

Resilience under the tapering shadow: A study on the dynamics of shariah stock markets in Indonesia and Malaysia

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Abstract: The initiation of tapering, sparked by heightened inflation in the United States, reverberates across global markets, with notable implications for Indonesia. This study delved into the nuanced impact of tapering on Sharia-compliant stocks in both Indonesia and Malaysia. The rationale behind selecting Sharia stocks for analysis lies in their composition, featuring companies boasting low debt-to-asset and equity ratios, thereby positing robust resilience in the face of the Federal Reserve's implementation of tapering. Employing a time series dataset with a weekly sampling period spanning from January to September 2022, the analysis adopted the Error Correction Model (ECM) within a multiple regression framework to circumvent potential spurious regression pitfalls. The results of this study indicate that the impact of tapering off policy in Indonesia has a positive impact in the short term and long term, while in Malaysia it tends to be insignificant in the short term and has a positive impact from the US 10-year bond yield variable and a negative impact from US 1-Year Treasury Bills. This result is interesting because it differs from the general theory. The causal factors include the agility of the Indonesian central bank in maintaining the benchmark interest rate spread with the Fed, the economic stability of both countries, and the increasing trend of coal, with Indonesia being one of the largest producers of the commodity. Investors, in navigating these intricate dynamics, may find strategic insights derived from this research invaluable for shaping their investment decisions. While government policymakers may use them as a reference for shaping policies related to Sharia stock investments, including the incorporation of artificial intelligence.

Keywords: artificial intelligence; error correction model; FTSE bursa Malaysia Hijrah shariah index; Jakarta Islamic index; sharia capital market; tapering off

1. Introduction

The global economy posts the COVID-19 pandemic faces multiple challenges, including inflation, the looming specter of recession, and disruptions in global supply chains attributed to geopolitical conflicts. According to by the International Monetary Fund (2022) in the World Economic Outlook, inflation stands out as the most impactful issue affecting the current global economic landscape, necessitating focused governmental attention. Inflation is characterized by a sustained increase in the prices of goods or services at a general level (Natsir, 2014). Indrawati (2022) as cited in Pratiwi (2022), attributes the current inflationary pressures to disruptions in the supply chain, leading to an upswing in global commodity prices.

The situation is further compounded by the conflict between Russia and Ukraine, acting as a catalyst for global economic turbulence (Avisena, 2022). These two nations are vital producers of key commodities globally, with Russia contributing oil and gas

and Ukraine supplying wheat. The ongoing war has disrupted the global supply chain, resulting in persistent price hikes for several essential commodities. Even the United States, boasting the world's largest economy, is not immune to the specter of inflation, experiencing considerable levels of inflation. As of August 2022, the United States contends with inflation primarily driven by the Energy Consumer Price Index, registering at approximately 32.9%. Within the energy sector, various commodities such as gasoline, fuel oil, and natural gas contribute to this surge. Additionally, the food sector witnesses a notable inflationary surge of 10.9%, marking the highest since 1979 (U.S. Bureau of Labor Statistics, 2022). The multifaceted nature of these inflationary pressures underscores the intricate challenges facing economies on both a global and national scale as shown in **Figure 1**.

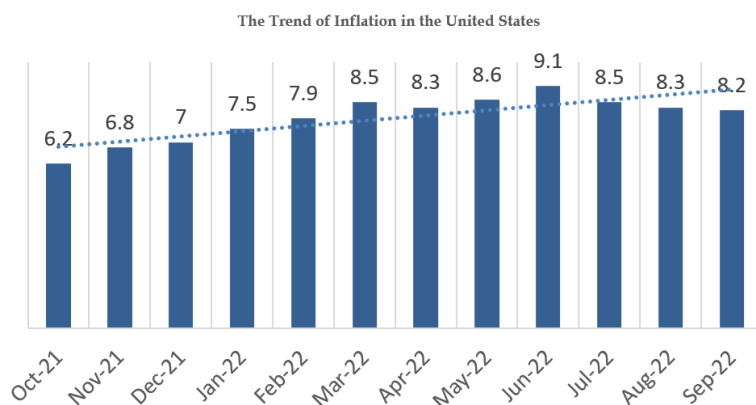


Figure 1. Inflation in the United States (Source: Data processed by the researchers (2022)).

Given the concerning inflation trends in the United States, the Federal Reserve has initiated Tapering in early 2022 as a policy measure to curtail inflationary pressures (Maduma, 2015). Tapering involves the deliberate reduction of monetary stimulus by the Federal Reserve. This policy resulted in a surge in United States bond yields, famously known as the taper tantrum. The rise in bond yields becomes a favorable sentiment for investors, attracting capital into these bond instruments due to increased yields and perceived security. This phenomenon leads to a significant capital inflow into the United States. Conversely, there is a massive selling of assets in emerging markets to redirect capital to the United States, perceived as a safer haven amid global economic instability, resulting in capital outflow. This, in turn, impacts financial asset markets in other countries, as financial assets exhibit high mobility between nations.

The increase in the US interest rate can pose a considerable threat to the financial crisis in emerging market countries because the capital outflow has resulted in decreased consumption and investment, which has prompted emerging market governments to cut spending to improve state budgets (Arteta et al., 2022; Ouerk, 2023). In simple terms, this interest rate hike could lead to a slowdown in the business processes of companies. This can reduce the profitability of the company and lead to capital outflows on the stock, thus lowering the price of the stock (Park et al., 2024). Furthermore, Koleva (2022) highlights that Tapering induced panic in the markets of developing countries, causing capital outflows and devaluation of their currencies. In

response, many developing countries, including Brazil, Indonesia, India, Malaysia, and others, increased their benchmark interest rates. This is the opposite of the quantitative easing policy, which creates economic spillover for emerging countries (Bhattarai et al., 2021).

Previous research by Ferriani (2021), Indriawan et al. (2021), Maduma (2015), Rai and Suchanek (2014) have delved into the impact of Tapering. Ferriani (2021) revealed abnormal capital outflow and a sell-off in China during the 2015 taper tantrum. Indriawan et al. (2021) found that the Federal Open Market Committee's (FOMC) announcements significantly influenced 10-year bond futures transactions in the United States and Germany. Apart from that, there were findings that there was a large shift after the FOMC announcement by the Fed, namely resulting in up to four times the Sharpe ratio for buying and holding bonds. Maduma (2015) indicated that the US-1 Year Bond Yield or T-Bills had a negative but not significant influence on Indonesia's Composite Stock Price Index (IHSG), while Exchange Rate had a significant negative impact on the IHSG. Finally, Rai and Suchanek (2014) showed that the Federal Reserve's announcement about Tapering had a significant negative impact on emerging markets.

Importantly, none of these studies utilized an index measuring the performance of Sharia stock prices; instead, they relied on general stock price indices. Significantly, no research explored the impact of the 2022 Tapering policy on Sharia stocks in Indonesia and Malaysia. Furthermore, there was a notable absence of comparative studies examining the impact of the 2022 Tapering policy on the two emerging market countries: Indonesia and Malaysia. Research related to the impact of the Fed's tapering off policy on emerging market countries, such as Indonesia and Malaysia, has a deep urgency in the current global economic context. The tapering off policy by the US Federal Reserve has the potential to create significant volatility in the financial markets of emerging market countries. The urgency in this study lies in an in-depth understanding of how the Islamic capital markets in these two countries could be affected by the Fed's tapering off policy. Currency fluctuations, interest rate changes, and capital flows are some of the factors that could potentially affect the performance of Islamic stock exchanges. This is certainly very important considering that both countries are countries with large Muslim populations and certainly have a preference for investing in Islamic stocks.

