

Nexus between the Shariah and Traditional Stock Indices in Bangladesh: Implications of COVID-19 and Russia-Ukraine Crisis

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Abstract: This objective of this study is to investigate the nexus between Shariah and traditional stock indices in the Dhaka Stock Exchange of Bangladesh using co-integration and VAR approaches. The primary results show that the Shariah and traditional both stock indices prices and return positively movement together, however, during the COVID-19 pandemic periods both indices' prices and returns drastically declined. After the pandemic period, the trend has gained positive momentum, surprisingly, the Ukraine-Russia war has again disrupted the positive momentum and prolonged to the downward trend. Furthermore, the empirical findings reveal a lack of enduring correlation between Shariah and traditional stock indices. Intriguingly, the Shariah-based stock index demonstrates Granger causality over the traditional stock index. Additionally, the impulse response function analysis indicates that both Shariah and non-Shariah compliant stock indices exhibit positive responses to each other's shocks. These outcomes carry significant implications for investors, fund managers, and policymakers alike, influencing their decision-making processes and policy formulations in the realm of investments and financial regulations.

Keywords: *Shariah stock index, traditional stock index, the COVID-19 pandemic, Russia-Ukraine crisis, Co-integration, and VAR model.*

1. Introduction

The stock market reflects any country's economic condition, whether the economy is performing well or not. It works as a lifeblood circulation of the economy. In developed and developing countries, the stock market and economic development are integrated part. Moreover, the Stock market is an essential component that link between savers and borrowers, generating liquidity that can assist investors, corporate bodies, and governments for exchanging equities as a readily available key section of economic development (Chikwira and Mohammed, 2023). The convergence of the contemporary COVID-19 pandemic and the Ukraine-Russia geopolitical tensions has ignited discourse regarding the resilience of financial markets, with particular emphasis on the efficacy of Islamic equity markets. Such markets serve as a bulwark against the destabilizing forces inherent in conventional financial systems, mitigating the propagation of market disturbances. Emphatically advocating for the eradication of all proscribed elements within the framework of Shariah, including interest-based

transactions and undue uncertainty, Islamic equity markets substantially diminish the likelihood of recurrent financial crises. Therefore, there is no doubt on the need to adopt the financial market, complying Shariah tenets that diminishes the risk that conventional financial markets undertake in order to have a stable financial markets (Hasan et al., 2022; Taera et al., 2023). An overarching challenge confronting financial markets, particularly equity markets, pertains to effectively managing escalating risks stemming from deepening global economic interconnections. Consequently, this investigation delves into the interplay between Shariah-compliant and conventional stock indices to refine portfolio diversification strategies. The potency of diversification benefits materializes when stock prices exhibit negative correlations, underscoring the viability of portfolio diversification within domestic markets and cross-border counterparts. Grubel (1968) delineates the pursuit of enhanced returns and diminished risks through international portfolio diversification, contrasting with its domestic market counterpart.

Conversely, market integration assumes a pivotal role in nurturing domestic stock markets by fostering robust trade partnerships across global markets, thereby propelling economic advancement. This integration catalyzes enhanced factor productivity, mitigates the cost of capital, and fosters superior corporate governance standards. Furthermore, it bolsters market liquidity and augments market size (Dewandaru, et al., 2014). In tandem with examining stock market co-movements, the concept of financial contagion emerges as a pivotal variable extensively explored in financial literature. Financial contagion denotes a phenomenon wherein the synchronicity across various markets undergoes temporary alterations (Dewandaru et al., 2014). This phenomenon is commonly categorized into two forms: pure and fundamental contagion. Pure contagion denotes the transmission of shocks in an exaggerated manner, transcending idiosyncratic disturbances and fundamental links (Bae et al., 2002; Forbes and Rigobon, 2002). On the other hand, fundamental contagion signifies the propagation of shocks through the interplay of financial market integration and trade relationships (N'Diaye et al., 2010). Given this context, the analysis of co-movements among stock markets assumes particular significance for investors, policymakers, and scholars in emerging economies. However, while a substantial body of literature exists on conventional financial markets, empirical and theoretical research exploring the nature of co-movements between Islamic stock markets and conventional ones, particularly within the context of the Bangladesh stock market, remains scarce.

