

Is Islamic Financial Portfolio Allocation Sufficient to Safeguard Investors During Economic Downturns?

هل الاستثمار في الأوراق المالية الإسلامية كافٍ لحماية المستثمرين خلال فترات الركود الاقتصادي؟

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Abstract:

Objectives: This study aims to explore the dynamic interactions between Islamic and conventional financial markets at both national and international levels. It also evaluates the role of Islamic indices in enhancing portfolio performance and resilience, particularly during periods of economic stress such as the COVID-19 recession.

Methods: The research employs a Vector Autoregressive (VAR) model, Granger causality tests, impulse response functions, and variance decomposition to analyze market interdependencies.

Results: The empirical findings reveal asymmetric relationships between Islamic and conventional markets. While Islamic markets are significantly influenced by conventional markets, the reverse effect is minimal. National Islamic indices exert a stronger influence on global Islamic trends than they receive, suggesting limited global integration within Islamic finance sector. In contrast, conventional markets exhibit strong bidirectional interdependence. Portfolio analysis indicates that international diversification, particularly through Islamic indices, enhances resilience and performance. Islamic assets yielded higher returns with lower risk during the COVID-19 crisis.

Conclusions: Islamic financial instruments can serve as effective stabilizing assets during periods of economic uncertainty. The study highlights the strategic importance of Islamic finance in global portfolio diversification and risk management. The results support the inclusion of Islamic indices in international investment strategies to improve stability and performance, especially in turbulent market conditions.

Keywords: Islamic finance; conventional finance; VAR model; Granger causality; impulse response function; variance decomposition; financial market interdependence; portfolio diversification; COVID-19 recession; risk management.

الملخص:

الأهداف: تهدف هذه الدراسة إلى استكشاف التفاعلات الديناميكية بين الأسواق المالية الإسلامية والتقليدية على المستويين الوطني والدولي، كما تسعى إلى تقييم دور المؤشرات الإسلامية في تعزيز أداء المحافظ الاستثمارية ومرونتها، خصوصاً خلال فترات الأزمات الاقتصادية مثل الركود الناتج عن جائحة كوفيد-19.

المنهجية: تستخدم الدراسة نموذج الانحدار الذاتي المتجه، واختبارات السببية لغرانجر، ودوال الاستجابة للصدمات، وتحليل تباين التنبؤ لفحص الترابط بين الأسواق.

النتائج: تكشف النتائج التجريبية عن علاقات غير متماثلة بين الأسواق الإسلامية والتقليدية، حيث تتأثر الأسواق الإسلامية بشكل كبير بالأسواق التقليدية، في حين أن التأثير العكسي محدود. كما تُظهر المؤشرات الإسلامية الوطنية تأثيراً أقوى على الاتجاهات الإسلامية العالمية مقارنةً بتأثيرها بها، مما يشير إلى ضعف التكامل العالمي للأسواق الإسلامية. وعلى العكس، تُظهر الأسواق التقليدية ترابطاً ثنائياً الاتجاه قوياً. وتُشير تحليلات المحافظ إلى أن التنوع الدولي، لا سيما من خلال المؤشرات الإسلامية، يعزز من مرونة المحافظ وأدائها. وقد حققت الأصول الإسلامية عوائد أعلى ومخاطر أقل خلال أزمة كوفيد-19.

الخلاصة: يمكن للأدوات المالية الإسلامية أن تؤدي دوراً فعالاً في تحقيق الاستقرار خلال فترات عدم اليقين الاقتصادي. وتبرز الدراسة الأهمية الاستراتيجية للتمويل الإسلامي في تنوع المحافظ الاستثمارية وإدارة المخاطر على المستوى العالمي. وتدعم النتائج إدراج المؤشرات الإسلامية ضمن استراتيجيات الاستثمار الدولية لتحسين الاستقرار والأداء، خاصة في ظروف السوق المضطربة. **الكلمات المفتاحية:** التمويل الإسلامي؛ التمويل التقليدي؛ نموذج الانحدار الذاتي؛ السببية لغرانجر؛ دالة الاستجابة للصدمة؛ تحليل تَفَكُّك التباين؛ الترابط بين الأسواق المالية؛ تنوع المحافظ الاستثمارية؛ ركود كوفيد-19؛ إدارة المخاطر.

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1 Introduction

Islamic finance has seen impressive growth over the years, with global assets reaching \$3.374 trillion in 2020. According to Refinitiv's 2021 Islamic Finance Development Indicator, this upward trend is expected to continue, with assets projected to exceed \$4.94 trillion by 2025. The assessment of Islamic and conventional assets concerning risk and return constitutes a pivotal area of research, particularly in the context of portfolio optimization strategies. As Islamic finance continues to expand globally, the comparative performance of Islamic and conventional assets, along with their role in portfolio allocation, has become an area of growing interest in both academic research and financial markets. A fundamental question in this discourse is whether Islamic assets provide distinct advantages in terms of risk-adjusted returns or if their performance closely parallels that of conventional financial instruments.

Over the past forty years, Islamic financial institutions have launched a wide range of Sharia-compliant products and services across the globe (Seho et al. 2020, Sunitha et al. 2019), and (AlSharari & Alhmoud, 2019)). These offerings span various sectors, including consumer finance, investment banking, poverty alleviation, venture capital, and small and medium enterprise financing (Jaballah et al., 2018, Ben Jedidia & Guerbouj, 2020). The financing methods primarily fall into two categories: equity-based models—such as Musharakah, Diminishing Musharakah, and Mudarabah—and asset-backed structures like Murabaha, Ijarah, Salam, and Istisna (Bani Ata, 2019 & Sherif, 2020). In addition, other frequently used services include Qardh al-Hasan (benevolent loans), Bay al-Sarf (currency exchange), and agency-based transactions.

Numerous Islamic scholars believe that Islamic finance possesses not only the capacity to address the economic repercussions of global crises such as the COVID-19 pandemic but also the potential to position itself as a viable alternative to the conventional financial system (Pitluck, 2012 & Pervez, 1990). Following the 2008 global financial crisis, the recent pandemic has served as another critical juncture for Islamic finance to demonstrate its resilience and relevance (Richardson, 2006). Rooted in the principles of risk-sharing, ethical conduct, and moral responsibility, Islamic finance is viewed as a mechanism capable of protecting the interests of the economically vulnerable during periods of instability (Mirakhor, 2010). Its significance is particularly evident in its pursuit of equitable income distribution and the promotion of socio-economic justice (Sakai, 2014). Specialized Islamic microfinance institutions play a vital role by offering accessible financial solutions to low-income individuals and micro-entrepreneurs, thereby contributing to poverty reduction and improved living standards (Rahim Abdul Rahman, 2010). One of the central aims of Islamic finance is to offer a value-based alternative that aligns with Islamic ethical norms, especially for Muslim communities (Aliyuet al. (2017)). It prohibits involvement in unethical activities such as gambling, and the trade of alcohol or explicit materials. Although Islamic financial institutions were not entirely immune to the 2008 financial crisis, they experienced relatively less disruption compared to conventional systems (El-Gamal, 2008).

Research on the performance of Islamic Finance has produced mixed findings. While some studies indicate that Islamic equities outperform their conventional counterparts, others report no statistically significant difference in performance. Additionally, certain studies suggest that conventional stocks may yield superior returns under specific market conditions. These variations highlight the complexity of financial market dynamics and the necessity for a context-specific analysis when assessing investment performance.

The comparison of mean-variance efficiency between Islamic and conventional assets plays a vital role in optimizing portfolios. A lot of research has been done to assess how these asset classes perform across various financial markets and investment types. For example, Bialkowski et al. (2012), and Hoepner et al. (2011) have provided substantial evidence supporting the profitability of Islamic stocks, indicating their potential as viable investment options. Another study focused on exchange-traded funds (ETFs) found that Islamic ETFs actually outperformed both conventional ETFs and the market benchmark index when it came to risk-adjusted performance metrics. Plus, Islamic ETFs showed lower volatility, which means they carry less risk compared to their conventional counterparts (Alam, 2013).