Considering these phenomena and previous research outcomes, this study aimed to address the problem of how the Federal Reserve's Tapering policy will affect the resilience of Sharia stock prices in the Jakarta Islamic Index (JII-30) and FTSE Bursa Malaysia Hijrah Shariah (FTSEM) in 2022. The primary focus was on determining whether or not the 2022 Tapering policy have similar or distinct effects on the Sharia index in Indonesia (JII-30) and Malaysia (FTSEM). JII-30 and FTSEM are selected as dependent variables for testing because no research has specifically delved into the impact of Tapering on Sharia stocks, and JII-30 and FTSEM represent indices of Sharia-compliant companies with the largest capitalization in Indonesia and Malaysia. Additionally, in Indonesia, guided by the MUI DSN Fatwa, the total interest-based debt cannot surpass 45 percent of total assets (Prasetyo, 2017). In Malaysia, following the Sharia Advisory Council regulations of the Securities Commission Malaysia, the total interest-based debt is limited to 33% (Firmansyah, 2017). This regulatory

framework is expected to enhance the resilience of Sharia companies in the face of interest rate increases due to Tapering, particularly in JII-30 and FTSEM.

This study aimed to empirically investigate the immediate and prolonged ramifications of the Tapering-off policy on Sharia stocks in the JII-30 index in Indonesia and FTSEM in Malaysia. A comparative analysis between the two nations was undertaken, with a specific emphasis on the utilization of artificial intelligence in trading transactions. The outcomes of this research expectedly would carry implications for investors, offering valuable insights for informed decision-making in the dynamic landscape of JII-30 and FTSEM shares. Furthermore, the governmental authorities can derive policy implications, particularly in utilizing the potential of artificial intelligence across both monetary and fiscal instruments to optimize economic strategies.

2. Review of literature

2.1. The influence of interest rates on stock prices

In accordance with Keynesian economic theory, there exists an inverse relationship between interest rates and stock prices. This is primarily due to the substitution effect within the money market, where rising interest rates attract investors towards alternative financial instruments such as deposits or bonds. Concurrently, the escalated interest rates lead to increased interest expenses for corporate issuers, resulting in reduced corporate profits. As happened in South Korea, where a 3% increase in the benchmark interest rate resulted in a 116% increase in interest expenditure on shipping companies (Park et al., 2024). This reduction in profitability diminishes investor appetite for stock acquisition. Consequently, the diminished demand for stocks aligns with the principles of supply and demand, leading to a corresponding decrease in stock prices.

2.2. Tapering

Tapering can be construed as the gradual reduction of the monetary stimulus initiated by the Federal Reserve. This is typically executed through a decrease in the volume of bond purchases. Tapering strategies are commonly employed when the economy is trending towards the peril of heightened inflation, often referred to as overheating. The manifestation of concerns and the formal declaration of the Federal Reserve's Tapering policy exerted a noteworthy adverse influence on economies in emerging markets (Rai and Suchanek, 2014).

This phenomenon is driven by capital outflows from emerging markets to the United States, aimed at safeguarding capital through the acquisition of United States bonds. Mankiw (2006) stated that an elevation in the benchmark interest rate in the United States leads to a diminished interest and inclination of U.S. residents to invest in foreign assets, thereby reducing capital outflows from the United States. Another repercussion is the upsurge in United States bond yields, commonly known as the Taper Tantrum. This typically occurs following the Federal Open Market Committee's (FOMC) announcement of a policy decision to increase interest rates (Fed Fund Rate). This creates a market sentiment favoring the purchase of United States bonds,

considered a safe investment (Indriawan et al., 2021). In this study, the variables employed to represent the Tapering policy include the US 10-Year Bond Yield and US 1-Year Treasury Bills.

2.3. Jakarta Islamic Index (JII) and FTSE Bursa Malaysia Hijrah Shariah (FTSEM)

The Jakarta Islamic Index (JII) serves as an index on the Indonesian Stock Exchange, acting as a benchmark for the performance of Sharia-compliant stocks in accordance with the Sharia Securities List (DES) (OJK, 2019). Specifically, the JII comprises 30 Sharia-compliant stocks with the highest market capitalization and the most liquidity in daily transactions on the regular market over the past one year. Criteria for Sharia-compliant stocks in Indonesia adhere to the MUI DSN Fatwa, stipulating that total interest-based debt must not exceed 45% of total assets and prohibiting involvement in businesses related to alcohol, gambling, usury, and products involving pork or other haram substances (Prasetyo, 2017).

On the other hand, the FTSE Bursa Malaysia Hijrah Shariah (FTSEM) is an index consisting of 30 Sharia-compliant shares, specifically designed to encompass stocks of companies meeting Sharia criteria or Islamic law principles. Criteria for Sharia-compliant stocks are established based on the Sharia Advisory Council regulations of the Securities Commission Malaysia, where the total interest-based debt must not exceed 33% and businesses related to alcohol, gambling, usury, and products involving pork or other haram substances are prohibited (Firmansyah, 2017).

2.4. US 10-Year bond yield and US 1-Year treasury bills

The US 10-Year Bond Yield and US 1-Year Treasury Bills are two categories of debt securities with respective terms of 10 and 1 year, involving interest payments at intervals until maturity. Broadly speaking, the purposes of these bonds can be categorized into three main functions: managing the state debt portfolio, addressing short-term cash shortages, and financing budget deficits (Tandelilin, 2010). When the Federal Reserve increases the benchmark interest rate, there is a prevailing market sentiment to acquire and retain these bonds as a means to safeguard assets amid economically uncertain conditions triggered by, among others, inflation (Indriawan et al., 2021).

2.5. Exchange rate

This study examined the valuation of the United States currency against the Indonesian currency and the Malaysian currency. As defined by Dornbusch et al. (2008), the nominal exchange rate signifies the relative price of one country's currency in comparison to another. Fluctuations in the USD/IDR and USD/MYR exchange rate, whether appreciating or depreciating, can significantly impact a company's profitability (Bhargava and Konku, 2023), thus potentially influencing the company's share price, contingent upon the extent of depreciation or appreciation in the exchange rate strength.

2.6. Dow Jones Industrial Average

The DJIA, or Dow Jones Industrial Average, is a stock index in the United States comprising 30 stocks with significant capitalization, often recognized as blue-chips. Notably, the DJIA holds the distinction of being the oldest index on the New York Stock Exchange (NYSE), which, in turn, is the world's largest stock exchange by market capitalization. Given the financially oriented nature of the United States as a capital country, the condition of the US economy is often mirrored in its capital market (Agudelo and Múnica, 2023). Investors worldwide frequently turn to the DJIA as a benchmark for assessing the global economy due to the contagion effect theory or the domino effect associated with international capital market integration. As highlighted by Yang and Lim (2004), the accelerating pace of globalization augments capital flows and fosters economic interdependence among nations. This heightened interconnectedness increases the likelihood of transmission between global stock exchanges during periods of crisis or economic recovery.

2.7. Research hypotheses

- H1: US 10-Year Bond Yield and US-1 Year Treasury Bills have both short-term and long-term negative impacts on the Jakarta Islamic Index (JII-30) and FTSE Bursa Malaysia Hijrah Shariah (FTSEM).

This hypothesis finds support in the research findings of Ferriani (2021), Indriawan et al. (2021), Aizenman et al. (2018), Rai and Suchanek (2014) all of whom assert that the Tapering-off policy exerts an effect on asset sell-offs in various developing countries. However, contradictory results emerge from Maduma's (2015) research, which suggested that the discourse surrounding the Tapering-off announcement did not yield a significant impact on the IHSG.

- H2: The USD/IDR exchange rate and the USD/MYR exchange rate have both short-term negative impacts on the Jakarta Islamic Index (JII-30) and the FTSE Bursa Malaysia Hijrah Shariah (FTSEM), respectively.

This research hypothesis gains support from the findings of Zarei et al. (2019), Hajilee and Al Nasser (2014), dan Cheung and Sengupta (2013) that collectively asserted that the USD/IDR and USD/MYR exchange rate exerts a significant negative influence on Stock Prices Index.

- H3: Dow Jones Industrial Average has both short-term and long-term positive impacts on the Jakarta Islamic Index (JII-30) and FTSE Bursa Malaysia Hijrah Shariah (FTSEM).

This research hypothesis is supported by the findings of Beureukat and Andriani (2021), Iwanicz-Drozowska et al. (2021), dan Boubaker et al. (2016) that stated that Dow Jones Industrial Average (DJIA) has a significant positive influence on Stock Prices Index.

