Abdala, 2012), (v) time series data has a stationarity problem so it will produce spurious regression (Widodo, 2022).

Therefore, this study uses ARCH-GARCH analysis, then tested for the absence of asymmetric problems using the approach of various error term distributions. It is expected to provide more accurate and robust results in researching whether or not there is an EMH problem in the daily return of the JII index.

This study aims to find out whether the daily return of the JII index is efficient with the volatility approach, in accordance with what is expected by the EMH theory. The test is important because it is a solid foundation for developing modern financial theory in the context of the Islamic market. In addition, Validate public information-based prediction models (e.g. CAPM, APT). If it turns out that there is an EMH anomaly, it is expected to open up a space for interdisciplinary studies, such as behavioral finance that links psychology to investment decisions. In addition, it will be a signal of the potential for market manipulation, insider trading, or information imbalance for investors, especially shariah-sham stock investors. In addition, if the daily return of the JII Index is not affected by economic shocks (such as Covid-19), then the market is considered stable and crisis-resistant. However, if it is affected by economic shocks, then the market shows its vulnerability to external factors, so this condition provides different benefits for researchers, regulators, and investors.

2. LITERATURE REVIEW

2.1 Efficient Market Hypothesis Theory

In 1970, Eugene F. Fama in The Journal of Finance volume 25, year 2, with the title “Efficient Capital Markets: A Review of Theory and Empirical Work” stated that “the price of e security “full reflects” avalailable information was assumed to imply that successive price changes (or more usually, successive one-period returns) are independent”. This concept shows that the

behavior of stock market asset prices under certain conditions includes informational efficiency. Furthermore, Spulbar et al. (2021) show that the EMH concept was actually inspired by the random walk theory from Kendall (1953) which states that "stock price fluctuations are independent of each other and have the same probability distribution." Fama (1970) stated that "the future path of the price level of a security is no more predictable than the path of a series of cumulated random numbers". Furthermore, Fama discussed the matter of efficient capital markets and suggested that the perfect scenario targets a capital market "in which prices provide accurate signals for resource allocation." The efficient market hypothesis (EMH) theory, although still an unfinished debate, has more or less been able to change the perspective of financial experts and investors about how the capital market works. Competition between investors is very tight, causing stock prices to accurately reflect all relevant information so that investors can believe that the price is fair.

Research in Indonesia has yielded inconsistent results. Pratiwi (2017) shows that there is an anomaly in the weekday and weekend effects, but is unable to prove the existence of a Monday effect. Suryandari and Wirawan (2018) found an anomaly of the day of the week effect, Monday Effect and The Month of the year effect, but did not show the January Effect. Hendrawati and Huzaemah (2019) have an anomaly The day of the week effect, Monday Effect, but there is no weekend effect or January Effect. Wakhidah and Rafik (2019) anomaly the day of the week effect.

Extreme events such as the global financial crisis (GFC) have significantly affected the development of the financial sector. For example, the recent COVID-19 pandemic caused a severe lockdown in most countries of the world, whether they were developed, emerging, or underdeveloped, thus affecting the performance of all sectors of the economy, including the financial system (Batool et al., 2020). However, Spulbar et al. (2020) consider that global financial liberalization generates a lower impact on emerging economies compared to the case of developed economies. Consequently, it is important to have a theoretical foundation that provides efficient solutions, especially in times of financial turmoil.

2.2 The Day of Week Effect

According to the EMH concept, the return of securities traded on a stock exchange will be relatively the same from Monday to Friday, but empirical evidence shows that there is a significant difference in returns between Monday and other days of the week, which is called the day of the week effect.

The Monday Effect is a part of the day of the week effect, where Monday tends to produce negative returns, whereas positive returns occur on days other than Monday (Werastuti, (2012). Another evidence was found by Desmizar (2024) using the banking sector for the 2022 period, namely the day of nthe week effect.

Akkuş's research (2022) using Morgan Stanley Capital International (MSCI) Islamic indices with EGARCH analysis confirmed the existence of an EMH anomaly, namely the day-of-the-week effect in the MSCI Islamic. The same results were confirmed by Adam and Sidek (2022), based on research on 10 Islamic stock markets' returns such as Dow Jones Islamic Market (DJIM), Saudi Arabia, Malaysia, United Arab Emirates (UAE), Kuwait, Qatar, Turkey, Indonesia, Bahrain, Pakistan—for 20 years from 25 September 2000 to 24 September 2020, namely there was an EMH anomaly in the Islamic stock market: DJIM, Indonesia, and Pakistan.