The primary objective of this study is to investigate the relationship between Shariah-compliant and conventional stock indices performance within the context of the Dhaka Stock Exchange (DSE), Bangladesh. Several rationales underpin the pursuit of this research endeavor. Firstly, it seeks to discern the nature of co-movements in Islamic stock markets, thereby affording international investors the opportunity to diversify their investment portfolios, thereby optimizing returns while mitigating risks. Secondly, while extant literature extensively covers the co-movements of conventional stock markets, particularly in developed countries, scant attention has been paid to examining the co-movement and integration of Shariah-compliant stock market indexes, with notable exceptions such as the works of Arshad and Rizvi (2013), Majdoub and Mansour (2014), and Nazlioglu, Hammoudeh, & Gupta (2015). Thirdly, the need for further research on the co-movement of Islamic stock markets in Bangladesh is underscored by empirical evidence post the recent financial crisis, which suggests that Islamic stock indices outperform their conventional counterparts, offering viable diversification opportunities across both stable and turbulent market conditions (Abbes & Trichilli, 2015).

The superior performance of Islamic stock indices and conventional ones can be attributed to their distinctive characteristics, elucidated by Saiti, Bacha, & Masih (2014), which include ethical and rational screenings aimed at eliminating interest-based transactions and the exclusion of conventional financial instruments such as derivatives. Consequently, the integration of Islamic equity markets with other markets is constrained, rendering Islamic products less susceptible to risk. Notably, Islamic stocks operate in accordance with Shariah principles, distinguishing them from conventional stocks. Furthermore, the risk-return trade-off in the Islamic stock market deviates from that of traditional stock markets, further underscoring the imperative for this study to address the gap in understanding the co-movement dynamics of Islamic stock indices in Bangladesh.

The study makes several noteworthy contributions to the existing body of literature. Firstly, it advances the understanding of the dynamics of co-movement between Shariah-compliant and traditional indices not only in Bangladesh but also in emerging economies more broadly. By examining the nexus between Shariah and traditional stock indices amidst the backdrop of the pandemic and geopolitical crises, this research expands the discourse on financial market interactions during turbulent times.

Secondly, the study leverages a comprehensive dataset spanning the inception of Shariah-compliant stock indices in Bangladesh, thereby offering holistic insights into the performance and behavior of the Shariah-based stock market over time. Thirdly, the findings of this research hold significant implications for both domestic and international investors seeking to optimize their portfolio diversification strategies, particularly in light of the insights garnered from the co-movement analysis of the indices. Lastly, the study employs a range of econometric techniques to rigorously investigate the co-movement of the indices, enhancing the robustness of the empirical results.

The subsequent sections of this paper are structured as follows: Section 2 provides a comprehensive review of the relevant literature. Section 3 outlines the dataset utilized and the econometric specifications employed. Section 4 presents the empirical findings, while Section 5 offers concluding remarks.

2. Literature Review

The growing globalization and economic integration among nations have intensified the focus of investors and policymakers on understanding the interrelationships among global capital markets. Notably, the movement of stock markets and their co-movements have received considerable attention due to the inherent uncertainty in the global stock market environment. Researchers have employed various methods and techniques to study the co-movement of stock market indices, aiming to unravel the intricate dynamics of these interactions.

For instance, Bonfiglioli & Favero (2005) investigated the interdependence between US and German stock markets, highlighting short-term effects following shocks in the US market. Similarly, D'ecclisia & Constantini (2006) analyzed short-run co-movements among US, UK, Japan, and Canada stock markets, revealing a leading role for the US market. Hoque (2007) explored the co-movement of Bangladesh stock market with developed and developing countries, identifying co-integration among variables but limited diversification benefits. Abd Majid and Haj Kassim (2010) studied integration among Islamic stock markets, suggesting diversification benefits across economic groupings. Albaity

and Ahmad (2011) examined the relationship between Shariah and non-Shariah firms' returns, revealing influential factors for each category. Guyot (2011) observed no co-integration between Shariah and conventional indices, implying portfolio diversification opportunities. El Alaoui et al. (2015) investigated co-movement dynamics in the Dubai Islamic Financial Market, indicating strong correlations across different scales and time periods. Chowdhury, Haque, & Islam (2017) found marginal effects of Bangladeshi Islamic stock market on other markets, with limited impact from global Islamic stock markets. Sahabuddin et al. (2018) and (2020) explored co-integration relationships in Malaysian and Bangladeshi stock markets, highlighting long-term associations between Shariah and traditional indices.