3. Methodology

This research aimed to investigate the impact of the Federal Reserve's policy, specifically Tapering, on the resilience of Sharia stock prices in the Jakarta Islamic Index (JII-30). The methodology employed in this study was quantitative. Quantitative research methods, as defined by (Kasiram, 2010) involve the use of numerical data for

analysis to achieve research objectives. This research was categorized as an associative (relationship) type, falling under the explanatory research type, as it would identify the influence between variables (Sugiyono, 2015). The operational definitions of the variables in this study can be seen in **Table 1**.

Table 1. Operational definition of variables.

Variable	Definition	Units of measurement	Sources
Dependent variable			
Jakarta Islamic Index (JII)	An index consisting of 30 sharia shares in Indonesia with the largest capitalization and liquidity listed on the Indonesian Stock Exchange	Basis Point Equals	Investing.com
FTSE Bursa Malaysia Hijrah Shariah (FTSEM)	An index consisting of 30 sharia shares in Malaysia with the largest capitalization and liquidity listed on the Kuala Lumpur Stock Exchange	Basis Point Equals	Investing.com
Independent variable			
US 10-Year Bond Yield (BOND)	United States bond yield with a tenor of 10 years; There is a tendency for yields to increase when the Fed Funds Rate is increased by the Fed	Percent	The Fed and Investing.com
US 1-Year Treasury Bills (T_BILLS)	United States bond yield with a tenor of 1 year; There is a tendency for yields to increase when the Fed Funds Rate is increased by the Fed	Percent	The Fed and Marketwatch.com
USD/IDR Exchange Rate (KURSI)	A country's currency exchange rate (USD value against IDR)	Rupiah	Investing.com
USD/MYR Exchange Rate (KURSM)	A country's currency exchange rate (USD value against MYR)	Ringgit	Investing.com
Dow Jones Industrial Index (DOW)	An index containing 30 blue-chip stocks in America; This index can be used as a reference to see economic conditions between countries	Basis Point Equals	Investing.com

Source: The researchers (2023).

This research relied on secondary data obtained from various official websites, including the Federal Reserve, investing.com, and marketwatch.com. Data collection ran on a weekly basis throughout the period from January 2022 to December 2022, and the measuring scale for the five variables was the ratio. The author took data in 2022 to determine the first time effect on the bond market where the bond market in the US can affect the flow of foreign capital out or into emerging market countries. The first time effect will signal whether tapering has a good impact or even a bad impact in the short and long term for Indonesia and Malaysia as developing countries.

The chosen data analysis method for the research as the Error Correction Model (ECM), utilizing Eviews 10 as the statistical tool. Researchers opted for this method because time series data, commonly employed in the study, often lacks stationarity at the level of differentiation. This situation can lead to biased regression, where the independent variable is not significant, but the coefficient of determination (R_{squared}) remains high (Gujarati and Porter, 2009). Thus, the Error Correction Model (ECM) analysis was utilized to mitigate the risk of false regression.

The stages involved in this ECM analysis method include a data stationarity test, cointegration test, model feasibility test using the Ramsey RESET Test method, model stability test, classical assumption test, short-term and long-term ECM tests, as well as f-tests and t-tests. The method is elucidated by the following equation models:

Model 1 (Indonesia):

$$\Delta JII_t = \beta_0 + \beta_1 \Delta BOND_t + \beta_2 \Delta T_BILLS_t + \beta_3 \Delta KURSI_t + \beta_4 \Delta DOW_t + \beta_5 ECT(-1) + \mu_t$$

where,

ΔJII_t = Changes in the Jakarta Islamic Index for period t ;
 β_0 = Constant;
 $\beta_1, \beta_2, \beta_3, \beta_4$ = Coefficients of the independent variables;
 β_5 = ECT Constant (-1);
 $\Delta BOND_t$ = Change in US 10-Year Bond Yield for period t ;
 ΔT_BILLS_t = Changes in US 1-Year Treasury Bills for period t ;
 $\Delta KURSI_t$ = Changes in the USD/IDR Exchange Rate for period t ;
 ΔDOW_t = Changes in Dow Jones Index for period t ;
 ECT(-1) = Error Correction Term;
 μ_t = Estimated Error.

Model 2 (Malaysia):

$$\Delta FTSEM_t = \beta_0 + \beta_1 \Delta BOND_t + \beta_2 \Delta T_BILLS_t + \beta_3 \Delta KURSM_t + \beta_4 \Delta DOW_t + \beta_5 ECT(-1) + \mu_t$$

where,

$\Delta FTSEM_t$ = Changes in FTSE Bursa Malaysia Hijrah Shariah for period t ;
 β_0 = Constant;
 $\beta_1, \beta_2, \beta_3, \beta_4$ = Coefficients of the independent variables;
 β_5 = ECT Constant (-1);
 $\Delta BOND_t$ = Change in US 10-Year Bond Yield for period t ;
 ΔT_BILLS_t = Changes in US 1-Year Treasury Bills for period t ;
 $\Delta KURSM_t$ = Changes in the USD/MYR Exchange Rate for period t ;
 ΔDOW_t = Changes in Dow Jones Index for period t ;
 ECT (-1) = Error Correction Term;
 μ_t = Estimated Error.

4. Findings

4.1. Unit root test

In research employing the Error Correction Model (ECM), the initial step involves conducting a stationarity test. This test holds significant importance to prevent spurious regression when analyzing time series data (Gujarati and Porter, 2009). All variables undergo a unit roots test, utilizing the Augmented Dickey-Fuller (ADF) test. The purpose of this test is to ascertain whether the variables exhibit stationarity at a specific level of differentiation. The results of stationarity testing of this study can be seen in **Table 2**.

Table 2. Data stationarity test results.

Variable	Level		1st Difference	
	T-Statistics	Probability	T-Statistics	Probability
JII	-2.315954	0.1710	-8.383470	0.0000
FTSEM	-1.371976	0.5887	-5.844712	0.0000
BOND	-1.220989	0.6585	-7.032137	0.0000
T_BILLS	-0.953603	0.7628	-8.701983	0.0000
KURSI	-0.284763	0.9197	-9.162821	0.0000
KURSM	-1.692619	0.4288	-4.462016	0.0007
DOW	-2.472816	0.1280	-6.595989	0.0000

The decision criterion for the stationarity test is to use $\alpha = 5\%$ or 0.05. If the probability associated with the variable is < 0.05 , it is concluded to be stationary. Consequently, based on this criterion, all variables presented in the table above are deemed stationary at the first difference.

4.2. Cointegration test (Engle-Granger)

Cointegration test is needed to determine whether the models in the long and short term are related. **Table 3** presents the results of the cointegration test.

Table 3. Cointegration test results.

	Indonesia		Malaysia	
	T-Statistics	Probability	T-Statistics	Probability
Augmented dickey-fuller test statistic	-4.541736	0.0006	-3.413118	0.0150

In the Engle-Granger cointegration test, a significant condition for cointegration is that the Error Correction Term (ECT) must be significant at the level. As per the findings in the table above, the cointegration test reveals an ECT probability value of < 0.05 . A value of less than 0.05 signifies the presence of a long-term cointegration relationship in the equation.

4.3. Stability model test

The results of the model stability test for Indonesia can be seen in **Figure 2** and Malaysia can be seen in **Figure 3**.

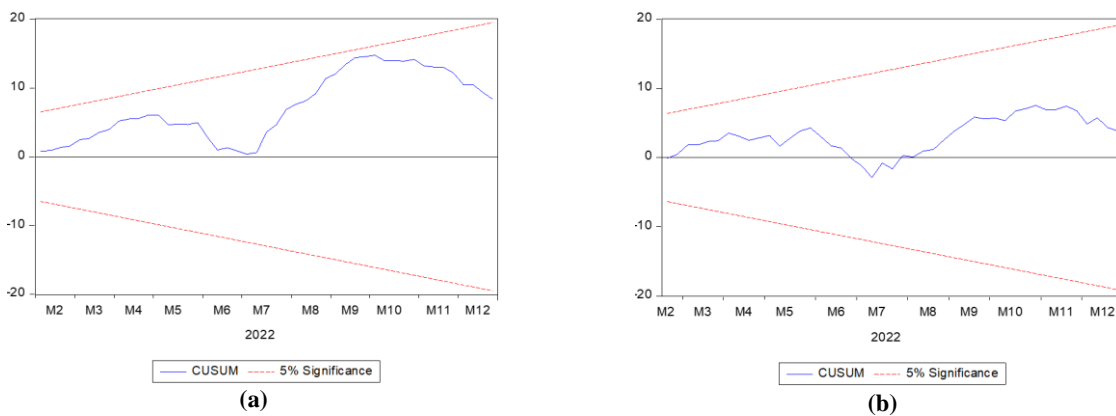


Figure 2. Cusum test for Indonesia. (a) long-term stability; (b) short-term stability.