The research of Yang and Nemlioğlu (2023) used the Russell 100 index from the American stock market and the GEM composite index from the Chinese stock market period3

2012 – 2021. The data analysis used is ARMA-GARCH, in order to obtain robust results, the study then erases 2 years when Covid-19 occurred, the results remain consistent, namely the day of the week effect on both markets.

2.3 Week-four Effect

The Week-four Effect is a phenomenon that reveals that the Monday Effect only occurs in the fourth or fifth week of each month. Meanwhile, Monday's return from the first week to the third week is considered not significantly negative or equal to zero. Wang, Li, and Erickson (1997) first revealed the phenomenon of the Week Four effect. The Week-four Effect tests whether negative Monday returns only occur in the fourth and fifth weeks (Saraswati et al., 2015), Cahyaningdyah and Faidah, 2017).

Furthermore, Cahyaningdyah and Faidah (2017) stated that the concept of the day of the week effect is a significant difference in returns between Monday and other days of the week. The negative return on Monday was due to selling pressure on Monday. The high selling activity on Monday was probably due to investors, especially individual investors, who received unfavorable information about the stock market conditions that occurred on the previous Friday.

2.4 Covid-19 and Its Influence on the EMH Anomaly

Related to the Covid-19 pandemic, several studies have been conducted that show the impact of the spread of the virus, including research conducted by Sansa (2020) on the Shanghai Stock Exchange and New York Dow Jones

The research conducted by Widodo (2024) used the daily return of the LQ 45 index for the period January 3, 2008 to December 30, 2020. The results of the analysis showed that Covid-19 had no effect on the daily return pattern of LQ45, The Week Four effect was proven, but The Day of Week effect, Monday effect and Weekend effect were not found. Another finding is that the trading day anomaly testing model is sensitive to term error distribution, as well as hinting that good news or bad news in volatility depends not only on the asymmetric model but also on the choice of term error distribution.

3. RESEARCH METHODS

This study uses the Jakarta Islamic Index (JII) daily return, which is the main index of the Indonesian capital market. The initial research on the global financial crisis that began in the United States in 2008 ended on December 30, 2022, then it is divided into: : periods before Covid-19 (January 2008–February 2020), during (March 2020–December 2022), and combined before and during the Covid-19 crisis

Most financial series are trendy at the level of heavy fluctuations; therefore, it is implausible to attain valid inferences. The log reduces the fluctuation to some extent and the difference makes the series stationary or mean reversion, so JII's daily return calculation uses the method used by Widodo (2022).

$$RJII_t = ln(\frac{JII_t}{JII_{t-1}}) \quad \text{..... (1)}$$

Where JII_t is the daily Jakarta Islamic Index in period t and JII_{t-1} is the index of the previous period.

The data used in this study are a time series; therefore, it is necessary to examine the stationarity problem. Stationary testing uses augmented Dickey (ADF) and Philips – Perron (PP).

The first step of data analysis is modeling with the ARMA/ARIMA Box Jenkins model, which is considered fit if it is proven that there is no white-noise problem. For white noise testing, the authors used the Box and Pierce Test or the Q Test (Portmanteau Test).

$$Q = n\sum_{k=1}^{m}\rho_k^2 \sim \chi^2_{df=m} \quad \text{..... (2)}$$

If the value of probability Q is greater than the level of significance, then it is concluded that the series of data is white noise.

After confirming that the ARMA/ARIMA model had white noise. The LM test was used to determine the ARCH effect. If there is an ARCH effect problem, then the ARMA/ARIMA model has white noise modeled with: ARCH (autoregressive conditional heteroskedastic model); GARCH (Generalized Autoregressive Conditional Heteroskedastic Model); EGARCH (Exponential Generalized Autoregressive Conditional Heteroskedastic Model); TARCH (Threshold GARCH); and PARCH (The Power ARCH) are developed (Nur and Dewangkara, 2020)

Model I for estimating The Day of Week Effect

$$RJII_t = \beta_o + \beta_1 Mon_t + \beta_2 Tues_t + \beta_3 Wed_t + \beta_4 Thurs_t + \beta_5 Covid_t + \sum_{i=1}^{p}\gamma_i\, RJII_{t-i} + \varepsilon_i \text{..... (3)}$$

where Mont, Tuest, Wedt, and Thurst are dummy variables for Monday, Tuesday, Wednesday, and Thursday, respectively. Where $\sum_{i=1}^{p}\gamma_i\, RJII_{t-i}$ are the lag values of the return variable, whereas Covid is a dummy variable, worth 1 if during Covid-19 and 0 before Covid-19. It was included in the equation to eliminate the possibility of autocorrelated errors and heteroscedasticity problems) (Nur and Dewangkara, 2020).