However, previous studies have predominantly focused on either time or frequency domain aspects, overlooking a comprehensive analysis integrating both dimensions. Rua and Nunes (2009) noted the importance of considering both time and frequency components in stock market co-movement analysis to capture short-term and long-term dynamics effectively. Thus, this study proposes a novel approach utilizing wavelet analysis, which preserves both time and frequency information, enabling a deeper understanding of stock market interactions.

This study aims to investigate the nexus between Shariah and traditional indices in Bangladesh, offering several contributions to the literature. Firstly, it pioneers the examination of dynamic co-movements between Shariah and conventional stock indexes in Bangladesh. Secondly, by utilizing Shariah-compliant stock index data since incorporation in Bangladesh, it provides valuable insights spanning a significant period. Thirdly, the findings will inform domestic and international investors seeking diversification opportunities. Fourthly, the study enriches existing literature, particularly in the context of an emerging economy. Finally, employing various econometric techniques ensures robustness in analyzing index interdependence.

3. Methodology

This paper investigates the nexus between Shariah and traditional stock indices in Dhaka Stock Exchange of Bangladesh using co-integration and VAR approaches.

3.1 Johansen Co-integration Test

This study adopts a co-integration technique developed by Johansen and Juselius, which is particularly well-suited for analyzing the long-run relationships between series, especially when dealing with a large number of observations. To facilitate this analysis, VAR statistics are utilized to determine an appropriate lag number, which is a prerequisite for estimating co-integration.

The Vector Autoregression (VAR) equation employed in this study assumes that the vector Y_t , representing the variables of interest, is stationary, and the error term is a vector of dimension $n \times 1$. Consequently, the VAR equation can be expressed as follows:

$$Y_t = \mu + \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + \Pi_3 Y_{t-3} \dots \dots \dots + \Pi_k Y_{t-k} + e_1 \quad (1)$$

The Vector Error Correction Model can be derived by first differencing the aforementioned equation and rearranging it as follows:

$$\Delta Y_t = \mu + \Pi_1 \Delta Y_{t-1} + \Pi_2 \Delta Y_{t-2} + \Pi_3 Y_{t-3} \dots \dots \dots + \Pi_k \Delta Y_{t-k} + e_1 \quad (2)$$

There are two measures for test for Cointegration: Trace test and Maximum Eigen value test. The specifications of tests are written as follows:

$$\varphi_{Trace} = -T\sum \ln(1 - \varphi_1) \quad (3)$$

The Trace test formulates the null hypothesis asserting the absence of co-integration, while the alternative hypothesis posits the presence of co-integration. Rejecting the null hypothesis indicates statistical significance, implying that Shariah and non-Shariah stock returns in Bangladesh exhibit long-run relationships.

Conversely, the Maximum Eigenvalue test posits the null hypothesis of no long-run relationships between Shariah and non-Shariah stock returns in Bangladesh, with the alternative hypothesis suggesting the existence of such relationships. The Maximum Eigenvalue test is specified as follows:

$$\varphi_{Max} = -T\ln(1 - \varphi_{1+1}) \quad (4)$$

3.2 Data

The Shariah-based products have gained popularity in recent year due to its distinct features of Shariah law or principles. The Shariah law does not allow the Riba (interest), Maysir, and Grarar, however, these are common practice in traditional financial system. Therefore, as a Muslim country, the government of Bangladesh has introduced the Shariah-based stock index in Dhaka stock exchange, Bangladesh. In 2014, the Shariah-based index (e.g. DSES) was included with the DSEX and DS30 in Bangladesh. DSEX is the board or benchmark index, where DS30 is a proxy index of DSEX. Top 30 companies are included to this index. We collect daily data from the Dhaka stock exchange's website for 20 March 2014 to 13 March 2022. The aims of this current study are determining the nexus between Shariah and traditional stock indices in Dhaka Stock Exchange of Bangladesh using co-integration and VAR methods.