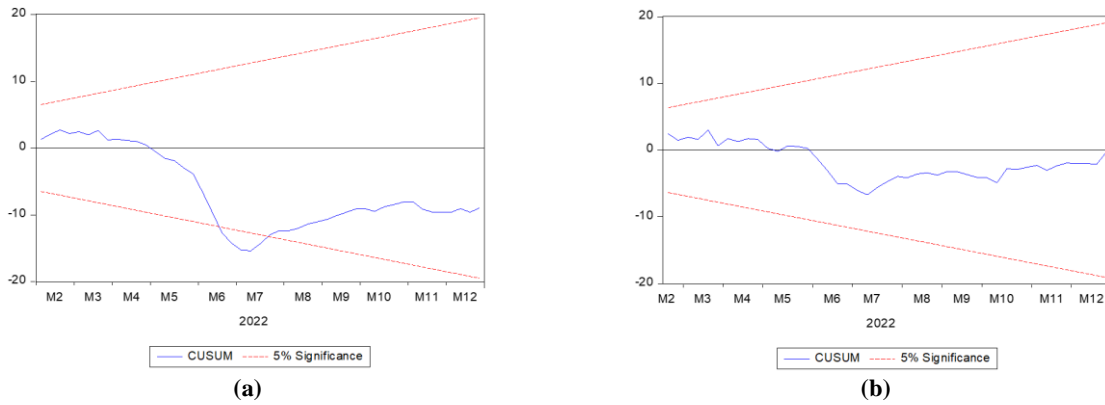


Figure 3. Cusum test for Malaysia. **(a)** long-term stability; **(b)** short-term stability.

The **Figure 3** indicate that the short-term and long-term models employed by the researchers demonstrate parameter stability, as the cumulative recursive residual values fall within the expected range. An exception is noted in the long-term model for Malaysia, where a negative shock occurred in the 7th month, leading to parameter instability.

4.4. Collinearity test

Several classical assumption tests were conducted to obtain more valid estimation results. **Table 4** shows the results of multicollinearity testing.

Table 4. Multicollinearity test results.

Indonesia		Malaysia	
Variable	Centered VIF	Variable	Centered VIF
D(BOND)	1.308830	D(BOND)	1.535366
D(T_BILLS)	1.076759	D(T_BILLS)	1.098420
D(KURSI)	1.482758	D(KURSP)	1.421835
D(DOW)	1.199034	D(DOW)	1.111123
ECT (-1)	1.264316	ECT (-1)	1.106717

The VIF value used as a threshold for detecting multicollinearity is typically set at $VIF > 10$ (Gujarati and Porter, 2009). As presented in the table above, all independent variables exhibit centered VIF values below 10, indicating that the models successfully pass the multicollinearity test.

4.5. Heteroscedasticity test

Table 5. Heteroscedasticity test results.

Indonesia				Malaysia			
F-statistic	2.164313	Prob. F (20, 30)	0.0271	F-statistic	1.528535	Prob. F (20, 30)	0.1430
Obs*R-squared	30.12296	Prob. Chi-Square (20)	0.0679	Obs*R-squared	25.74027	Prob. Chi-Square (20)	0.1746
Scales explained SS	18.78750	Prob. Chi-Square (20)	0.5357	Scales explained SS	18.60230	Prob. Chi-Square (20)	0.5478

Based on **Table 5**, can be seen the indication that a model is free from heteroscedasticity issues is observed when the Obs*R-squared probability test yields a value greater than 0.05, corresponding to a significance level of 5% (alpha 5%). In this case, the Chi-square probability value of Obs*R-squared for each model is >0.05, suggesting that the models successfully avoid heteroscedasticity problems.

4.6. Serial Correlation LM Test

Lastly, the results of the autocorrelation test can be seen in **Table 6**.

Table 6. Autocorrelation test results.

Indonesia			Malaysia				
F-statistic	0.238463	Prob. F (2, 43)	0.7889	F-statistic	1.335012	Prob. F (2, 43)	0.2738
Obs*R-squared	0.559452	Prob. Chi-Square (2)	0.7560	Obs*R-squared	2.981632	Prob. Chi-Square (2)	0.2252

An indicator that a model mitigates heteroscedasticity issues is when the ObsR-squared probability from the test yields a value greater than 0.05, corresponding to a significance level of 5% (alpha 5%). In this case, the chi-square probability of ObsR-squared for each model is > 0.05, suggesting that the models are free from autocorrelation problems.

4.7. Short Term Results

Table 7 shows the results of the short-term ECM test. There are similarities and differences regarding the effect of tapering off in Indonesia and Malaysia.

Table 7. Short term ECM test results.

Indonesia			Malaysia		
Variable	Coefficient	Prob	Variable	Coefficient	Prob
C	1.124910	0.4660	C	10.81952	0.6976
D(BOND)	22.42626	0.0327*	D(BOND)	-65.90730	0.7453
D(T_BILLS)	-0.933261	0.8655	D(T_BILLS)	-143.4564	0.1635
D(KURSI)	-0.052249	0.0016*	D(KURSM)	-750.3864	0.3926
D(DOW)	0.002424	0.1703	D(DOW)	0.085341	0.0078*
ECT (-1)	-0.487843	0.0011*	ECT (-1)	-0.258592	0.0148*
R-Squared		0.335641	R-Squared		0.332877
F-Statistic		4.546894	F-Statistic		4.490772
Prob(F-Statistic)		0.001933*	Prob(F-Statistic)		0.002099*

*Significance level of 0.05.

Based on the estimation results, the ECM model equation in the short term was obtained as follows:

$$\Delta JII_t = 1.124910 + 22.42626\Delta BOND_t - 0.052249\Delta KURSI_t - 0.487843ECT(-1) + \mu_t \quad (1)$$

$$\Delta FTSEM_t = 10.81952 + 0.085341\Delta DOW_t - 0.258592ECT(-1) + \mu_t \quad (2)$$

Based on the short-term ECM regression results, it is evident that the error correction model (ECT) coefficient for both Indonesia and Malaysia are negative and

statistically significant. These findings validate the models, as they indicate that the correction factor for the imbalances in the changes of JII and FTSEM during one period is -0.487843 and -0.258592 basis points (BPS) in the subsequent period. This implies an adjustment toward equilibrium.

It is anticipated that the direction of the short-term independent variables' influence aligns with the direction of the long-term independent variables' influence. Additionally, the *F*-Statistics probability values for Indonesia and Malaysia are significant, signifying that, in the short term, changes in the US 10-Year bond yield, US 1-Year Treasury Bills Yield, exchange rate, and Dow Jones Index collectively exert a significant influence on JII and FTSEM.

Examining the short-term ECM model reveals that the R-Square values for Indonesia and Malaysia are 0.3356 and 0.3328, respectively. These values indicate that the combination of independent variables in the models can explain changes in JII by 33.56% and for FTSEM by 33.28%.

Moreover, in the short-term ECM model for Indonesia, individual analysis reveals that changes in the variables US 10-Year Bond Yield and Exchange Rate each exert a significant influence on JII, whereas changes in the US 1-Year Treasury Bills and Dow Jones Index are not statistically significant. The effect of the US 10-Year Bond Yield on JII is positive. Assuming other factors remain constant (*ceteris paribus*), a 1 percent increase in the US 10-Year Bond Yield is associated with an average change in JII of 22.42626 basis points (BPS). Conversely, Exchange Rate has a negative impact on JII, indicating that every weakening of the Indonesian Rupiah by 1 unit against the USD leads to an average decrease in the value of JII by 0.052249 BPS under the *ceteris paribus* assumption.