After modeling with ARCH-GARCH, testing is performed for the presence or absence of Asymmetries in Volatility. To test asymmetries in volatility, we use the model developed by Engle and Ng (1993) (Brooks, 2019):

$$\hat{u}_t^2 = \phi_o + \phi_1 S_{t-1}^- + \phi_2 S_{t-1}^- \mu_{t-1} + \phi_3 S_{t-1}^+ \mu_{t-1} + v_t \text{ ..... (4)}$$

Significance of ϕ_1 indicates the presence of sign bias, where positive and negative shocks have differing impacts upon future volatility, compared with the symmetric response required by the standard GARCH formulation. On the other hand, the significance of ϕ_2 or ϕ_3 would suggest the presence of size bias, where not only the sign but the magnitude of the shock is important. A joint test statistic is formulated in a standard fashion by calculating TR2 from regression equation (4), which asymptotically follows a $\chi 2$ distribution with three degrees of freedom under the null hypothesis of no asymmetric effects.

The Day of Week Effect can be seen from whether the difference in returns Monday to Friday or the regression coefficient is not equal to zero (Asarowati, 2009). The Monday Effect is detected if the regression coefficient on Monday is significantly negative, while the other days are positive. (Cahyaningdyah and Faidah, 2017)

Model 2 for estimating Week Four Effects

$$RJII_t = \beta_o + \beta_1 Monw1_t + \beta_2 Monw2_t + \beta_3 Monw3_t + \beta_4 Monw4_t + \beta_5 Covid_t + \sum_{i=1}^{p}\gamma_i\, RJII_{t-i} + \varepsilon_i \text{ ..... (5)}$$

where Monw1t, Monw2t, Monw3t, and Monw4t are dummy variables for Monday Week1, Monday Week2, Monday Week3 and Monday Week4 and whereas Covid is a dummy variable, worth 1 if during Covid-19 and 0 before Covid-19.

4. RESULTS AND DISCUSSION

Time series data often have an average and variance that are not constant over time, making predictions difficult (Widarjono, 2018). To overcome this problem, stationarity testing was performed. The result is:

Table 1. JII Stationarity Return Test

	Exogenous	t-Statistic	Probability	
ADF Test	None	-58.4948	0.0001	***)
PP Test	None	-58.481	0.0001	***)
Note : ***) significance at the level 1%				

Table 1 shows the stationarity test of JII returns using the ADF and PP tests. The results of JII's descriptive statistical returns during the observation period were divided into three periods: before the Covid-19 crisis, namely: January 3, 2008, to 28 February 2020, and March 1, 2020, to December 30, 2022 (the period of the Covid-19 crisis.

Table 2. Descriptive Statistics of JII Return Trading Days Before, During and Before – During Covid

Day			Mean	Minimum	Maximum	Standard Deviation
Monday	COVID	Before	-0.0015	-0.1538	0.0786	0.0172
		During	-0.0023	-0.0817	0.0499	0.0174
	Before - During		-0.0016	-0.1538	0.0786	0.0173
Tuesday	COVID	Before	0.0001	-0.0729	0.071	0.0141
		During	0.0005	-0.0662	0.0573	0.0134
	Before - During		0.0002	-0.0729	0.071	0.0139
Wednesday	COVID	Before	0.0014	-0.1085	0.0875	0.015
		During	0.0000	-0.0401	0.0362	0.0119
	Before - During		0.0011	-0.1085	0.0875	0.0144
Thursday	COVID	Before	-0.0003	-0.0991	0.0564	0.0149
		During	0.0008	-0.0666	0.1206	0.0179
	Before - During		-0.0001	-0.0991	0.1206	0.0155
Friday	COVID	Before	0.0004	-0.0817	0.0636	0.0139
		During	0.0015	-0.0269	0.0589	0.0129
	Before - During		0.0006	-0.0817	0.0636	0.0137