Furthermore, research on Malaysian stocks indicates that Islamic stocks have greater mean-variance efficiency, as shown by their lower annualized standard deviation, which falls between 3.43% and 3.78% compared to non-Islamic stocks. This reduced volatility points to lower risk and greater stability in Islamic stocks compared to conventional ones (Akhtar & Jahromi, 2017). Adekunle and Masih (2017) conducted a study on Sukuk and found that these Islamic financial instruments provide significant diversification benefits for investors, especially during periods of market turbulence. All these findings suggest that Islamic financial instruments could help improve portfolio stability and enhance risk-return efficiency.

Combining Islamic and conventional assets in a portfolio can indeed provide a more stable return profile during recessions. This stability is attributed to the unique characteristics of Islamic finance, which emphasizes ethical investment principles and risk-sharing mechanisms that align financial activities with the real economy. The integration of these assets can enhance diversification and reduce volatility, offering a more resilient investment strategy during economic downturns. Islamic finance principles, such as the prohibition of interest and speculative activities, contribute to the resilience of Islamic banks during financial crises. This framework fosters long-term stability by aligning financial activities with tangible economic assets (Alisic et al., 2024). Including Islamic assets in a portfolio can expand the mean-variance frontier, reducing volatility linkages by up to 3.16 percentage points. This diversification benefit arises from the distinct information sets and lower cross-market hedging between Islamic and conventional markets (Akhtar et al., 2023). Asl et al., 2023 showed that employing advanced optimization techniques, such as EWMA and DCC, can yield portfolios that outperform conventional ones across various risk-adjusted performance measures, particularly during crisis periods. Mirza et al. (2025) demonstrated that portfolios incorporating Sharia-compliant investments with dynamic monthly rebalancing exhibited superior performance, characterized by higher Sharpe ratios and greater resilience during periods of market turbulence. Their findings further indicated that dynamic optimization techniques, such as monthly rebalancing, effectively enhance asset allocation by maximizing returns while minimizing risk.

The emergence of the COVID-19 pandemic in early 2020 significantly disrupted global financial markets, leading to widespread volatility. Stock markets across the world experienced substantial disruptions, with U.S. markets activating circuit breakers twice within a single week, and similar patterns observed in other major economies. Numerous studies have concluded that the market turbulence induced by the COVID-19 pandemic was comparable to, or even more severe than, the financial crisis of 2008. Combining Islamic and conventional assets in a portfolio can indeed provide a more stable return profile during recessions. This integration leverages the unique characteristics of Islamic finance, which emphasizes ethical investing and risk-sharing, potentially enhancing portfolio resilience. Asl et al. (2023) established that Islamic asset outperformed their conventional counterparts during market downturns, as evidenced by higher Sharpe ratios and superior risk-adjusted returns. Likewise, Hamma et al. (2024) found that incorporating Islamic investments enhances diversification and mitigates risk during periods of market turbulence. Similarly, Bulut (2025) identified that the Dow Jones Islamic Index offered substantial diversification benefits, especially during phases of heightened market volatility, such as the COVID-19 crisis.

Numerous studies indicate that while Islamic portfolios demonstrate strong risk management capabilities and yield favorable short-term returns during economic downturns, conventional investment strategies may still offer advantages in long-term growth. This underscores the importance of contextual factors in investment decision-making. For instance, Hayat and Kraeussl (2011) present limited evidence supporting the profitability of Islamic investments when compared to conventional investments. Mansor and Bhatti (2011) looked into Malaysian mutual funds and discovered that while Islamic mutual funds had lower risk, their returns were just a bit lower than those of conventional mutual funds. Al-Khazali et al. (2014) and Ho et al. (2014) present mixed findings, indicating that Islamic stock indices tend to outperform conventional indices during periods of crisis, but do not show a similar performance advantage during non-crisis periods. Rohuma (2023) examined Bursa Malaysia and found that Islamic and conventional portfolios exhibited largely comparable performance across different economic conditions, with similar risk-adjusted return characteristics across various economic regimes. Alamgir (2023) found that Islamic stock indices typically outperform conventional indices during periods of crisis, particularly in developing economies and in the short term. However, conventional stock indices are observed to show stronger performance in the long term and after the crisis has passed. In addition, Arif and Majeed (2023) examined mutual funds in Pakistan and found that Islamic mutual funds outperformed conventional funds in terms of risk-adjusted returns. However, there was no significant difference in absolute returns between the two. Similarly, Marlinda and Syahputra (2024) analyzed the JII and IDX30 indices from 2019 to 2023 and found no statistically significant difference in returns between Islamic and conventional stocks. Their t-test results yielded a p-value of 0.777, confirming the absence of a notable distinction in returns. These findings suggest that the appeal of Islamic financial products may extend beyond return generation to factors such as ethical investment principles and risk mitigation strategies.

Our study takes a closer look at how conventional and Islamic stock indices are interconnected, especially from the viewpoint of a U.S. investor navigating the recent economic downturn. This topic is super relevant because it sheds light on investment strategies and diversification options across two different types of financial funds and three distinct regions. With the heavy financial losses and the dip in investor confidence brought on

by the global financial crisis, this research holds considerable importance for both investors and policymakers. The insights gained could help reshape investment strategies and improve risk management practices by considering Islamic funds as a viable asset class. In particular, this study provides solid evidence on how to allocate resources effectively and manage portfolios optimally by blending conventional and Islamic financial instruments.

Firstly, to take a closer look at the short-term dynamics and interconnections between conventional and Islamic stock returns we use Vector Autoregressive (VAR) models. We also employ Granger causality tests to see how conventional stock prices react to shocks in the Islamic finance sector. The Impulse Response Function (IRF) helps us understand how one variable responds over time to a shock in another, shedding light on how these shocks ripple through the system. Moreover, Variance Decomposition (VD) is used to figure out how different shocks contribute to the forecast error variance of a variable, which helps us gauge the significance of various factors. Both of these techniques are essential for grasping the interdependencies and influences of variables within the VAR model framework. To explore diversification potential further, portfolio simulations are run to assess the opportunities linked to Islamic financial products. This research is especially important, as its findings can aid in crafting optimal investment strategies, portfolio allocations, and resource distributions, offering valuable insights for investors navigating through times of financial uncertainty.

The structure of the paper is organized as follows: Section 2 provides a detailed description of the dataset and outlines the methodological framework employed in the analysis. Section 3 presents key statistical characteristics of the data, followed by the principal results derived from the Vector Autoregressive (VAR) model. It further includes an examination of Granger causality test outcomes, an analysis of the Impulse Response Functions, and a discussion of the results obtained from the Variance Decomposition analysis. Additionally, portfolio simulations are introduced to assess practical implications. The final section concludes the study by summarizing the main findings and discussing their broader implications.

2 Data and Methodology

To investigate the dynamic interactions between conventional and Islamic stock returns, this study employs a Vector Autoregressive (VAR) modeling framework. The VAR model facilitates an in-depth examination of temporal relationships and interdependencies among financial indices at both national and global scales. Granger causality analysis is employed to identify the directionality of influence between Islamic and conventional markets. Additionally, Impulse Response Functions (IRFs) are employed to trace the time path of shocks originating in one market and their propagation across the system. Variance decomposition analysis further quantifies the contribution of each variable's innovations to the forecast error variance of others, offering insights into the relative importance of domestic versus cross-market shocks. Finally, portfolio simulations are conducted across three economic phases—pre-COVID-19, during the pandemic-induced recession, and post-recession—to assess the potential benefits of combining Islamic and conventional assets in terms of enhancing returns and mitigating systemic risk.