4. Results and Discussion

4.1 Preliminary analysis

Figure 1 exhibits the daily stock price performance and return movement. The findings show that stock price performance positively moved except the disruption of the COVID-19 pandemic period. The Shariah and traditional both stock price and return movement dramatically decline during the COVID-19 pandemic periods. After the pandemic period, the trend of the stock indices has positively moved, however the Ukraine-Russia war not only disrupt the supply chain of the food items, it also impacts the financial markets world-wide.

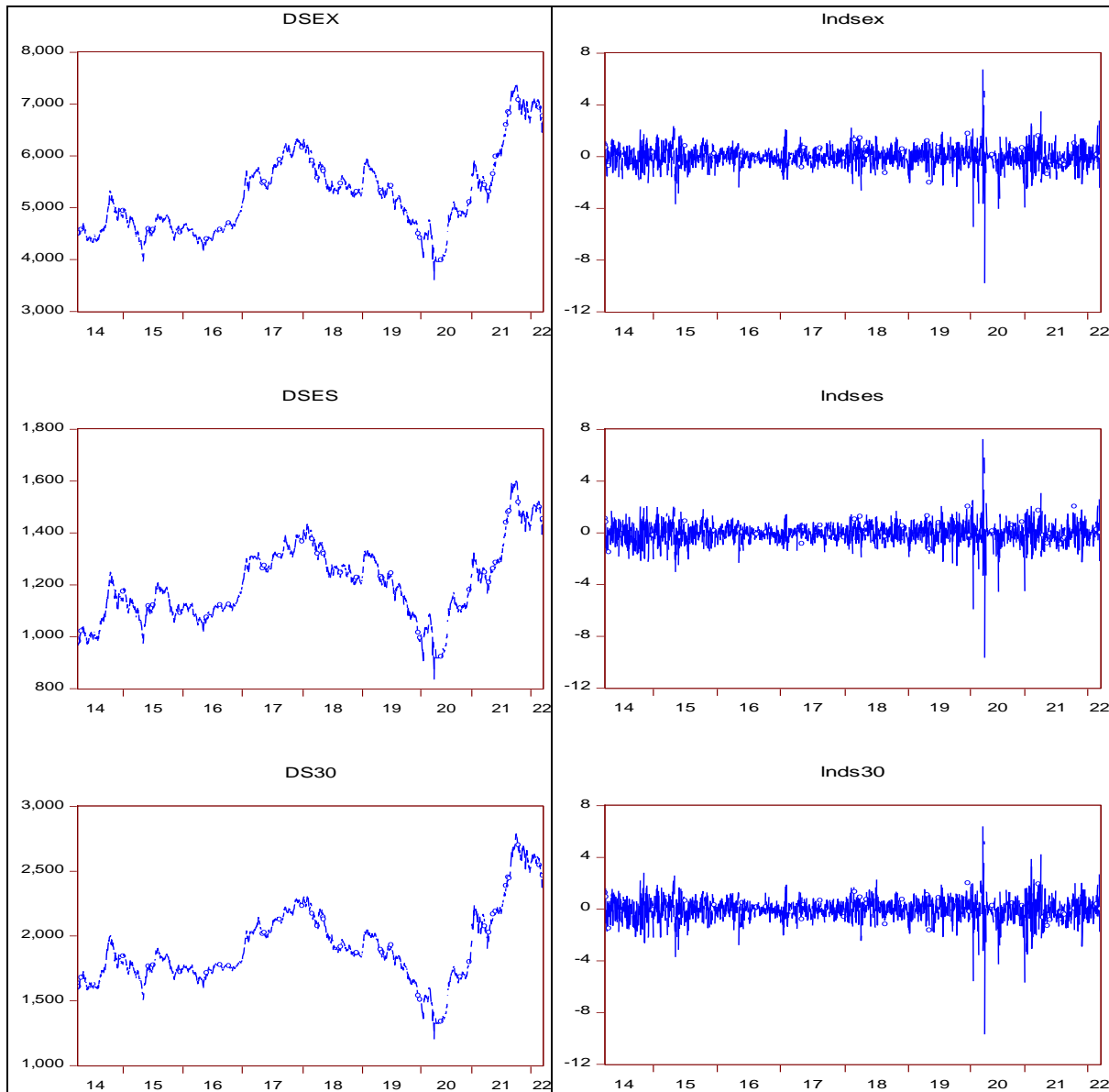


Fig .1. Stock indices performance and return movement.

4.2 Descriptive statistics

Table 1 highlights the summary of descriptive statistics. The empirical results show that DS30 provides better average return as well as with the higher risk. Among the three variables, Shariah-based index provides lower average return with the lower risk. This result is in line with the risk-return trade of theory.

Table-1: Descriptive statistics

Indices	Mean	Std.Dev.	Skewness	Kurtosis	Jarque-Bera	Observations
DSEX	0.0208	0.8332	-0.6926	18.4340	18960.0600	1895
DSES	0.0203	0.8279	-0.6418	19.7936	22398.2700	1895
DS30	0.0216	0.8947	-0.6995	15.1876	11882.7900	1895

Source: Developed by author

4.3 Correlation Matrix

Table 2 unveils the correlation matrix. The findings show that Dhaka stock exchange benchmark index (DSEX) is highly correlated to the DS30 index. On the other hand, DSES index relatively lower correlated from the DSEX index. Based on the correlation between two series, lower correlation offers better portfolio diversification benefits. Therefore, the empirical results report that the Shariah-based stock index offer better portfolio benefits.

Table-2: Correlation Matrix

Indices	DSEX	DSES	DS30