Table 2 shows that the average JII daily return for Monday Before, During, or Before – During Covid is consistently negative, while the average returns for Tuesday, Wednesday, and Friday are consistently positive. Tursday before and before – during is negative, while during the crisis it is positive. These results are in line with research conducted by Iramawati and Mahdi (2006) using stocks that are members of LQ45 for the period January - December 2005, Suryandari and Wirawan (2018), LQ45 for the period February 2015 to August 2016; Afrilianto and Daryanto (2019) LQ45 companies for the 2013 to 2018 period, showed similar results, namely the average return on Monday was negative, while other days tended to be positive. After it is known that JII's daily returns are stationary and data descriptions, the next step is to model JII's returns using dummy variables on trading days and COVID.

The first step is to use the Box–Jenkins method and then test for white noise.

The results of the White test on the Jenkins Box model using the Box and Pierce Test or the Q Test (Portmanteau Test) with a lag of 36 obtained Q equal to 29,667, while the probability was 0.483. Because the probability value was greater than the significance level, it was concluded that the ARMA/ARIMA model contained white noise.

The next step is to test for an ARCH effect using the LM test. LM Test results using F-statistics and Chi-Square, the probability is significant at the 1 percent level, while the Box and Pierce Test or Q Test (Portmanteau Test) with a lag of 36 on the Quadratic Residual Correlogram obtained Q equal to 2240.8 while the probability is 0.000, so it is concluded that there is an ARCH Effect problem.

The next step is modeling using ARCH-GARCH. ARCH-GARCH modeling is considered appropriate if there are no ARCH Effet problems. The LM Test results using F-statistics and Chi-Square have a probability that is not significant at the 5 percent level, while the Box and Pierce Test or Q Test (Portmanteau Test) with a lag of 36 on the Quadratic Residual Correlogram obtains a Q value equal to 26,193 while the probability is 0,665, so it is concluded that there is no ARCH Effect problem.

The ARCH-GARCH model, which no longer has an ARCH effect, is then analyzed to see whether there is a leverage effect,, as recommended by Brooks (2019). Leverage testing: Engle and Ng (1993)Band rooks (2019). The result is :

Table 5. Engle and Ng Test Model 1

	t-Statistic	Prob.	
Sign-Bias	1.548246	0.1216	
Negative-Bias	-4.832361	0.0000	***)
Positive-Bias	1.196450	0.2316	
Joint-Bias	44.52617	0.0000	***)
Note: ***) significant at the 1% level, **)			

The Engle and Ng test in Table 5 shows that of $\phi_1$and ϕ_2 are not significant, while negative-bias and joint-bias are significant at the 1 percent level, these results indicate that there is a difference in response if there is good news with bad news or in other words there is a problem leverage effect. Because there is a leverage effect, it is modeled with an asymmetric model, namely EGARCH (1,1), TARCH(1,1), and PARCH(1,1). The result is :

Table 6. Analysis Results of Model 1 The Day of Week Effect

Variable	Coefficient	Std. Error	z-Statistic	Prob.	
FRI	0.0007	0.0004	1.7429	0.0814	*)
MON	-0.0018	0.0005	-3.4171	0.0006	***)
TUES	-0.0001	0.0006	-0.1672	0.8672	
WED	0.0005	0.0006	0.9405	0.3469	
THUR	-0.0004	0.0005	-0.7617	0.4462	
COVID	-0.0005	0.0004	-1.4211	0.1553	
AR(3)	-0.0390	0.0158	-2.4723	0.0134	***)
AR(2)	-0.0687	0.0157	-4.3650	0.0000	***)
	Variance Equation				
C(9)	-0.2700	0.0188	-14.3550	0.0000	***)
C(10)	0.1585	0.0112	14.1649	0.0000	***)
C(11)	-0.0635	0.0067	-9.4541	0.0000	***)
C(12)	0.9828	0.0018	546.5730	0.0000	***)
GED PARAMETER	1.3419	0.0377	35.5610	0.0000	***)
Note: ***) significant at the 1% level, **) significant at the 5% level					
*) significant at the 10% level					