2.1 Data

This study examines the diversification potential of Islamic versus conventional equity indices from the perspective of a U.S.-based investor. By analyzing both local and international markets, we aim to assess how Shariah-compliant investments perform across varying economic conditions. A U.S. investor cannot be unequivocally classified as a global investor; however, they may serve as a representative proxy for international investment behavior, particularly given the significant integration of U.S. financial markets with the global economy. To maximize the advantages of national (international) portfolio diversification, an investor should allocate their wealth within the local (international) market portfolio, ensuring that investments are distributed by the market capitalization of the respective assets. Thus, for comparative analysis, we categorize the selected indices into two groups: Islamic indices and conventional indices. In examining local portfolio diversification, we utilize daily price data from the NYSE Composite Index (NYSE Composite), which represents the aggregate performance of all stocks listed on the New York Stock Exchange, and the Dow Jones Islamic Market U.S. Index (DJ Dom Islamic), which tracks the performance of U.S. equity securities that comply with Shariah investment principles. For international portfolio diversification, we incorporate daily price data from the MSCI World Index (MSCI World) and the MSCI World Islamic Index (MSCI W Islamic). The dataset, obtained from **Investing.com**, spans the period from June 1, 2019, to March 28, 2024. This timeframe allows for an evaluation of the role of Islamic fund investments in portfolio diversification both before and after the global

economic downturn triggered by the COVID-19 pandemic. To mitigate variance and enhance statistical robustness, all time-series data are transformed into logarithmic form.

2.2 Methodology

This study employs advanced econometric techniques to investigate the dynamic relationships between Islamic and conventional financial markets. Using a Vector Autoregressive (VAR) model, the analysis explores how these markets interact and respond to shocks over time. Key tools such as Granger causality tests, impulse response functions, and variance decomposition are employed to uncover causality directions, measure the impact of market disturbances, and assess the degree of interdependence. Additionally, portfolio simulations across different economic periods, including the COVID-19 recession, offer insights into diversification benefits and risk management strategies when integrating Islamic and conventional assets.

Vector Autoregressive Modeling (VAR): To understand the dynamics of stock returns and examine the relationships between conventional and Islamic stock returns, we estimated a Vector Autoregressive (VAR) model consisting of two equations. This model simultaneously captures the dynamics of both conventional and Islamic indices at the national and international levels. The VAR approach is particularly advantageous for modeling the interdependencies between Islamic and conventional indices, allowing for an analysis of how Islamic funds respond to shocks that impact conventional funds. Subsequently, we employed the Granger causality test to assess the presence of linear causal effects between the indices.

We examine the short-term dynamics of conventional and Islamic stock markets using VAR models. These models expand upon the univariate Autoregressive (AR) framework introduced by Sims (1980). The primary advantage of VAR models is their ability to provide a multivariate representation, which captures the interrelationships among multiple variables and their responses to shocks impacting any component within the system. A VAR model is formally defined as follows:

$$Y_t = \alpha_0 + \sum_{i=1}^p \phi_{1i} X_{t-i} + \sum_{i=1}^p \phi_{1i} Y_{t-i} + \mu_{1t}$$

$$X_t = \eta_0 + \sum_{i=1}^p \phi_{2i} X_{t-i} + \sum_{i=1}^p \phi_{2i} Y_{t-i} + \mu_{2t}$$

Variables Y_t and X_t are stationary. We used Logs and differences.

μ_{1t} and μ_{2t} are white noise disturbances. Commonly called innovations or shock terms.

The coefficients are estimated by OLS.

A VAR model is a specialized version of a simultaneous equation model, where each equation follows an autoregressive structure with p time lags and includes the same set of explanatory variables. These models can also incorporate trends, indicator variables, or other stationary exogenous factors. VAR models provide a robust and versatile framework for data analysis, forecasting, structural inference, and decision-making. In this study, we utilize the VAR model to forecast returns on conventional and Islamic indices, thereby aiding in decision-making processes.

The development of VAR models was pioneered by Christopher Sims in his seminal 1980 paper, *Macroeconomics and Reality*. Unlike univariate autoregressive models, which predict the current value of a single variable based solely on its past values, VAR models extend this framework to multiple time series. A VAR model consists of n equations, each corresponding to one of the n variables in the system. Each variable is modeled as a linear function of its own past values, the past values of all other variables in the system, and a serially uncorrelated error term.

This structure enables VAR models to provide an effective means of describing data, generating forecasts, making structural inferences, and analyzing the impact of policies. In this study, the variables in the VAR system consist of lagged stock returns for both conventional and Islamic indices. For each region, a bivariate VAR model is implemented. The first equation captures the dynamics of conventional and Islamic index returns at the national level, while the second equation models the returns of the Islamic index and the conventional index at the international level. The third equation captures the dynamics of the Islamic index returns, and the final equation models the returns of the conventional index alone.

Granger Causality test: The Granger causality test assesses whether the past values (lags) of one variable contain predictive information about another variable within the model. The Granger causality test is essential in time series analysis for establishing the direction of influence between variables. It assesses whether incorporating past data from one variable significantly improves predictions of another. This moves beyond

correlation to suggest potential causal links, proving invaluable in economics and finance for modeling interactions, guiding policy, refining forecasts, and developing strategies based on variable interdependencies. **Impulse response Function:** An Impulse Response Function (IRF) is a key analytical tool in Vector Autoregressive models, used to assess the dynamic effects of shocks within an economic system. It measures how an unexpected disturbance in one variable transmits through the system, impacting other variables over time. A key strength of the Impulse Response Function lies in its ability to quantify and visualize the temporal impact of shocks within a multivariate system. Unlike static coefficients, the IRF maps out the entire time path of a variable's response to a sudden, one-time perturbation in another variable. This dynamic perspective is indispensable for interpreting complex models (like VARs), as it shows not just if variables interact, but how and for how long a shock propagates. This makes the IRF critical for evaluating policy interventions, stress testing scenarios, and understanding the real-world transmission mechanisms of events like economic crises or market surprises.

The variance decomposition: The variance decomposition illustrates the proportion of forecasting errors attributed to a specific shock over time. In other words, it quantifies how much of the variability in a dependent variable is driven by its own shocks compared to shocks from other variables within the system. The variance decomposition analysis provides critical insights into the interdependencies between Islamic and conventional financial indices at both national and international levels. A key strength of Variance Decomposition is its ability to measure how shocks propagate and contribute to system-wide uncertainty over time. It answers the critical question: "What percentage of the forecast error for variable X after H periods is attributable to shocks originating in variable Y?" This reveals the evolving influence structure within interconnected variables, helping analysts identify dominant drivers, assess the persistence of different shocks, and validate the economic interpretation of a model. This makes it indispensable for attributing fluctuations and prioritizing factors in economic forecasting or financial modeling.

Portfolio Simulation: The simulation analysis aimed to assess whether combining conventional and Islamic funds in investment portfolios could enhance expected returns and/or mitigate systemic risk linked to stock market investments. To achieve this, portfolio simulations were conducted across three distinct periods: before the COVID-19 recession, during the recession, and after the recession. These timeframes were selected to capture shifts in stock market behavior and to examine how the economic downturn influenced resource allocation and investment decisions.

A mean-variance approach was employed, focusing on the correlations between conventional and Islamic funds. This methodology allowed for an evaluation of investment prospects in Islamic funds across different economic conditions, offering insights into their performance and potential role in portfolio diversification before, during, and after the recession.

Formally, we construct different portfolios, each consisting of two specific indices: one portfolio with two domestic indices, another with two global indices, a portfolio containing only Islamic indices, and another including only conventional indices. We define p_i as the proportion allocated to one of the two indices in a given portfolio, referred to as Index 1, with possible allocation values of 100%, 75%, 50%, 25%, and 0% (where 0% Index 1 corresponds to 100% allocation to Index 2). The remaining proportion, $(1-p_i)$, is allocated to the second index. The expected return of the portfolio is calculated as follows:

$$E(R) = p_i E(R_1) + (1 - p_i) E(R_2)$$

Where R_1 , R_2 , and R denote respectively the stock return for the index 1, the index 2, and, the portfolio.

The variance equation representing the risk associated with this portfolio is expressed as:

$$\sigma^2 = p_i^2 \sigma^2(R_1) + (1 - p_i)^2 \sigma^2(R_2) + 2\rho_{1,2} p_i (1 - p_i) \sigma(R_1) \sigma(R_2)$$

Where σ^2 , $\sigma^2(R_1)$, and $\sigma^2(R_2)$ denote respectively the variances for the portfolio, index 1, and index 2.