Conversely, in the case of Malaysia, the short-term ECM model indicates that only the variable Dow Jones Index has a significant influence, while the variables US 10-Year Bond Yield, US 1-Year Treasury Bills, and Exchange Rate do not exert a significant influence on FTSEM. The influence of Dow Jones Index is positive; for every 1 basis point increase in Dow Jones Index, the average change in FTSEM increases by 0.085341 BPS under the *ceteris paribus* assumption.

4.8. Long term results

Table 8 presents the results of the long-run ECM test. Unlike the short-term test results where there are quite a lot of differences, in the long-term model the difference is only seen in the US 1-Year Treasury Bills variable between Indonesia and Malaysia.

Table 8. Long term ECM test results.

Indonesia			Malaysia		
Variable	Coefficient	Prob	Variable	Coefficient	Prob
C	1289.221	0.0000*	C	16355.77	0.0000*
BOND	31.83498	0.0000*	BOND	651.0076	0.0008*
T_BILLS	14.21977	0.0063*	T_BILLS	-341.9786	0.0000*
KURSI	-0.061876	0.0000*	KURSM	-2353.813	0.0003*

Table 8. (Continued).

Indonesia			Malaysia		
Variable	Coefficient	Prob	Variable	Coefficient	Prob
DOW	0.002822	0.0315*	DOW	0.147836	0.0000*
R-Squared		0.666301	R-Squared		0.832368
F-Statistic		23.46139	F-Statistic		58.34395
Prob(F-Statistic)		0.000000*	Prob(F-Statistic)		0.000000*

*Significance level of 0.05.

Based on the estimation results, the long-term ECM model equation was obtained as follows:

$$JII_t = 1289.221 + 31.83498BOND_t + 14.21977T_BILLS_t - 0.061876KURSI_t + 0.002822DOW_t + \mu_t \quad (3)$$

$$FTSEM_t = 16,355.77 + 651.0076BOND_t - 341.9786T_BILLS_t - 2353.813KURSM_t + 0.147836DOW_t + \mu_t \quad (4)$$

The F-Statistics probability values for both the Indonesian and Malaysian models are significant, indicating that in the long term, the variables US 10-Year Bond Yield, US 1-Year Treasury Bills, Exchange Rates, and Dow Jones Index collectively influence the JII and FTSEM indices. Examining the long-term ECM model reveals R-Square values for Indonesia and Malaysia of 0.6663 and 0.8323, respectively, indicating that the combination of independent variables in the model can explain changes in JII by 66.63%, and for FTSEM by 83.23%.

In the long-term ECM model equation for Indonesia, all independent variables exhibit a significant influence. The impact of the US 10-Year Bond Yield, US 1-Year Treasury Bills, and Dow Jones Index is positive, while Exchange Rate exerts a negative influence on the JII. Specifically, a 1 percent increase in the US 10-Year Bond Yield is associated with an increase in the JII value by 31.83498 BPS. Similarly, a 1 percent increase in US 1-Year Treasury Bills leads to an increase in the JII value by 14.21977 BPS. Furthermore, a 1 BPS increase in Dow Jones Index results in an increase in the JII value by 0.002822 BPS. On the other hand, every 1 Rupiah weakening against the USD leads to a decrease in the JII value by 0.061876 BPS, assuming ceteris paribus.

For the long-term ECM equation model in Malaysia, all independent variables also exhibit a significant influence. However, there is a distinction in the impact of the variable US 1-Year Treasury Bills, where its influence on the FTSEM value is negative. In contrast, the influence of the remaining variables—US 10-Year Bond Yield, Exchange Rate, and Dow Jones Index—aligns with the direction of influence observed in the long-term ECM model for Indonesia. Specifically, every 1 percent increase in US 1-Year Treasury Bills has a negative impact, leading to a weakening of the FTSEM value by 341.9786 BPS. Meanwhile, for the remaining variables, every 1 percent increase in the US 10-Year Bond Yield is associated with an increase in the FTSEM value by 651.0076 BPS. Additionally, every time there is a weakening of the Malaysian Ringgit against the USD, it results in a decrease in the FTSEM value by 2353.813 BPS. Furthermore, every 1 BPS increase in Dow Jones Index leads to an increase in the FTSEM value by 0.147836 BPS, assuming ceteris paribus. To simplify the comparison of the effect of tapering off between Malaysia and Indonesia, the researcher presents **Table 9** as an overview of the research results.

Table 9. Comparison of short- and long-term ECM results.

Variable	Short term		Long term	
	Indonesia	Malaysia	Indonesia	Malaysia
US 10-Year Bond Yield	Positive	Insignificant	Positive	Positif
US 1-Year Treasury Bills	Insignificant	Insignificant	Positive	Negatif
Exchange Rate	Negative	Insignificant	Negative	Negatif
Dow Jones Index	Insignificant	Positive	Positive	Positif

Source: the researchers (2023).

Based on the short-term ECM regression results, notable differences emerge between Indonesia and Malaysia concerning the impact of Tapering, proxied by the US 10-Year Bond Yield and US-1 Year Treasury Bills, on their respective Sharia stock indices (JII for Indonesia and FTSEM for Malaysia). In the short term, there is a positive influence on one of Tapering proxies—specifically, the US 10-Year Bond Yield on JII—while there is no significant influence on FTSEM during this period. Moreover, variations in influence are observed for the control variables, namely Exchange Rate and Dow Jones Index, in the short term.

Moving to the long-term ECM results, differences persist in the influence of one of Tapering proxies, namely the US 1-Year Treasury Bills variable. In the long term, Tapering, as proxied by US-1 Year Treasury Bills, exhibits a positive influence on JII in Indonesia but a negative impact on FTSEM in Malaysia. Meanwhile, the remaining variable, namely the US 10-Year Bond Yield (also a proxy for Tapering), along with the two other control variables—Exchange Rate and Dow Jones Index—demonstrate consistent influence across both countries.

5. Discussion

A comparative analysis of the impact of the Tapering policy on Indonesia and Malaysia holds significant importance in research. Both countries fall under the classification of emerging markets, and when the United States implements a tapering policy, it carries the potential to induce capital outflows from emerging markets. Investors often perceive the United States as a safer haven for their equity amid global economic instability (Mankiw, 2006). Consequently, understanding the actual conditions during the implementation of the Tapering policy is crucial, particularly in the context of the sharia capital market in Indonesia and Malaysia in 2022.

5.1. Effect of Tapering (US 10 Year Bond Yield and US I Year Treasury Bills) on JII and FTSEM

The short-term ECM regression results reveal that Tapering, proxied by the US 10-Year Bond Yield and US 1-Year Treasury Bills, does not exhibit a significant impact on the Malaysian FTSEM index. Conversely, the JII index in Indonesia experiences a positive impact. These short-term findings depict an anomalous condition, as per Mankiw’s (2006) theory, wherein an increase in benchmark interest rates or US bonds typically triggers capital outflows in emerging market countries such as Indonesia and Malaysia. However, this short-term anomaly can be explained by the relatively stable economic conditions in both Indonesia and Malaysia. **Figure**

4 shows the data of GDP growth and inflation in ASEAN countries.

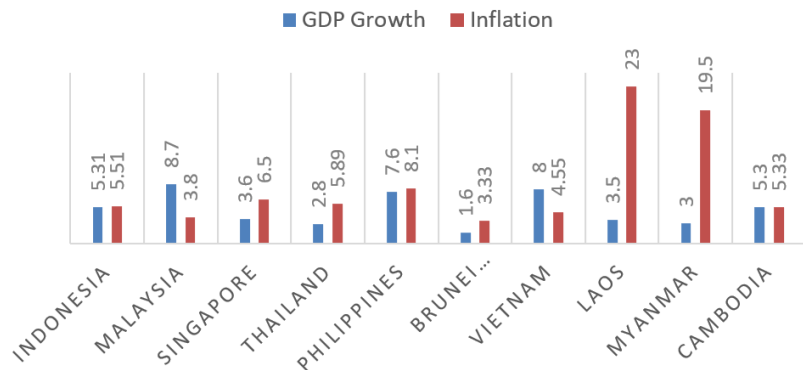


Figure 4. GDP growth in ASEAN 2022.