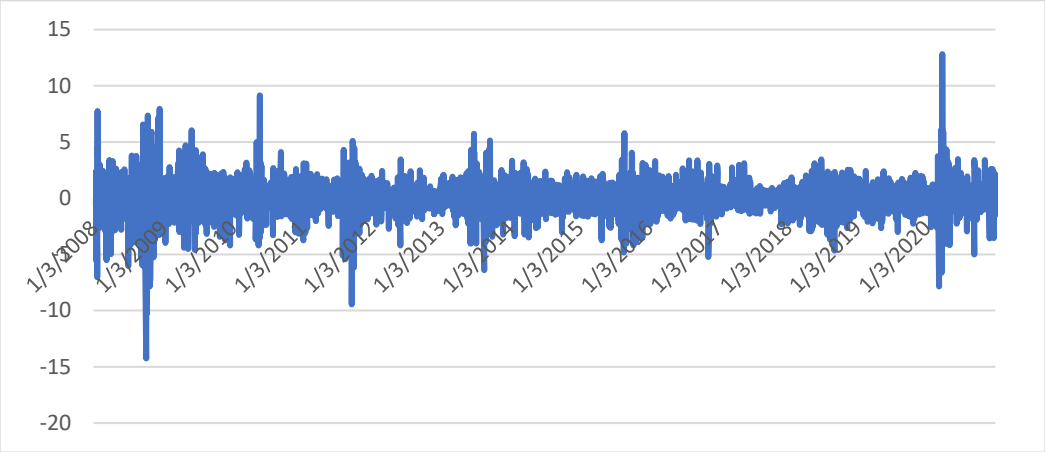

Figure 1. Return JII before – during Covid 19

The results of the analysis of Model 1 in Table 6 show that the appropriate model is EGARH(1,1), which does not follow the normal distribution, but follows the Generalized Error Distribution (GED). To see the existence of the leverage effect, see equation (11). These results are consistent with Shamsir and Mustafa's (2014) research, where Karawachi Stock Market returns are modeled by the GARCH model with a non-normal distribution. Coefficient C(11) shows a negative and significant sign; therefore, the existence of a leverage effect is confirmed (Brooks, (2019)). In addition, it can be seen that the Covid variable is not significant, meaning that the Covid-19 crisis does not affect the pattern of JII's daily returns. These results confirm the existence of the day-of-week effect in this study. The results of the analysis are strengthened by figure 1, where there is no significant difference in return patterns before and during Covid-19. These results are in accordance with the research conducted by Susianti and Rahmawati (2020), while Ambarwati (2016) and Dharmawan et all., (2020) show that there is no day-of-week effect in JII.

The next test determines whether there is a Monday Effect. The results of the Wald test show that the difference in Monday's coefficient is smaller than the average regression coefficient on the other days because the value is negative and statistically significant because the probability is less than 1%. These results indicate that the Monday effect is found in the JII return pattern. The same result was obtained by Mardila (2020), while Kusherawati (2022) did not show a Monday Effect on JII.

The next test is to determine whether there is a weekend or Friday effect. The results of the Wald test prove the existence of the Weekend Effect, in which it is hypothesized that the Monday Regression coefficient should be greater than the average regression coefficient on other days. The results show that the t-statistics, F-Statistics and Chi-square are not significant; therefore, it can be concluded that the Weekend Effect is not found in the JII return pattern. Mardila (2020) and Kusherawati (2022) obtained similar results.

The descriptive statistics for Model II testing are as follows:

Table 9. Week Four Effect Descriptive Statistics

Monday	COVID		Mean	Standard Deviation	Maximum	Minimum
Mon-Week1	COVID	Before	0.0004	0.0587	-0.0622	0.0137
		During	0.0039	0.0499	-0.0268	0.0139
	Before - During		0.001	0.0587	-0.0622	0.0137
Mon-Week2	COVID	Before	-0.0003	0.0786	-0.1538	0.0159
		During	-0.0007	0.0435	-0.0817	0.0155
	Before - During		-0.0003	0.0786	-0.1538	0.0158
Mon-Week3	COVID	Before	0.0004	0.0765	-0.0615	0.0154
		During	-0.0011	0.0589	-0.0666	0.0152
	Before - During		0.0001	0.0765	-0.0666	0.0153
Mon-Week4	COVID	Before	-0.0008	0.0746	-0.0991	0.0143
		During	0.0003	0.1206	-0.0686	0.0161
	Before - During		-0.0006	0.1206	-0.0991	0.0146
Mon-Week5	COVID	Before	0.0009	0.0875	-0.0742	0.0156
		During	-0.0003	0.0573	-0.0384	0.0125
	Before - During		0.0007	0.0875	-0.0742	0.0151

Table 9 shows that the average return on Monday of the 1st week and Monday of the 5th week Before, During and Before – During Covid is consistently positive, Monday the 2nd week is negative, while Monday the 3rd week and Monday the 4th week are inconsistent.