$\rho_{1,2}$ refers to the correlation measure between the two indexes composing the portfolio.

3 Results and interpretation focus

This study examines the dynamic relationship between Islamic and conventional financial markets using advanced econometric techniques. By applying Vector Autoregressive (VAR) modeling, Granger causality tests, impulse response functions, and variance decomposition, the research explores the direction and strength of interactions between various financial indices at both national and international levels. The analysis spans three key periods—before, during, and after the COVID-19 recession—to capture shifts in market behavior and resilience. In addition, portfolio simulations assess the benefits of combining Islamic and conventional assets

for diversification and risk mitigation. The findings highlight asymmetric dependencies, with Islamic markets generally influenced by conventional counterparts, and reveal the comparative stability and diversification potential of Islamic assets, especially during times of economic distress.

Closing Price Analysis and Descriptive Statistics: Before performing an econometric analysis on the returns of Islamic and conventional indices, we first examine the stationarity of their closing prices. To assess stationarity, we apply the Dickey-Fuller (1981) and Phillips-Perron (1988) unit root tests. The results, presented in the table below, indicate that the stock price series are integrated with order one, $I(1)$. Therefore, we analyze stock returns by taking the first difference of the logarithmic stock prices to ensure stationarity.

Table 1: The Unit Root Test Results

	Augmented Dickey-Fuller Unit Root Test				Philips-Perron Unit Root Test			
	In level with intercept	In level with trend and intercept	1 st difference with intercept	1 st difference with trend and intercept	In level with intercept	In level with trend and intercept	1 st difference with intercept	1 st difference with trend and intercept
NYSE_COMPOSITE	-1.632347	-3.250032	-11.97808	-11.98894	-1.503361	-2.962359	-45.08887	-45.08398
DJ Dom Islamic	-1.003779	-2.280703	-12.15472	-12.15528	-0.961754	-2.081826	-40.75960	-40.74864
MSCI World	-1.115044	-2.865795	-11.85090	-11.86137	-1.004294	-2.560375	-41.44002	-41.43309
MSCI W Islamic	-0.714365	-3.862008	-40.64822	-40.64546	-0.632923	-3.791782	-40.70960	-40.70823
	t-statistic critical values							
1% level	-3.434172	-3.963704	-3.434172	-3.963704	-3.434150	-3.963673	-3.434152	-3.963676
5% level	-2.863115	-3.412579	-2.863115	-3.412579	-2.863105	-3.412563	-2.863106	-3.412565
10% level	-2.567656	-3.128250	-2.567656	-3.128250	-2.567651	-3.128241	-2.567652	-3.128242

We now move on to the analysis of the logarithmic returns of these prices. We recall that the logarithmic return is the difference of the prices in the logarithm. We computed the main descriptive statistics of stock returns and reported them to check the statistical properties of our index returns (Tables 2). In particular, we compute these statistics for three subsamples: 1/01/2018 – 31/12/2019, 01/01/2020 – 31/12/2022, and 01/01/2022 – 28/03/2024 as well as for the whole period under consideration in order to capture the impact of the Covid 19 economic recession on Islamic and conventional financial industries.

The analysis reveals that the average returns of the selected indices are positive. Furthermore, Islamic indices exhibit higher average returns compared to their conventional counterparts. In terms of risk assessment, Islamic indices demonstrate greater volatility, as indicated by their slightly higher standard deviation of returns relative to conventional indices. The superior average returns and heightened volatility of Islamic indices relative to conventional indices can be attributed to multiple factors. Islamic indices exclude firms engaged in activities deemed non-compliant with Shariah principles, such as conventional banking, alcohol production, and gambling. As a result, they are heavily concentrated in industries like technology, healthcare, and consumer goods, which often experience rapid growth but also exhibit higher price fluctuations.

Furthermore, Shariah-compliant investment guidelines impose restrictions on excessive debt levels. Companies listed in Islamic indices typically maintain lower leverage, which reduces financial risk during economic downturns. However, this reliance on equity financing rather than debt may contribute to greater variability in returns. Additionally, Islamic finance tends to attract investors with ethical and long-term investment objectives, which can lead to distinct market behaviors compared to conventional indices. Nevertheless, the prohibition of financial instruments such as derivatives and interest-bearing securities limits opportunities for risk hedging, thereby amplifying market volatility.

In a normal distribution, the skewness coefficient is equal to zero, while the kurtosis coefficient is expected to be 3. Based on the obtained results, it is observed that the skewness values for all indices are negative, indicating that the return distributions exhibit asymmetry with a leftward skew. This asymmetry may be attributed to nonlinearities in the return evolution processes. Regarding the kurtosis coefficient, its values exceed 3 for all indices, suggesting that the return distributions are leptokurtic. This characteristic implies the presence of heavy tails, indicating a higher probability of extreme values compared to a normal distribution.

Furthermore, the Jarque-Bera test yields a zero probability, confirming the findings derived from the skewness and kurtosis measures. Consequently, the null hypothesis of normality is rejected for all stock market index return distributions.

Table2: Descriptive statistics for stock returns

Panel A: Sample 1: Whole period: 01-01-2018 – 28-02-2024				
	NYSE_COMPOSITE	MSCI_WORLD	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
Mean	2.22E-05	3.81E-05	4.26E-05	0.000284
Std. Dev.	0.001261	0.001383	0.001296	0.009425
Skewness	-1.210523	-1.110300	-0.805216	-0.787583
Kurtosis	23.86461	21.04020	15.48858	9.812799
Jarque-Bera	30019.54	22479.60	10788.55	3326.923
Probability	0.000000	0.000000	0.000000	0.000000
Panel B: Sample 2: 01/01/2018-31/12/2019 before Covid 19 economic recession				
	NYSE_COMPOSITE	MSCI_WORLD	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
Mean	1.65E-05	2.82E-05	3.84E-05	0.000151
Std. Dev.	0.000844	0.000939	0.000944	0.008113
Skewness	-0.741659	-0.629478	-0.539552	-0.506852
Kurtosis	7.039124	5.563028	5.093691	4.928019
Jarque-Bera	405.7818	178.7103	121.5939	103.9914
Probability	0.000000	0.000000	0.000000	0.000000
Panel C: Sample 3: 01/01/2019-31/12/2020 during Covid 19 economic recession				
	NYSE_COMPOSITE	MSCI_WORLD	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
Mean	4.16E-05	7.60E-05	9.06E-05	0.000422
Std. Dev.	0.001737	0.001807	0.001594	0.011350
Skewness	-1.359466	-1.493969	-1.257862	-1.069771
Kurtosis	19.70447	20.98877	18.63678	11.52732
Jarque-Bera	6241.827	7246.242	5466.171	1684.338
Probability	0.000000	0.000000	0.000000	0.000000
Panel D: Sample 4: 01/01/2022-28/03/2024 after Covid 19 economic recession				
	NYSE_COMPOSITE	MSCI_WORLD	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
Mean	9.85E-06	1.30E-05	3.38E-06	0.000280
Std. Dev.	0.001051	0.001279	0.001272	0.008603
Skewness	-0.099677	-0.026112	-0.031161	-0.355102
Kurtosis	4.520638	4.766972	4.512033	4.955329
Jarque-Bera	57.23398	76.03962	55.72646	105.3074
Probability	0.000000	0.000000	0.000000	0.000000

Correlation of returns: The correlation matrix analysis, as outlined in the table 3, provides valuable insights into the relationships among the selected indices. Firstly, a strong correlation is observed among the U.S. local market index, the U.S. Islamic market index, and the global market index. This high level of association can be attributed to the dominant role of U.S.-based companies in global financial markets. American firms, particularly those in technology, finance, and consumer goods sectors, have a significant presence worldwide, leading to a high degree of market integration. As a result, the performance of the U.S. stock market is closely interconnected with broader global market movements, explaining the strong correlation among these indices.