Source: Trading economics, processed (2023).

The figure above illustrates the crucial role of relatively stable economic conditions in Indonesia and Malaysia, among other ASEAN countries, in mitigating the negative impact of the tapering policy—a phenomenon that often poses potential risks to the economies of developing nations (Creel et al., 2015). The stability in economic conditions acts as a resilience factor against market fluctuations and potential increases in interest rates during the Tapering period. This stability fosters investor confidence, ensuring that investments continue to flow into countries with robust economic fundamentals and positive growth prospects (Creel et al., 2015). Other research also supports the notion of a positive causal relationship between economic stability and capital markets, where both variables mutually reinforce each other (Nazir et al., 2010).

Moreover, in the long term, the research findings indicate differences in the impact of Tapering, proxied by the US 1-Year Treasury Bills variable. In Malaysia, an increase in US 1-Year Treasury Bills has a negative impact on FTSEM, while in Indonesia, it exhibits a positive impact on JII. This phenomenon can be explained by several factors, including the monetary policy responses adopted by the central banks of Indonesia and Malaysia in the face of an increase in the US benchmark interest rate (Fed Funds Rate). **Figure 5** can be seen how the interest rate policy between Indonesia and Malaysia in maintaining the interest rate spread with the United States.

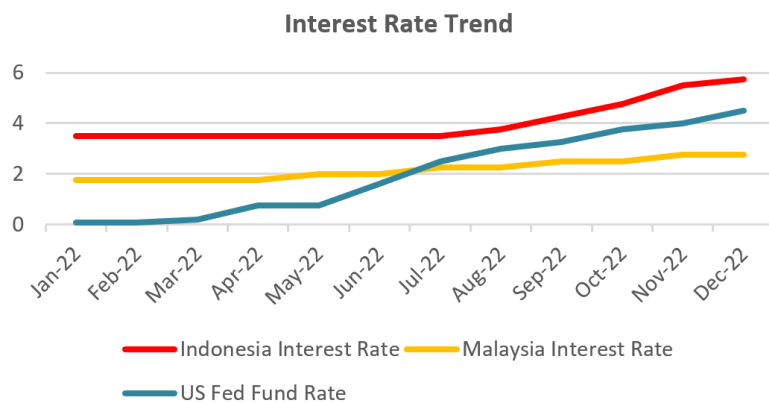


Figure 5. Trend of JII and FTSEM.

Source: Trading economics, processed (2023).

In the depicted figure, it is evident that Bank Indonesia’s response, as the central bank, to adjustments in the Fed Fund Rate plays a crucial role in upholding the stability of the domestic economy and the Indonesian stock market. Swift and appropriate reactions by the Central Bank to changes in US interest rates contribute to managing inflation risks, ensuring exchange rate stability, and regulating capital inflows or outflows (Dinçer et al., 2019). Well-considered adjustments can ultimately help alleviate potential adverse impacts on the Indonesian economy and stock market.

Moreover, the figure illustrates that the Indonesian Central Bank’s response to the Fed Fund Rate increase was more favorable compared to that of the Malaysian Central Bank. Indonesia’s benchmark interest rate consistently remains above the Fed Funds Rate, aiming to maintain spreads and minimize capital outflows. In contrast, Malaysia’s benchmark interest rate has been below the Fed Funds Rate since July, posing the risk of capital outflows, particularly as Malaysia, being an emerging market, is highly sensitive to macroeconomic conditions and policies from developed countries, notably the United States (Banerjee et al., 2016). The significance of maintaining the spread between Indonesian and Malaysian benchmark interest rates and the Fed Fund Rate is evident in the trends of the JII and FTSEM stock indices below. **Figure 6** shows the movement trend of JII and FTSEM.

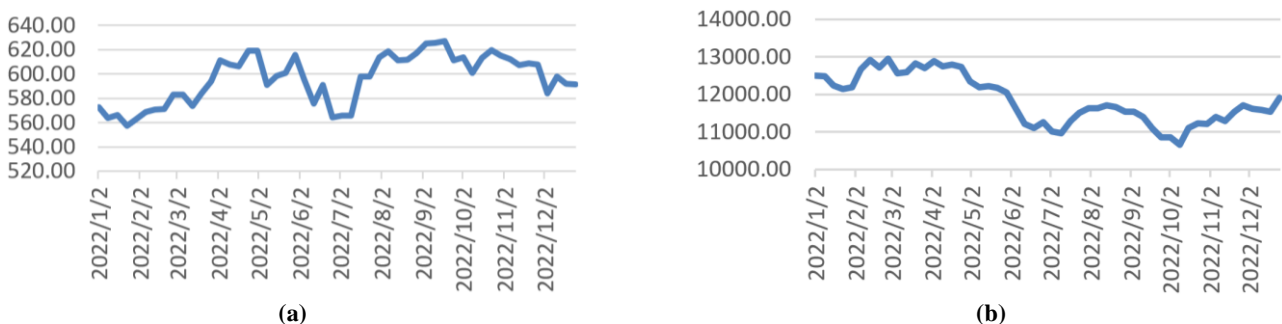


Figure 6. Tren JII and FTSEM. (a) JII Trend; (b) FTSEM Trend.

Source: Investing, processed (2023).

Analyzing the figures above, a pivotal juncture in the disparity between the trends of JII and FTSEM is evident in the 7th month, or July. The repercussions of the pronounced tapering in the preceding month are well anticipated, as reflected in the JII trend in Indonesia, which undergoes a significant upswing, albeit with a moderate downward fluctuation. In contrast, Malaysia’s trend, post-July, exhibits an increase that is not as pronounced as Indonesia’s, and the subsequent month witnesses a fairly substantial decline. This underscores the significance of maintaining a divergence between domestic benchmark interest rates, particularly in emerging market countries, and the Fed Funds Rate to mitigate the occurrence of excessive capital outflows.

Another contributing factor to the disparate impact of the Tapering policy, as indicated by US 1-Year Treasury Bills, between the two countries is the upward trajectory in coal commodity prices. The heightened demand for coal in 2022 is anticipated to lead to a substantial increase in commodity prices. **Figure 7** shows the trend of coal price movement in 2022.

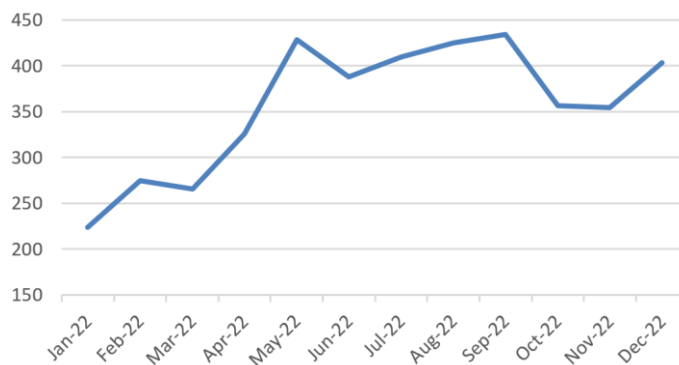


Figure 7. Coal price trends in 2022.

Source: Investing, processed (2023).

In the JII index, several coals mining companies, including Adaro Energy Indonesia Tbk (ADRO), Aneka Tambang Tbk (ANTM), Barito Pacific Tbk (BRPT), Harum Energy Tbk (HRUM), Indo Tambangraya Megah Tbk (ITMG), Bukit Asam Tbk (PTBA), and United Tractors Tbk (UNTR), play a significant role. A surge in commodity prices positively impacts the stock index by boosting the income and profitability of companies involved in commodity production, export, or processing (Ildirar and Iscan, 2016; Kang et al., 2020). Consequently, investors express interest in investing, leading to an increase in the share prices of coal mining companies. Given that seven out of the 30 companies in JII are engaged in mining, particularly coal mining, this condition contributes to the overall upward trajectory of the JII index. This dynamic elucidates why the Tapering policy, which might be expected to have a negative impact, actually manifests as a positive influence on JII.