DSEX	1		
DSES	0.9287	1	
DS30	0.9369	0.9306	1

Source: Developed by author

4.4 Unit Root Test Result

Before applying the econometric model, time series data is required to test the stationarity using the Augmented Dickey-Fuller (ADF) model. There are commonly two models to the stationarity of the dataset. Among the two models ADF is the most popular and widely used model for testing stationarity of time series data. Table 3 presents the unit root test outcomes. The findings reveal that both the Shariah and traditional indices are non-stationary when examined at levels $I(0)$, yet they become stationary at the first difference $I(1)$. This outcome substantiates the prerequisite assumption for conducting the co-integration test, which necessitates that the datasets under consideration exhibit stationary properties of the same order.

Table 3: Unit root test

Indices	ADF	
	Level	First Difference
DSEX	-0.9926 (0.7579)	-18.6971(0.0000)***
DSES	1.8852 (0.3391)	-16.0907(0.0000)***
DS30	-1.1612(0.6931)	-18.8113(0.0000)***

4.5 Co-integration test

Table 4 presents the results of the co-integration test, indicating the absence of co-integration among the variables. This absence of co-integration implies that the variables are individually non-stationary in nature. Consequently, it suggests that a linear combination of two or more time series may exhibit non-stationarity, signifying the absence of long-run relationships among these variables. Due to the tremendous demand, Dhaka Stock Exchange in Bangladesh move to promote, therefore, the authority of the Bangladesh security exchange commission (BSEC) has launched the Shariah compliant stock index in January 20, 2014. Meaning that Shariah compliant stock index is not move together theoretically with Non-Shariah compliant stock index counterpart.