Secondly, the global Islamic index exhibits a relatively lower correlation with the other indices. This weaker relationship can be linked to the distinct composition of the global Islamic index, which comprises a larger proportion of non-U.S. companies that comply with Shariah investment principles. Islamic finance prohibits interest-based transactions and excessive leverage, influencing the financial behavior of Shariah-compliant firms and differentiating them from conventional companies. Additionally, the global Islamic index's broader geographic diversification reduces its reliance on the U.S. market, further contributing to its weaker correlation with other indices.

Lastly, a notable increase in stock index correlations is evident during the economic downturn triggered by the COVID-19 pandemic. This trend aligns with the well-established observation that financial markets become more interconnected during periods of crisis, as investors adopt similar risk mitigation strategies in response to global economic shocks. However, despite the overall rise in correlations, the global Islamic index continues to maintain a relatively lower correlation with the other indices. This sustained distinction suggests that the unique structural characteristics of Shariah-compliant investments, such as sectoral distribution and financial constraints, provide a degree of insulation from complete market integration, even in times of financial turmoil.

Table 3: Index Return Correlation matrices

Panel A: Sample 1: Whole period: 01-01-2018 – 28-02-2024				
	NYSE_COMPOSITE	MSCI_WORLD	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
NYSE_COMPOSITE	1	0.95	0.89	0.56
MSCI_WORLD		1	0.98	0.63
DJ_IP			1	0.59
MSCI_W_ISLAMIC				1
Panel B: Sample 2: 01/01/2018 – 31/12/2019 Before Covid 19 economic recession				
	USA	MSCI_WORLD	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
USA	1	0.90	0.87	0.47
MSCI_WORLD		1	0.97	0.58
DJ_IP			1	0.56
MSCI_W_ISLAMIC				1
Panel C : Sample 3: 01/01/2020 – 31/12/2021 During Covid 19 economic recession				
	USA	MSCI_WORLD	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
USA	1	0.96	0.92	0.63
MSCI_WORLD		1	0.98	0.69
DJ_IP			1	0.66
MSCI_W_ISLAMIC				1
Panel D: Sample 4: 01/01/2022-28/03/2024 after Covid 19 economic recession				
	USA	MSCI_WORLD	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
USA	1	0.94	0.89	0.49
MSCI_WORLD		1	0.98	0.56
DJ_IP			1	0.53
MSCI_W_ISLAMIC				1

To improve the investigation of the interaction dynamics between conventional and Islamic stock returns and check their linkages within the context of the last economic recession, as well as explore the feedback effects between conventional finance and the Islamic finance industry, we use a Vectorial Autoregressive (VAR) model to model short-term stock returns.

Results of Short-term investigation: To identify the optimal lag length (Appendix A), we apply lag-length selection criteria and verify the absence of autocorrelation at the selected lag. The commonly used criteria for this process include the Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan-Quinn Information Criterion (HQIC). Based on the results presented in the tables below, we conclude that the Schwarz Information Criterion, Hannan-Quinn Information Criterion, and Akaike Information Criterion all recommend the use of two lags.

The stability of the Vector Autoregressive model is assessed using the Inverse Roots of the Autoregressive Characteristic Polynomial (Appendix C). A VAR model is considered stable if all inverse roots of the characteristic AR polynomial have a modulus less than one and are located within the unit circle. If this condition is not met, the VAR model may be unstable, potentially compromising the validity of various statistical tests, including impulse response functions. The results presented in Appendix 3 indicate that all roots lie within the unit circle, confirming the stability of the estimated VAR models.

Residual Diagnostics: To evaluate the adequacy of the model, residual diagnostics were performed. The residual correlograms (Appendix D) suggest that most autocorrelation values fall within the two-standard-error bounds, which is an indication of a well-specified model.

Residual Serial Correlation Test: The presence of serial correlation in the residuals was tested (Appendix E) using a significance level of 5%. The p-value obtained exceeds the 5% threshold, leading to the failure to reject the null hypothesis of no serial correlation. This result confirms that there is no significant autocorrelation in the residuals at a lag length of two, suggesting that the selected lag order is appropriate for capturing the underlying data dynamics.

The findings from the Vector Autoregressive model (Appendix B) provide valuable insights into the interdependencies between Islamic and conventional financial markets at both national and international levels. At the national level (Table B1), the analysis indicates that the local Islamic index does not exert a significant influence on the local conventional index. However, conventional stock returns play a crucial role in explaining fluctuations in Islamic stock returns. This suggests that Islamic financial markets, while operating under distinct principles, remain influenced by conventional market movements, highlighting a degree of dependency on

broader financial trends. At the international level (Table B2), the results reveal a significant dependence of the global Islamic index on the global conventional index. However, this relationship is not reciprocal, as the global conventional index does not exhibit a similar dependence on the global Islamic index. This asymmetry suggests that while Islamic financial markets are shaped by conventional financial trends on a global scale, they do not exert a substantial impact on conventional financial markets in return.

For Islamic indices (Table B3), the VAR model results indicate that the domestic Islamic index influences the global Islamic index. However, the local Islamic index remains unaffected by fluctuations in the global Islamic index. This suggests that domestic Islamic markets play a crucial role in shaping broader Islamic financial trends, reinforcing the importance of national Islamic financial ecosystems in driving global Islamic finance dynamics.

Regarding conventional assets (Table B4), the findings demonstrate a strong interdependence between the global conventional index and the local conventional index. This mutual dependence underscores the high level of integration within conventional financial markets, where global trends directly influence domestic market performance and vice versa.

Overall, these results highlight key differences in the interaction patterns between Islamic and conventional financial markets. While conventional markets exhibit strong bidirectional dependencies at both national and international levels, Islamic financial markets appear to be more influenced by conventional finance rather than exerting influence on it. Additionally, domestic Islamic markets play a more prominent role in shaping global Islamic finance than the other way around. These insights carry important implications for investors and policymakers, emphasizing the need for tailored portfolio diversification strategies and risk management approaches that account for the unique dynamics of Islamic and conventional financial markets.

Granger causality test (Appendix F): First, at the national level (Table F1), the results indicate a unidirectional causality where the conventional local index Granger-causes the Islamic local index, suggesting that movements in conventional stock returns significantly influence the dynamics of Islamic stock returns. However, the absence of a reverse causal effect implies that Islamic indices do not exert a meaningful influence on conventional markets within the domestic financial system.

Second, at the international level (Table F2), a similar pattern is observed, with the conventional global index Granger-causing the Islamic global index. This finding highlights the dominant role of conventional financial markets in shaping the performance of Islamic indices on a global scale, reinforcing the dependence of Islamic finance on broader conventional market trends.

Third, within Islamic financial markets (Table F3), the local Islamic index Granger-causes the global Islamic index, suggesting that domestic Islamic market movements contribute to the overall performance of international Islamic indices. However, the lack of a reciprocal causal relationship indicates that global Islamic markets do not significantly influence local Islamic financial markets, pointing to a degree of segmentation within Islamic finance.

Finally, for the conventional financial market (Table F4), a bidirectional Granger-causal relationship exists between the conventional global index and the local conventional index, demonstrating strong interdependence and mutual influence between domestic and global conventional markets.

Overall, these findings suggest an asymmetric dependency between Islamic and conventional financial markets, where conventional markets play a leading role in driving Islamic financial performance both domestically and globally. Additionally, the observed segmentation within Islamic financial markets underscores the need for further integration and development to enhance their resilience and global influence. These results have important implications for investors and policymakers in designing diversification strategies and risk management frameworks that account for the varying degrees of interdependence among financial market segments.

Impulse Response Function (Appendix G): The Impulse Response Function illustrated in Appendix 7, Graph 1, reveals that a shock to the Islamic domestic index has a positive impact on the American conventional index. However, this effect diminishes rapidly, returning to nearly zero by the second period. A slight increase in the return is observed between periods 2 and 4, with the peak occurring in period 3. The impact gradually converges back to zero after period 4. However, the Impulse Response Function graph shows that a shock to the American conventional index has only a mild effect on the Islamic domestic index. A slight increase in the return is observed between periods 2 and 4, with the peak occurring in period 3.