Figure 8. BOND and T_Bills trends.

Source: Investing, processed (2023).

Turning to the long-term effects of the Tapering policy, represented by the US 10-Year Bond Yield, both Indonesia and Malaysia experience a positive influence, contrary to the expected negative impact. The discrepancy in the impact between the US 10-Year Bond Yield and US 1-Year Treasury Bills on stock indices in Indonesia and Malaysia can be attributed to various factors, including differences in tenor length,

liquidity levels, and return rates between the two instruments (Becker and Ivashina, 2015; Field et al., 2022). An increase in interest rates on the US 10-Year Bond Yield may signify expectations of long-term economic growth (Zaloom, 2009), fostering positive sentiment among investors and encouraging capital inflows to developing countries such as Indonesia and Malaysia. Conversely, US 1-Year Treasury Bills, being more liquid and responsive to changes in US monetary policy, can be employed by investors as a security tool amid short-term volatility. A rise in short-term interest rates has the potential to prompt some investors to opt for more liquid instruments, such as US 1-Year Treasury Bills, influencing stock markets in emerging market countries like Indonesia and Malaysia. **Figure 8** shows the movement trend of BOND and T_Bills in 2022.

Additionally, the inclination towards higher yields on US 1-Year Treasury Bills over US 10-Year Bond Yields, starting in July, could be a compelling factor encouraging investors to favor the former. This preference is reinforced by the argument that US 1-Year Treasury Bills offer investors quicker access to returns on their capital. In an environment where US interest rates have the potential to rise continuously, US 1-Year Treasury Bills can yield higher returns over short periods, making them an attractive option for investors seeking to maximize income without committing to longer-term, less liquid assets, such as US 10-Year Bond Yields. Consequently, an increase in the yield value of US 10-Year Bond Yields is unlikely to exert a negative impact on Indonesia and Malaysia. Conversely, the rise in the yield value of US 10-Year Bond Yields tends to foster positive sentiment among investors by signaling expectations of long-term economic growth in the United States, thereby encouraging capital inflows to developing countries such as Indonesia and Malaysia.

5.2. Effect of Exchange Rate on JII and FTSEM

The ECM regression results presented above indicate that both in the short and long term, the exchange rates of individual countries against the USD exert a negative influence on both JII and FTSEM. These findings align with research conducted by Zarei et al. (2019), Hajilee and Al Nasser (2014), and Cheung and Sengupta (2013). This negative impact is attributed to the depreciation of exchange rates, which can elevate the financial burden on companies and diminish their income, particularly those actively engaged in export and import activities (Cheung and Sengupta, 2013). **Figure 9** shows the trend of exchange rate movement on the Islamic stock index in Indonesia (JII) and Malaysia (FTSEM).

The figures below illustrate negative trends in the JII and FTSEM indices concerning the exchange rates of each country. In Indonesia, the USD/IDR exchange rate has been on the rise since April 2022, reflecting a depreciation of the Indonesian exchange rate driven by market reactions, including the effects of capital outflows, notably triggered by Tapering. Notably, the USD/IDR exchange rate peaked in October 2022 at IDR 15,735, coinciding with the lowest value of the JII index in that month at 600.63 basis points.

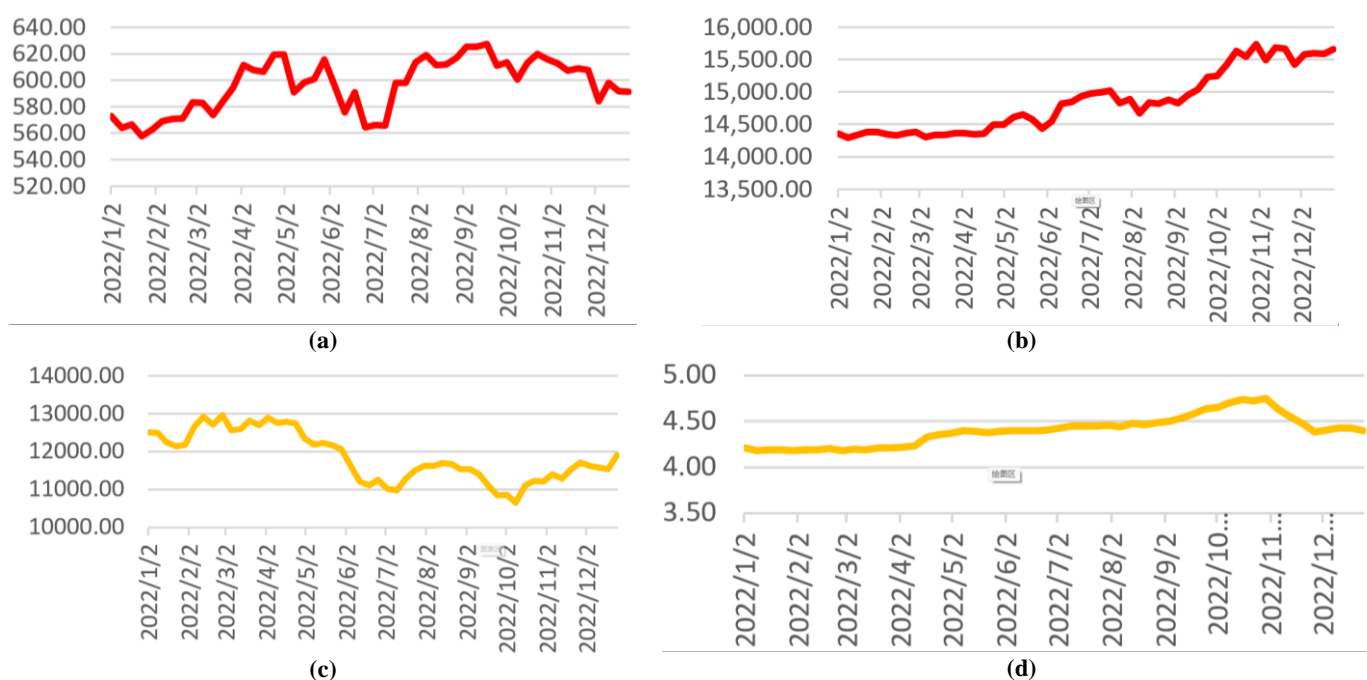


Figure 9. Comparison of JII and FTSEM trends on exchange rates. (a) JII trend; (b) USD/IDR exchange rate trend; (c) FTSEM trend; (d) USD/MYR exchange rate trend.

Source: Investing, processed (2023).

Similarly, Malaysia exhibits a comparable scenario, with the Malaysian ringgit (RM) experiencing substantial depreciation in October 2022, reaching around RM 4.75. This aligns with the lowest recorded value of the FTSEM index in the same month, standing at 10,648.21 basis points.

Several factors contribute to this situation, including a decrease in the exchange rates of Indonesian and Malaysian domestic currencies against the USD, leading to increased import costs. This, in turn, has a negative impact on companies reliant on imported raw materials or components (Bhargava and Konku, 2023). In the manufacturing sector, companies may face pressure on profit margins due to a declining exchange rate, potentially impacting the performance of company shares and causing an overall decline in the stock index. Additionally, a weakened exchange rate can contribute to economic uncertainty, diminishing investor confidence. This uncertainty may prompt foreign investors to withdraw from the Indonesian and Malaysian stock markets, further influencing stock indices. Investors often seek more stable alternatives or steer clear of volatile foreign currency risks in such situations.

5.3. Effect of Dow Jones Industrial Average on JII and FTSEM

Based on the ECM regression results presented above, it is evident that both in the short and long term, Dow Jones Industrial Average exerts a positive influence on both JII and FTSEM. These findings align with the research conducted by Beureukat and Andriani (2021), Iwanicz-Drozdowska et al. (2021), dan Boubaker et al. (2016). The positive impact of the Dow Jones Industrial Average value on the JII and FTSEM indices can be attributed to its status as a globally monitored index, serving as a key reference for gauging the world economy.