The results of the White test on the Jenkins Box model using the Box and Pierce Test or the Q Test (Portmanteau Test) with a lag of 36 obtained Q equal to 35,487, while the probability was 0.225. Because the probability value was greater than the significance level, it was concluded that Model II ARMA/ARIMA had white noise.

The next step is to test whether there is an ARCH effect using the LM test and squared residual correlation. The LM test shows that the probability of the F-statistic and Probability Chi Square is less than 1%; therefore, it is concluded that there is an ARCH effect problem. Then, the authors modeled with ARCH-GARCH (1,1) and tested again using the LM test to ensure the existence of the ARCH Effect no longer exists in model II. The results of the LM show that the probability of the F-statistics and the probability of Chi Square are greater than the level of significance, so it can be concluded that Model II has no problem with the ARCH Effect. Leverage Effect, as recommended by Brooks (2019). Leverage testing: Engle and Ng (1993). The result is

Table 11. Engle and Ng Test Model II

	t-Statistic	Prob.	
Sign-Bias	2.557052	0.0106	**)
Negative-Bias	-1.848796	0.0646	*)
Positive-Bias	-1.256443	0.2090	
Joint-Bias	36.31591	0.0000	***)
Note: ***) significant at the 1% level, **) significant at the 5% level, *) significant at the 10% level			

The Engle and Ng test in Table 11 shows that of ϕ_1 is significant and the joint-bias is significant at the 1 percent level, meaning that there is a difference in response if there is good news and bad news or in other words there is a leverage effect problem. Because there is a

leverage effect, it is modeled with an asymmetric model, namely EGARCH (1,1), TARCH(1,1), and PARCH(1,1). The result is :

Table 12. Results of Analysis of Model II The Week Four Effect

Variable	Coefficient	Std. Error	z-Statistic	Prob.	
SEN*M5	0.000487	0.000208	2.34313	0.0191	**)
SEN*M1	0.001947	0.001464	1.329771	0.1836	
SEN*M2	-0.00041	0.0007	-0.58588	0.558	
SEN*M3	-0.002296	0.000818	-2.80585	0.005	***)
SEN*M4	-0.002492	0.000609	-4.09516	0.0000	***)
COVID	-0.000322	0.000389	-0.8275	0.4079	
MA(3)	-0.041376	0.016475	-2.5114	0.012	***)
AR(2)	-0.06868	0.01574	-4.36502	0.0000	***)
	Variance Equation				
C(8)	-0.304429	0.037105	-8.20451	0.0000	***)
C(9)	0.162768	0.015793	10.30629	0.0000	***)
C(10)	-0.073338	0.010024	-7.31633	0.0000	***)
C(11)	0.979732	0.003551	275.8642	0.0000	***)
Note: ***) significant at the 1% level, **) significant at the 5% level					
*) significant at the 10% level					

The results of the analysis of model II in Table 12 show that the appropriate model is EGARH(1,1) but does not follow the normal distribution, namely the Student's t distribution. To see the existence of the leverage effect, see equation (10). It can be seen in table 12 if the coefficient C (10) is negative and significant so it is concluded that the existence of the leverage effect is confirmed (Brooks, (2019)). Other results show that the Covid variable is not significant, which indicates that the Covid-19 crisis does not affect the pattern of JII's daily returns.

The existence of the four-week effect is detected if the first Monday of the week is positive but not significant, while the second Monday and third Monday are negative and significant. In addition, Monday the fifth week was significantly positive, the fifth week was significantly positive. Table 11 shows what is expected of the week four effect to be fulfilled, because the regression coefficient for Monday 1st week is not significantly positive, Mondays 2nd and 3rd weeks are negatively significant, and Monday's 5th week is positively significant; in other words, the research is able to detect the existence of the Week four effect.