At the international level, the Impulse Response Function shown in Appendix 7, Graph 2, demonstrates that a shock to the World Islamic index positively affects the World conventional index. However, this impact fades quickly, returning to nearly zero by the second period. A slight increase in income is observed between

periods 2 and 4, peaking in period 3, before gradually converging back to zero after period 4. On the other hand, the graph indicates that a shock to the World conventional index has no immediate effect on the World Islamic index. A modest rise in income is seen between periods 1 and 3, with a peak in period 2, before the impact dissipates by period 4.

For Islamic indexes, Graph 3 from Appendix 7 shows that a shock to the domestic Islamic index has a significant positive impact on the World Islamic index. However, this effect diminishes quickly, returning to nearly zero by the third period and fully dissipating after period 5. Conversely, the graph indicates that a shock to the World Islamic index has no immediate effect on the domestic Islamic index. A slight fluctuation in income is observed between periods 1 and 4, with a peak in period 3, before gradually fading by period 4.

For conventional indexes, Graph 4 from Appendix 7 shows that a shock to the World conventional index has a significant positive impact on the American conventional index. However, this effect fades quickly by the second period. An increase in returns is observed between periods 2 and 4, peaking in period 3, before returning to nearly zero by the fourth period and fully dissipating after period 5. On the other hand, the graph shows that a shock to the American conventional index has no immediate effect on the World conventional index. A slight fluctuation in income is seen between periods 1 and 3, with a peak in period 2, before gradually fading by period 4. The Impulse Response Function analysis provides crucial insights into the dynamic interactions between Islamic and conventional financial indices at both domestic and global levels.

At the domestic level, the results indicate that a shock to the Islamic domestic index initially exerts a positive influence on the local conventional index. However, this effect is short-lived, rapidly diminishing and stabilizing near zero by the second period. A minor fluctuation occurs between periods 2 and 4, peaking in period 3, before fully dissipating. Conversely, a shock to the local conventional index has only a mild and transient impact on the Islamic domestic index, suggesting limited feedback effects between these two markets.

At the international level, the findings reveal that a shock to the global Islamic index positively influences the global conventional index, but this effect is short-term, fading quickly and stabilizing by the second period. A temporary increase in returns is observed between periods 2 and 4, with a peak in period 3, before converging back to zero. On the other hand, a shock to the global conventional index does not exert an immediate effect on the global Islamic index. Instead, a modest rise in returns is detected between periods 1 and 3, with a peak in period 2, before the impact dissipates by period 4.

Within Islamic financial markets, a shock to the domestic Islamic index significantly influences the global Islamic index, reinforcing the role of national markets in shaping international Islamic financial performance. However, this effect diminishes quickly, stabilizing near zero by the third period and disappearing by period 5. Conversely, a shock to the global Islamic index does not immediately impact the domestic Islamic index, with only slight fluctuations observed between periods 1 and 4, peaking in period 3, before gradually fading.

For conventional financial markets, the results demonstrate that a shock to the global conventional index exerts a strong positive influence on the local conventional index. However, this effect is temporary, fading by the second period, with fluctuations observed between periods 2 and 4, peaking in period 3, before stabilizing near zero by period 4 and fully dissipating after period 5. Meanwhile, a shock to the local conventional index does not immediately affect the global conventional index, with only minor fluctuations occurring between periods 1 and 3, peaking in period 2, before gradually subsiding by period 4.

Overall, these findings suggest a stronger influence of Islamic markets at the domestic level than at the global level, highlighting the limited integration of Islamic financial markets on an international scale. Moreover, the asymmetric effects observed between Islamic and conventional markets indicate that conventional indices play a dominant role in driving financial market movements, while Islamic markets exhibit weaker feedback effects. These insights provide valuable implications for investors and policymakers in designing portfolio strategies and risk management approaches tailored to the dynamic nature of financial market interactions.

The variance decomposition (Appendix H): At the national level (Table H1), the results indicate that the local conventional index does not exert an immediate influence on the local Islamic index in the first period. Although its effect gradually increases over time, it remains relatively limited, reaching a maximum of only 0.45%. However, the local Islamic index accounts for a substantial 81% of the variations observed in the local conventional index, suggesting that changes in the Islamic financial market play a key role in shaping conventional market dynamics domestically.

At the international level (Table H2), findings reveal that the global conventional index does not exert an immediate impact on the global Islamic index in the first period. Over time, its influence remains modest, explaining only 4.72% of the changes in the global Islamic index. Conversely, the global Islamic index plays a

more substantial role in driving changes in the global conventional index, accounting for 42% of its variations. These results highlight a degree of interdependence between global Islamic and conventional markets, with Islamic finance demonstrating a greater explanatory power in influencing conventional financial dynamics on a global scale.

Within Islamic financial markets (Table H3), the variance decomposition results indicate that the global Islamic index has a negligible effect on the local Islamic index, with its influence starting at 0% in the first period and increasing only marginally to 0.29% over time. In contrast, the local Islamic index exerts a significant contemporaneous effect on the global Islamic index, accounting for 38% of its variations. This suggests that national Islamic financial markets play a critical role in shaping global Islamic financial trends, reinforcing the importance of domestic Islamic markets in the broader Islamic finance landscape.

For conventional financial markets (Table H4), the analysis demonstrates that the local conventional index has a minimal effect on the global conventional index, reaching only a small maximum influence over time. However, the global conventional index exerts an immediate and substantial influence on the local conventional index, with this effect remaining stable and accounting for 90% of the variations. This indicates a strong dependency of domestic conventional markets on global conventional financial trends, reflecting the higher degree of integration and interconnectedness within conventional finance compared to Islamic finance.

Overall, these findings underscore the asymmetrical relationships between Islamic and conventional financial markets, both at national and international levels. While conventional finance exhibits strong top-down influences, with global markets driving domestic trends, Islamic finance appears to be more influenced by domestic factors, with local Islamic markets playing a significant role in shaping global Islamic financial movements. These insights have important implications for portfolio diversification strategies and risk management approaches, particularly for investors seeking to optimize exposure to Islamic and conventional financial assets in varying economic conditions.

Portfolio Simulation: The key empirical findings from the portfolio simulations are presented in Appendix I Table I1. The analysis reveals that, in the pre-COVID-19 recession period, international diversification in conventional assets was associated with higher returns and reduced portfolio risk, enhancing overall investment efficiency. However, in the post-recession period, the benefits of international diversification declined, resulting in lower returns and increased risk exposure. Notably, during the recession, portfolio risk reached its highest levels; yet, international diversification proved effective in mitigating risk while simultaneously enhancing returns. These findings underscore the dynamic nature of financial markets and emphasize the importance of adaptive investment strategies that account for shifting economic conditions and risk-return trade-offs.

The findings indicate that when investing exclusively in Islamic indices, both local and international, portfolio returns and risk levels remain relatively stable before and after the COVID-19 recession. However, during the recession, both risk and returns exhibit a slight increase. Additionally, as the allocation to international Islamic indices increases relative to domestic Islamic indices, portfolio returns rise, accompanied by a proportional increase in risk. A noteworthy observation emerges when comparing conventional and Islamic investments: during the recession, Islamic portfolios generate higher returns than their conventional counterparts, while both investment types exhibit similar risk levels. These insights highlight the resilience of Islamic finance during periods of economic uncertainty and underscore its potential as a viable alternative investment strategy.

When opting for international investments, specifically in the global conventional and global Islamic indices, the results indicate that portfolio risk remained low before the economic recession, peaked during the recession, and experienced a slight decrease in the post-recession period. Furthermore, across all three subperiods, an increase in the allocation to the International Islamic Index relative to the International Conventional Index resulted in higher portfolio returns, accompanied by a proportional rise in risk. These findings underscore the dynamic nature of portfolio risk and return across economic cycles and highlight the impact of Islamic asset allocation on investment performance.