Additionally, this positive influence can be explained through the Contagion Effect Theory, as described by Yang and Lim (2004). This theory posits that the rapid flow of globalization enhances capital flows and creates economic interdependence between countries. Specifically, it focuses on how stock market movements in developed countries, such as the United States, can propagate or “infect” stock markets in developing countries (Davidescu et al., 2023). Notably, significant gains in the Dow Jones often signify optimism in global financial markets, potentially triggering an increase in foreign investment. In this context, foreign investors may seek opportunities in the stock markets of developing countries like Indonesia and Malaysia. This dynamic is implicitly reflected in the figures below. **Figure 9** shows the movement trend of the JII, FTSEM and Dow Jones index.

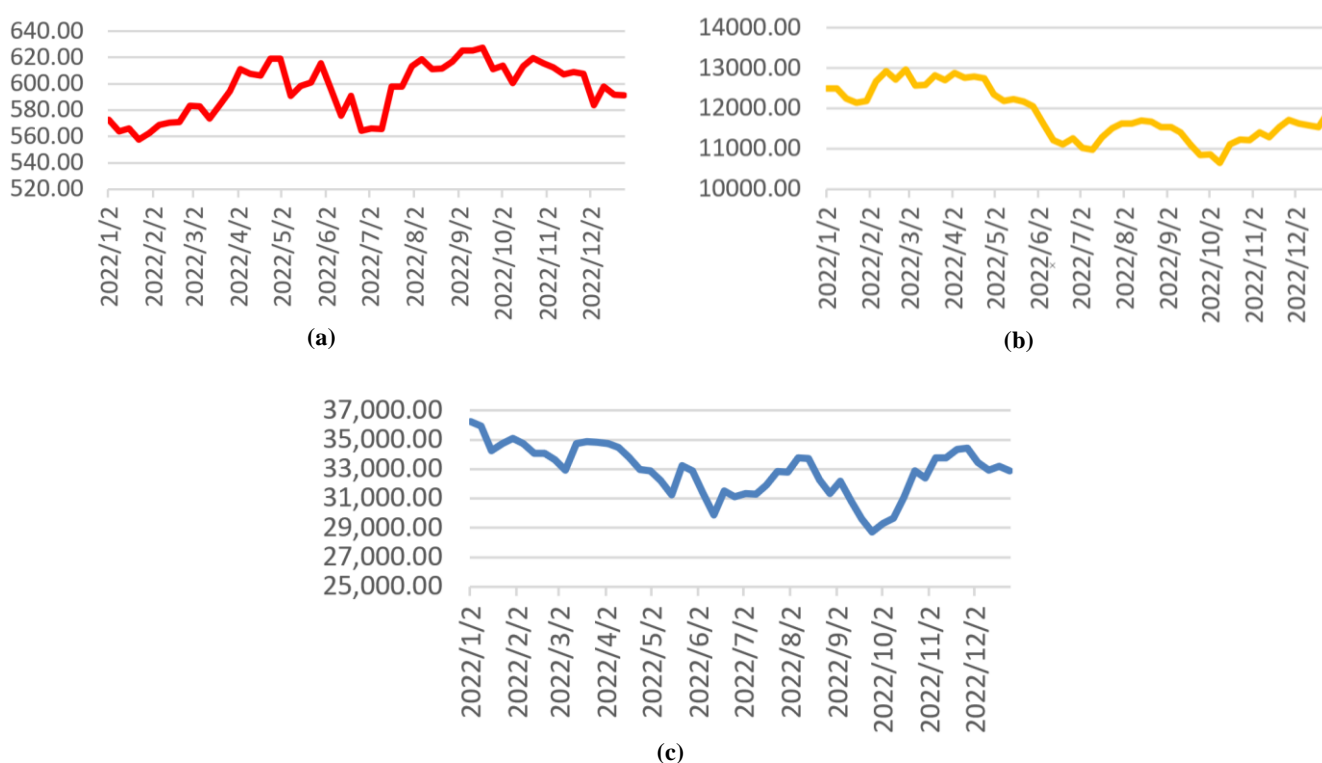


Figure 10. Comparison of JII, FTSEM, and DOW Jones trends. (a) JII trend; (b) FTSEM trend; (c) DOW Jones trend. Source: Investing, processed (2023).

The **Figure 10** illustrate that the short-term and long-term trend patterns of FTSEM and Dow Jones exhibit a similar trajectory, aligning with the ECM regression values that have been conducted. Conversely, in Indonesia, a countercyclical trend occurs in the short term, with JII moving in the opposite direction when the Dow Jones trend declines. However, in the long term, both JII and Dow Jones demonstrate nearly identical upward and downward trends. This phenomenon corresponds with the outcomes of the ECM regression analysis.

This phenomenon can be elucidated by the fact that an increase in foreign investment, represented by investment in Dow Jones, has the potential to elevate the demand for shares in the local stock market. This, in turn, can lead to an increase in stock indexes in both countries. Moreover, heightened foreign investment can infuse the necessary capital for the growth of companies in Indonesia and Malaysia, thereby

enhancing the performance of local stocks. Rapid globalization has facilitated substantial openness in capital markets between countries, allowing for the Contagion Effect, which can result in the transmission of stock market trends between countries, both during economic crises and periods of economic recovery.

6. Conclusion

This research offers a detailed perspective on the influence of the Tapering policy and associated factors on financial markets in Indonesia and Malaysia. In the short term, it appears that fluctuations in the US 10-Year Bond Yield and US 1-Year Treasury Bills do not significantly affect the two countries; in fact, in Indonesia, they exhibit a positive impact. In the long term, the Tapering policy surprisingly shows a positive impact on JII in Indonesia and a negative impact on FTSEM in Malaysia. This result is rare in emerging markets, in theory the impact of tapering off policies should have a negative impact on emerging market countries, especially in Indonesia. This result is interesting because the impact of tapering off, which is proxied by the increase in US 10 Year Bond Yield and US 1 Year Treasury Bills yield, actually has a positive impact in Indonesia.

This result could be a theoretical implication that could be due to the proactive measures taken by Bank Indonesia to maintain the spread between Indonesian and US interest rates. The stability of the economy in emerging market countries can avoid excessive capital outflows due to the tapering off policy. Additionally, the rise in coal prices emerges as a crucial factor enabling JII to anticipate substantial outflows, given that 7 of the 30 issuers in JII are coal mining companies. External factors such as surging coal prices act as stabilizing forces, contributing to stock market stability in Indonesia.

Furthermore, the adverse impact of exchange rate fluctuations observed in both countries underscores the serious repercussions of currency exchange rate changes on financial markets. The depreciation of exchange rates can erode a company's net profit margin, subsequently diminishing the company's perceived value in the eyes of investors. Additionally, the identified inter-exchange contagion effect through the Dow Jones Indices confirms that instability in one market can swiftly propagate and impact neighboring countries. As for the potential problems in this research model, unobserved endogenous factors can affect both ECM models. To overcome this problem, future researchers may add instrument variables or control variables to overcome the endogeneity problem.

In navigating the complexities of global economic dynamics, both the Indonesian and Malaysian governments should consider a more active role for artificial intelligence (AI) in formulating and implementing economic policies. Integrating AI into financial data analysis enhances prediction accuracy and understanding of global changes' impact on financial markets. Governments can leverage this technology to design responsive and adaptive policies in the face of rapid economic changes. Alongside this, increasing investment in AI research and development is crucial to ensure the technology's ability to offer profound and accurate insights. Moreover, investors should explore the utilization of AI in portfolio management, providing a competitive advantage. Automated analysis systems assist investors in identifying

opportunities and risks more efficiently, facilitating faster and more informed decision-making. By utilizing the potential of AI, both governments and investors can fortify their preparedness to intelligently and efficiently confront global economic challenges.

Author contributions: Conceptualization, AM and SAP; methodology, MR; software, MR; validation, MR, AR and AG; formal analysis, AG; investigation, AR; resources, SAP; data curation, MR; writing—original draft preparation, MR and SAP; writing—review and editing, SPP for visualization, MR; supervision, AM and AR; project administration, MDAW; funding acquisition, AM. All authors have read and agreed to the published version of the manuscript.

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