Table 4: Co-integration test

Co-integration test based on Trace Statistics					
Null hypothesis	Alternative hypothesis	Trace Statistics	Critical value (0.05)	P-value	Result
r=0	r=0	20.0843	29.7970	0.4172	No Co-integration
r<=1	r=1	5.1043	15.4947	0.7976	
R<=2	r=2	0.1325	3.8414	0.7158	
Co-integration test based on Maximum Eigenvalue					
Null hypothesis	Alternative hypothesis	Maximum Eigenvalue	Critical value (0.05)	P-value	No Co-integration
r=0	r=0	14.9799	21.1316	0.2903	No Co-integration
r<=1	r=1	4.9718	14.2646	0.7454	
R<=2	r=2	0.1325	3.8414	0.7158	

4.6 VAR model

Table 4 outlines the outcomes of the unrestricted VAR model. Given that the empirical results of the co-integration test fail to reject the null hypothesis (Ho), indicating no significant relationship between the two series, the subsequent step involves running the unrestricted VAR model. This model facilitates the exploration of joint dynamics and causal relationships between the traditional and Shariah stock indices.

Table 5: Unrestricted VAR Model

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.196849	0.068004	17.59961	0.0000
C(2)	-0.189951	0.068028	-2.792243	0.0053
C(3)	0.185153	0.285260	0.649067	0.5163
C(4)	-0.240997	0.284737	-0.846382	0.3974
C(5)	-0.173913	0.167325	-1.039371	0.2987
C(6)	0.179712	0.167269	1.074385	0.2827
C(7)	20.99741	10.98958	1.910666	0.0561
C(8)	0.012167	0.015241	0.798260	0.4248
C(9)	-0.009211	0.015247	-0.604100	0.5458
C(10)	1.130341	0.063934	17.67986	0.0000
C(11)	-0.151444	0.063817	-2.373110	0.0177
C(12)	-0.012122	0.037502	-0.323234	0.7465
C(13)	0.013665	0.037489	0.364494	0.7155
C(14)	7.184469	2.463039	2.916912	0.0035
C(15)	-0.003182	0.026667	-0.119313	0.9050
C(16)	0.007594	0.026676	0.284671	0.7759
C(17)	0.089300	0.111861	0.798306	0.4247
C(18)	-0.110487	0.111657	-0.989523	0.3224
C(19)	1.125834	0.065615	17.15825	0.0000
C(20)	-0.128401	0.065593	-1.957546	0.0503
C(21)	7.700107	4.309439	1.786800	0.0740

4.7 Granger Causality Tests

Table 6 exhibits the findings of the Granger causality test. The results denote that there is no causal relationship between DSEX and DS30. However, DSES have a causal relationship with the DSEX as p-value is statistically significant at 5% level, while it has no causal relationship with the DS30.

Table 6: Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
DSES does not Granger Cause DSEX	1893	1.4481	0.2353
DSEX does not Granger Cause DSES		3.5277	0.0296
DS30 does not Granger Cause DSEX	1893	0.4094	0.6641
DSEX does not Granger Cause DS30		0.5783	0.5609
DS30 does not Granger Cause DSES	1893	1.2611	0.6641
DSES does not Granger Cause DS30		0.6858	0.5038

4.8 Impulse Response test

To assess how the Shariah and traditional stock indices react to short-term temporary shocks, this study employs the impulse response function derived from the estimation of the VAR model. Fig. 2 presents the impulse response function of the Shariah and traditional stock indexes.

The graphical analysis depicted in Fig. 2 indicates that traditional stock indexes exhibit a positive response to shocks in the Shariah-compliant stock index. Similarly, the Shariah-compliant stock index demonstrates a positive response to shocks in non-Shariah compliant stock indexes. These findings align with those reported by Nazlioglu et al. (2015), who observed similar relationships between the Dow Jones Islamic stock and the S&P 500 index.