Sharia shares are securities in the form of shares that do not conflict with Sharia principles in the capital market, which refers to the general definition of shares regulated in laws and OJK regulations. All Sharia stocks in the Indonesian Sharia capital market are periodically included in the DES, which is the criterion for selecting Sharia shares by the OJK; namely, the issuer does not carry out gambling business activities and is prohibited according to Sharia; non-ribawi financial services; buying and selling risks that contain elements of uncertainty (gharar); not produce, distribute, trade illicit goods or services, goods/services that damage morale and/or are harmful, risywah transactions; and issuers comply with interest-based financial ratios compared to total assets of no more than 45% or total non-halal income of more than 10%. Sharia issuers or public companies are required to have a Sharia Supervisory Board (DPS). DPS members are required to have a Capital Market Sharia Expert license

(ASPM) from the OJK, and must be appointed by the General Meeting of Shareholders (GMS) (Iswadi et all., (2022).

The results of this study indicate that Covid-19 did not affect the presence of the EMH anomaly, because neither before, during nor during Covid did not affect the prior and whereabouts of the EMH anomaly, while the results of Iswadi et al.'s research. (2022) concluded that there was a significant difference before and during Covid-19. Similar results were obtained by Widodo (2024) using the daily return of the LQ 45 index, with an observation period from January 3, 2008 to December 30, 2020, it was concluded that Covid-19 did not affect the volatility of the movement of the daily stock return of LQ 45, but the EMH anomaly, namely The Week Four effect, was detectable, while The Day of Week effect, Monday effect and Weekend effect were not found.

The Covid pandemic event was initially considered bad news by investors and caused the Composite Stock Index (JCI) to reach its lowest level in March 2020 (the lowest since the last eight years starting from 2020). However, at the beginning of the first month of the year 2021, which was the first January in the era of the covid pandemic, investors began to feel optimistic about buying back shares (Maruli (2022)). This phenomenon shows that the high enthusiasm of investors in Indonesia in buying and selling shares after the previous month Indonesia experienced an unstable and declining economic condition caused by the Covid-19 virus which spread widely worldwide, including Indonesia, which became one of the countries with the highest number of the spread of covid was the highest, thus making stock trading activities and capital market conditions unfavorable also weakened; everyone, especially the government, was focused on dealing with the spreading virus so that it would recover quickly from the pandemic. Research conducted by Susianti and Rahmawati (2020) show that there is no difference in abnormal returns for stocks belonging to the JII group both before and during Covid-19. Apriani and Komariah (2022), based on research using stock exchanges in Indonesia, America, and Japan, concluded that there was no significant difference in stock returns both before and during Covid for the EMH anomaly.

A different result is Alam et al. 's (2020) research on the Indian Stock Exchange concluded that government-imposed lockdown had a positive effect on stock market performance. Iswadi et al. (2022), who used company returns that were included in JII, the Covid Crisis period, and during the Covid crisis, concluded that there were significant differences in the pattern of return on stocks in the JII group before and during the crisis.

Khan et all., (2025) examined the existence of the DOW effect on emerging Asian markets using ordinary least square regression (OLS), generalized autoregressive conditional heteroscedasticity (GARCH) (1, 1) and Kruskal-Wallis test for the period of July 2013 to 2019, the results showed that there was a DOW effect in China, South Korea, Taiwan, Thailand, Indonesia and Pakistan, but no significant day-of-the-week effect in returns was revealed in India and Malaysia.

Iswadi and Hafni (2018) used daily JII returns from December to 2017-May 2017 period. Dharmawan (2020) used the JII for the 2015-2019 period. Rahim and Berlian (2020) used JII for the June 2018-May 2019 period. Supriadi (2021) The Jakarta Islamic Index for the 2009 to 2019 period concludes that there is a day of the week at JII.

According to Suryandari and Wirawan (2018), The Day of Week Effect occurs because of high trading activity on Mondays caused by pressure on the capital market, where demand and supply are unequal. Investors, especially individual investors, are likely to have a higher desire to sell shares due to liquidity demands from weekend holidays, while individual investors' desire to buy shares is less. As a result, stock prices are depressed and tend to be lower for trading on Mondays than on other trading days. From the perspective of Behavior

Finance, the Monday effect phenomenon is related to decision making, which tends to be irrational. The cause of the Monday effect can be seen from the psychological side of investors, where investment decisions are made through rational, economic considerations, and objective data. However, it can also be influenced by several factors, such as emotions, psychological conditions, and investor mood. Monday is considered the worst day compared to other days throughout the week because it is the first day of work and vice versa, while Friday is the best day because it is the last working day before holidays. This causes investors to feel pessimistic on Mondays and optimistic on Friday. This tendency for irrational behavior makes the Monday return negative, on average. Another factor of issuers announcing bad news on the last day of stock trading also makes stock returns on Mondays tend to be negative. Investors will immediately sell their shares on Monday when they discover bad news about the company. This includes investors' overreaction behavior towards the latest information. This condition is also inseparable from psychological factors because, psychologically, investors react more dramatically (overreaction).