When opting for local investments, specifically in the Local Islamic Index and the Local Conventional Index, the results indicate a decline in portfolio returns and an increase in risk in the post-recession period compared to the pre-recession phase. This suggests that economic downturns have a lasting impact on local market performance, influencing both return potential and risk exposure in the aftermath of a recession. Additionally, the portfolio consisting of the Local Islamic Index and the Local Conventional Index exhibited the highest level of risk while maintaining relatively stable returns. This finding highlights the increased volatility associated with local market investments, despite the consistency in return generation. Furthermore, the

analysis reveals that increasing the allocation to the Local Islamic Index relative to the Local Conventional Index leads to a simultaneous increase in both portfolio returns and risk. Additionally, a comparative assessment of local and international investments demonstrates that international diversification effectively contributes to reducing overall portfolio risk.

However, the results obtained remain somewhat constrained by the assumptions underlying the aforementioned scenarios. To comprehensively assess investment opportunities, we propose constructing an optimal portfolio and determining the optimal allocation p_1^* . This is achieved by solving the following optimization framework, which focuses on minimizing portfolio variance:

$$\begin{aligned} \text{Min}\sigma^2 &= p_i^2\sigma^2(R_1) + (1 - p_i)^2\sigma^2(R_2) + 2\rho_{1,2}p_i(1 - p_i)\sigma(R_1)\sigma(R_2) \\ \frac{d\sigma^2}{dp_i} &= 0 \text{ as a result } p^* = \frac{\sigma_{R_2}^2 - \rho_{1,2}\sigma_{R_2}\sigma_{R_1}}{\sigma_{R_2}^2 + \sigma_{R_1}^2 - \rho_{1,2}\sigma_{R_2}\sigma_{R_1}} \end{aligned}$$

The main results are in Appendix I Table I2. When allocating investments exclusively to conventional indices the optimal allocation to international investments, which minimizes portfolio risk, is dependent on prevailing economic conditions. Specifically, the proportion of the portfolio allocated to the Global Conventional Index that minimizes risk is 81% prior to a recession, 91% during a recession, and 75% in the post-recession period. These shifts in the optimal allocation reflect changes in the risk-return dynamics across economic cycles: prior to a recession, higher international exposure is beneficial due to favorable market conditions, while during a recession, the increased volatility of global markets necessitates a higher allocation to reduce risk. After a recession, as market conditions stabilize, the optimal allocation to international assets is reduced to optimize the portfolio's overall risk and return.

When allocating investments exclusively to Islamic indices, empirical analysis reveals that increasing the proportion of capital invested in the Global Islamic Index, as opposed to the Local Islamic American Index, results in an enhancement of portfolio returns. However, this increase in returns is accompanied by a concomitant rise in portfolio risk. This occurs due to the greater exposure to global market volatility and sector concentration inherent in the Global Islamic Index, which is more sensitive to international economic conditions compared to the Local Islamic American Index. To optimize risk-adjusted returns, portfolio optimization models indicate that the allocation minimizing portfolio risk varies depending on the economic cycle. Specifically: Before a recession, the optimal risk-minimizing allocation is found to be 2% in the Global Islamic Index and 98% in the Local Islamic American Index. This allocation allows for limited exposure to the international market while maintaining the stability of the domestic market, which tends to be less volatile in pre-recession periods. During and after a recession, as the economic recovery phase begins and global markets start to stabilize, the allocation to the Global Islamic Index increases to 3%, with 97% allocated to the Local Islamic American Index. This shift reflects the marginally improved risk-return tradeoff of incorporating global assets into the portfolio during recovery phases, where diversification across international markets offers the potential for higher returns without overly increasing risk.

Empirical analysis of international portfolio diversification reveals that increasing the allocation to the Global Islamic Index, relative to the Global Conventional Index, results in higher portfolio returns, but this comes at the cost of increased portfolio risk. The enhanced returns are driven by the growth sectors and higher market exposure in the Global Islamic Index, but the increased risk arises due to factors such as sector concentration and lower financial diversification compared to the Global Conventional Index. Portfolio optimization models indicate that the optimal allocation to the Global Islamic Index that minimizes overall portfolio is 3% Global Islamic Index 97% Global Conventional Index before a recession, and 2% Global Islamic Index and 98% Global Conventional Index after a recession. The higher allocation to the Global Islamic Index before a recession is justified by the index's strong performance during favorable economic conditions, where growth sectors outperform, thus justifying a higher risk-return tradeoff. However, after a recession, market conditions typically stabilize, particularly for conventional assets, which reduces the overall risk of the Global Conventional Index. This stabilization leads to a reduction in the optimal allocation to the Global Islamic Index, as the lower-risk profile of the Global Conventional Index enhances the portfolio's risk-return efficiency, making a 2% allocation to the Global Islamic Index optimal in this phase. This strategic allocation adjustment reflects the dynamic nature of portfolio diversification, where optimal asset weights shift in response to changing economic conditions in order to maintain the desired balance between risk and return.

When allocating investments at the national level (specifically within the American market), empirical analysis reveals that both portfolio return and risk increase as the allocation to the Islamic Local Index increases,

both before and after the Covid recession. This relationship highlights the higher return potential and increased volatility associated with the Islamic local assets.

Surprisingly, during the recession, the dynamics changed. Increasing the allocation to the Islamic Local Index, compared to the Local American Conventional Index, results in a higher portfolio return and a reduction in portfolio risk. This unexpected outcome suggests that, during periods of economic downturn, Islamic assets may exhibit resilience or lower correlation with traditional assets, thus mitigating risk despite higher returns.

The optimal portfolio allocations that minimize risk across these different economic periods are as follows:

Before the recession, the optimal allocation is 21% in the Local American Conventional Index and 79% in the Islamic Local American Index.

During the recession, the optimal allocation shifts to 0% in the Local American Conventional Index and 100% in the Islamic Local American Index.

After the recession, the optimal allocation returns to 27% in the Local American Conventional Index and 73% in the Islamic Local American Index.

Our study provides empirical evidence supporting the notion that international diversification yields superior risk-adjusted returns compared to domestic diversification. This conclusion aligns with modern portfolio theory (MPT), which suggests that diversifying investments across different countries reduces unsystematic risk more effectively than limiting diversification to a single national market. By investing in international assets, investors can mitigate country-specific economic fluctuations, political risks, and market volatility, thereby achieving more stable portfolio performance. Our findings reinforce the significance of global diversification as a strategic approach to optimizing investment portfolios.

These findings underscore also the changing risk-return dynamics in response to economic conditions, suggesting that Islamic local assets may offer a unique benefit in risk mitigation, particularly during recessions. The unique benefit of Islamic local assets in risk mitigation during recessions stems from their ethical investment practices, lower correlation with conventional financial markets, emphasis on real and asset-backed investments, and focus on long-term sustainability. These characteristics enable Islamic assets to offer better risk-adjusted returns and reduced volatility, especially during periods of economic distress. Consequently, investors may allocate more to these assets during recessions to safeguard their portfolios from the heightened risk typically associated with conventional assets.

4 Conclusion

Islamic finance, guided by principles such as risk-sharing, asset-backed transactions, and ethical investing, presents a unique alternative to conventional financial systems, especially in times of financial instability. Our study analyzes whether Islamic finance can act as a reliable hedge against financial crises.

Firstly, our study identifies an asymmetric dependency between Islamic and conventional financial markets, with conventional markets acting as the primary driver of Islamic financial performance at both domestic and global levels. Additionally, the segmentation within Islamic financial markets underscores the need for greater integration and development to enhance their resilience and global reach. These insights are crucial for investors and policymakers in designing effective diversification strategies and risk management frameworks that account for the varying degrees of interdependence across financial markets.

Secondly, our research highlights that Islamic markets exert a more significant influence at the domestic level than on a global scale, reflecting their limited integration into the international financial system. Moreover, the asymmetric relationship between Islamic and conventional markets suggests that conventional indices predominantly shape financial market movements, while Islamic markets provide weaker feedback effects. These findings have important implications for investment strategies and risk management, emphasizing the need for tailored approaches that align with the evolving dynamics of financial market interactions.