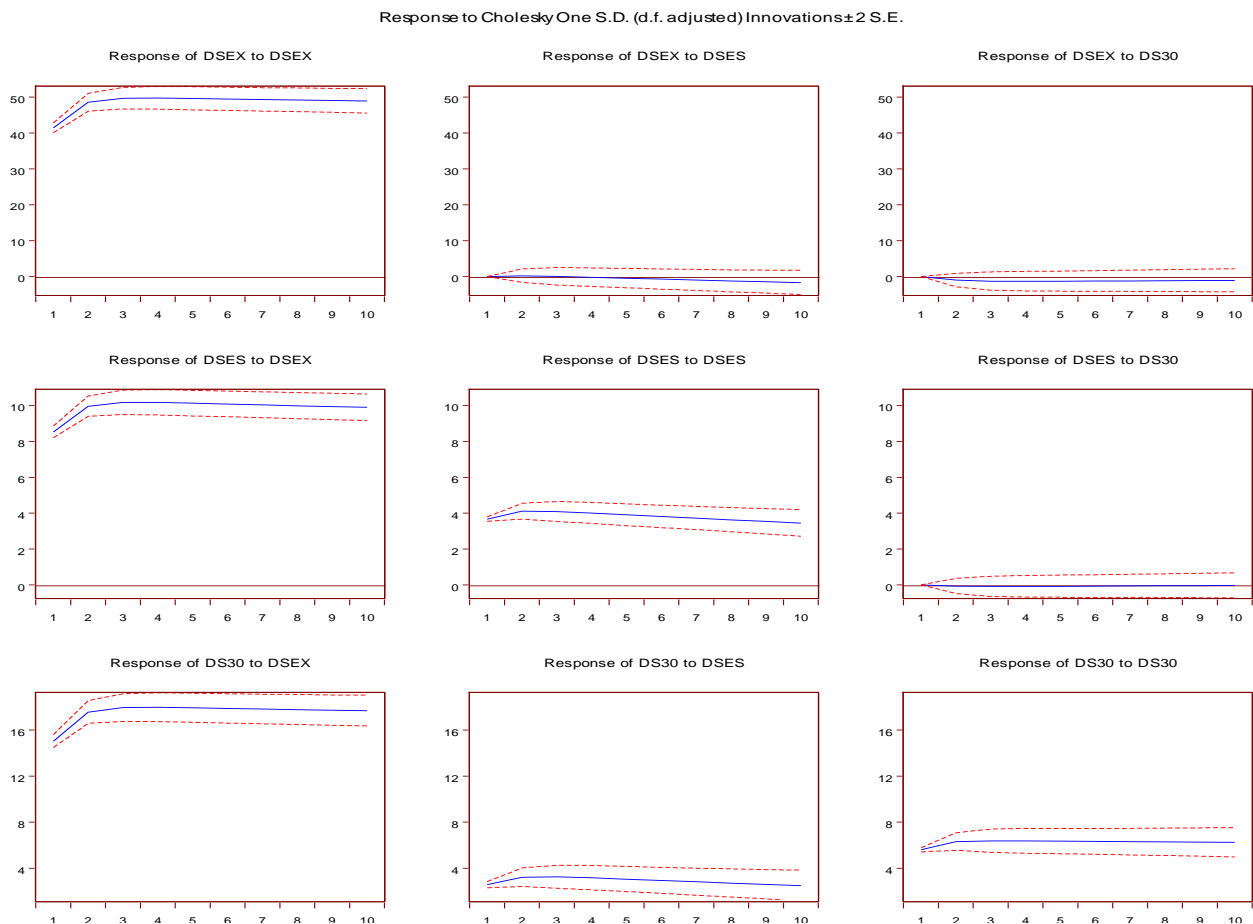


Fig. 2. Impulse response function.

5. Conclusions

This study investigated Shariah and traditional stock indexes relationship in the Dhaka Stock Exchange, employing standard time series econometric techniques. Unit root tests, including Phillips and Perron (1988) and Dickey-Fuller (1979), were conducted to assess the stationarity of the datasets. The presence of a long-run relationship was examined using the Johansen and Juselius (1990) co-integration test. The results indicate that there is no long-run relationship between the traditional and Shariah-compliant stock indices. Additionally, robustness tests utilizing VAR, Granger causality, and impulse response approaches were conducted. Notably, while no significant co-integration association was found between the Shariah and traditional stock indices, the Shariah-based stock index was observed to Granger cause the traditional stock index. Moreover, the impulse response function analysis revealed that both Shariah and non-Shariah compliant stock indexes respond positively to shocks from each other. These findings contribute to the understanding of the dynamics between Shariah and traditional stock indexes in the Dhaka Stock Exchange, shedding light on their interplay and response mechanisms to external shocks.

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