According to Cahyaningdyah and Faidah (2017), the Monday effect is driven only by the negative returns that occurred on the previous Friday (bad Friday). In addition, several researchers found that selling pressure from individual investors would be higher if unwanted information (bad news) was proxied by a negative return on the previous Friday (bad Friday).

This research proves the existence of the week four effect in the JII. From the test results, it can be concluded that the Monday effect phenomenon on the IDX is not only driven by negative returns in the fourth and fifth weeks but also by negative returns in the second and third weeks. This can happen because the problem of liquidity demand is not related to investment in the stock exchange, meaning that funds invested in the stock exchange are not used to meet liquidity demands at the end of each month. This condition is different from the condition of the US capital market, where many small investors participate in investing in the capital market and demand for liquidity at the end of the month are important factors that can move their trading activities on the stock exchange, so that at the end of the month, selling pressure by individual investors will be greater. Selling activity by individual investors increases on Monday because of the psychological aspects of investors who do not like Monday as the first day of trading, so selling pressure on Monday will be greater at the end of the month, namely, in the fourth and fifth weeks. This causes negative Monday returns to occur only in the fourth and fifth weeks.

5. CONCLUSION

This study examines the efficiency of the Jakarta Islamic Index (JII) by analyzing the presence of market anomalies, such as the day of the week, Monday, Friday, and Week Four effects, both before and during the Covid-19 pandemic. The findings reveal that the Covid-19 crisis did not significantly alter the pattern of JII returns, indicating that the pandemic's impact on the Islamic stock market was short-lived, likely because of effective government interventions that restored investor confidence. The study concluded that the return patterns of JII stocks remained consistent across different periods, suggesting that the market's reaction to the crisis was temporary.

The research identifies several anomalies in JII returns, confirming the existence of the day of the week, Monday, and Week four effects. Notably, Mondays consistently exhibited negative returns, while other weekdays showed positive returns, aligning with behavioral finance theories that attribute these patterns to investor psychology and liquidity demands. The Week Four Effect was also observed, with negative returns concentrated in the second and third

weeks of the month, in contrast to the traditional expectation that such effects occur only in the fourth and fifth weeks.

This study shows that the daily return of the JII index shows an asymmetric volatility response or leverage effect, where bad news has a greater impact on future volatility than good news. While the corresponding model is EGARCH (1,1) with Generalized Error Distribution (GED).

In addition, this study was able to prove that the daily return of the JII index is relatively resistant and stable to the economic shocks that occur, in this case Covid 19.

The study contributes to the ongoing debate about market efficiency in Islamic finance, suggesting that JII exhibits anomalies consistent with behavioral bias. These findings underscore the importance of considering psychological and liquidity factors in investment strategies, particularly in Islamic markets. Future research may explore these effects in other Islamic indices or during different crisis periods to validate the findings further.

Based on the results of the above research, the recommendations given to investors, regulators and future research are as follows:

1. The results of this study show that there is a Day of the Week effect and a Monday effect, therefore, investors in the Sharia stock market should take advantage of this phenomenon, for example by buying stocks at the beginning of the week and selling on days that are expected to give positive returns.
2. This research is able to prove the existence of a leverage effect (asymmetric volatility), therefore, it is necessary to be careful in paying attention to every news that exists. Because information is considered negative by the market, it will provide a greater shock compared to information that is considered positive. However, a big shock will also provide high returns – high risk, high return.
3. The occurrence of asymmetric volatility shows that there is still an information imbalance in the Sharia market. This is a signal to regulators (OJK and IDX) regarding the potential for market manipulation, insider trading or an imbalance in the information received by investors.
4. The resilience of the Sharia market, especially in Indonesia, which is resistant to economic shocks, shows a positive signal for the Sharia capital market, namely that the sharia capital market in Indonesia is relatively stable and crisis-resistant so that it will increase public confidence and promote sharia investment.
5. This research is expected to be able to encourage researchers in the sharia model market to use prediction models that accommodate volatility.
6. The existence of the EMH anomaly shows that Shariah capital market analysis requires an in-depth interdisciplinary study, which relates investor psychological factors to investment decisions (behavioral finance).

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