Furthermore, our research offers empirical support for the idea that international diversification leads to better risk-adjusted returns than domestic diversification. This finding is consistent with modern portfolio theory (MPT), which posits that spreading investments across multiple countries is more effective in minimizing unsystematic risk than concentrating them within a single national market. By allocating assets internationally, investors can reduce exposure to country-specific economic instabilities, political uncertainties, and market fluctuations, resulting in a more resilient portfolio. Our results highlight the importance of global diversification as a key strategy for enhancing portfolio performance.

Lastly, our simulation study supports previous research, confirming that Islamic equities tend to outperform conventional counterparts during economic downturns. However, during periods of economic

stability, conventional stocks may yield higher returns. These variations highlight the complexity of financial market behavior and underscore the importance of context-specific analysis when assessing investment performance.

Based on these findings, professional and scientific recommendations for portfolio selection include:

Investors should construct portfolios that incorporate both Islamic and conventional assets to optimize risk-adjusted returns. Given the dominant influence of conventional markets, Islamic investors should consider including a proportion of conventional stocks in their portfolios to capture global market trends while maintaining Shariah compliance.

Given the asymmetric dependency between Islamic and conventional financial markets, portfolio allocations should be adjusted dynamically in response to changing market conditions. During economic downturns, a higher allocation to Islamic equities may enhance resilience and stability, whereas, in stable market conditions, increasing exposure to conventional stocks could improve return potential.

Since Islamic financial markets exhibit stronger influence at the domestic level, investors should emphasize local Islamic equities while maintaining selective exposure to international Islamic indices. This approach ensures that portfolio strategies align with the limited global integration of Islamic finance while capitalizing on regional growth opportunities.

Investors should employ risk mitigation tools such as sectoral diversification within Islamic finance, hedging techniques using Sharia-compliant derivatives, and exposure management through strategic asset allocation. These measures can reduce vulnerability to the dominant impact of conventional markets and minimize risks associated with financial market segmentation.

By adopting these strategies, investors can effectively navigate the complexities of financial market dynamics, enhance portfolio performance, and remain aligned with Islamic finance principles. Future research should focus on further enhancing Islamic portfolio allocation to better promote sustainability. This involves incorporating ethical, social, and environmental factors into financial decision-making. Key areas for exploration include integrating ESG criteria into Islamic investment products, developing innovative Shariah-compliant sustainable investment options, and addressing the challenges Islamic finance faces in sustainable investing. Additionally, future studies should assess the long-term impact of Islamic sustainable finance on global financial stability and explore policy frameworks that can strengthen its role in advancing responsible and ethical investment practices.

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Appendix A**Table A1: VAR Lag Order Selection Criteria for Domestic Investment**

VAR Lag Order Selection Criteria						
Endogenous variables: DJ_DOM_ISLAMIC NYSE_COMPOSITE						
Exogenous variables: C						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	18408.80	NA	5.25e-13	-22.59889	-22.59227	-22.59644
1	18457.13	96.48218	4.98e-13	-22.65332	-22.63345	-22.64595
2	18472.22	30.08961*	4.91e-13*	-22.66694*	-22.63382*	-22.65465*
3	18475.77	7.070206	4.91e-13	-22.66639	-22.62001	-22.64918
4	18479.99	8.384237	4.91e-13	-22.66665	-22.60703	-22.64453
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Table A2: VAR Lag Order Selection Criteria for International Investment

VAR Lag Order Selection Criteria						
Endogenous variables: MSCI_W_ISLAMIC MSCI_WORLD						
Exogenous variables: C						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	14103.23	NA	1.04e-10	-17.31274	-17.30611	-17.31028
1	14170.80	134.9013	9.60e-11	-17.39079	-17.37092	-17.38342
2	14203.33	64.86330*	9.27e-11*	-17.42582*	-17.39270*	-17.41353*
3	14207.11	7.530727	9.27e-11	-17.42555	-17.37918	-17.40835
4	14209.65	5.037087	9.29e-11	-17.42375	-17.36413	-17.40163
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Table A3: VAR Lag Order Selection Criteria for Islamic investment

VAR Lag Order Selection Criteria						
Endogenous variables: MSCI_W_ISLAMIC DJ_DOM_ISLAMIC						
Exogenous variables: C						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	14162.88	NA	9.65e-11	-17.38598	-17.37936	-17.38352
1	14226.46	126.9210	8.97e-11	-17.45913	-17.43925	-17.45176
2	14252.39	51.69291*	8.73e-11*	-17.48605*	-17.45292*	-17.47376*
3	14255.89	6.969004	8.73e-11	-17.48543	-17.43906	-17.46823
4	14257.30	2.810662	8.76e-11	-17.48226	-17.42264	-17.46014
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Table A4: VAR Lag Order Selection Criteria for Non-Islamic Investments

VAR Lag Order Selection Criteria						
Endogenous variables: MSCI_WORLD NYSE_COMPOSITE						
Exogenous variables: C						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	18824.80	NA	3.15e-13	-23.10963	-23.10301	-23.10718
1	18938.36	226.7045	2.76e-13	-23.24415	-23.22427	-23.23677
2	18962.96	49.06173	2.69e-13	-23.26945	-23.23632*	-23.25716*
3	18965.73	5.499848	2.69e-13	-23.26793	-23.22155	-23.25072
4	18970.99	10.47101*	2.69e-13*	-23.26948*	-23.20986	-23.24736
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Appendix B**Table B1:** VAR Estimation for Domestic Investment

Vector Autoregression Estimates		
Standard errors in () & t-statistics in []		
	DJ_DOM_ISLAMIC	NYSE_COMPOSITE
DJ_DOM_ISLAMIC(-1)	-0.042449	-0.076070
	(0.05684)	(0.05484)
	[-0.74680]	[-1.38701]
DJ_DOM_ISLAMIC(-2)	-0.039001	0.007057
	(0.05564)	(0.05368)
	[-0.70101]	[0.13146]
NYSE_COMPOSITE(-1)	0.033594	-0.036982
	(0.05886)	(0.05679)
	[0.57075]	[-0.65118]
NYSE_COMPOSITE(-2)	0.159935	0.123553
	(0.05736)	(0.05535)
	[2.78812]	[2.23229]
C	4.12E-05	2.28E-05
	(3.2E-05)	(3.1E-05)
	[1.28832]	[0.73977]
R-squared	0.014482	0.031168
Adj. R-squared	0.012058	0.028785
Sum sq. resids	0.002699	0.002513
S.E. equation	0.001288	0.001243
F-statistic	5.973497	13.07742
Log likelihood	8541.510	8599.830
Akaike AIC	-10.46782	-10.53934
Schwarz SC	-10.45128	-10.52279
Mean dependent	4.20E-05	2.17E-05
S.D. dependent	0.001296	0.001261
Determinant resid covariance (dof adj.)		4.87E-13
Determinant resid covariance		4.84E-13
Log likelihood		18496.58
Akaike information criterion		-22.66901
Schwarz criterion		-22.63592
Number of coefficients		10

Table B2: VAR Estimation for International Investment

Vector Autoregression Estimates		
Standard errors in () & t-statistics in []		
	MSCI_W_ISLAMIC	MSCI_WORLD
MSCI_W_ISLAMIC(-1)	-0.201817	-0.004036
	(0.03227)	(0.00482)
	[-6.25353]	[-0.83800]
MSCI_W_ISLAMIC(-2)	-0.124211	0.002130
	(0.03147)	(0.00470)
	[-3.94668]	[0.45349]
MSCI_WORLD(-1)	1.911749	-0.010827
	(0.21557)	(0.03217)
	[8.86820]	[-0.33658]
MSCI_WORLD(-2)	0.848838	0.126266
	(0.22004)	(0.03283)
	[3.85774]	[3.84564]
C	0.000272	3.39E-05
	(0.00023)	(3.4E-05)
	[1.19272]	[0.99565]
R-squared	0.050966	0.018738
Adj. R-squared	0.048631	0.016324
Sum sq. resids	0.137504	0.003062
S.E. equation	0.009196	0.001372
F-statistic	21.83029	7.762553
Log likelihood	5335.960	8438.671
Akaike AIC	-6.537045	-10.34172
Schwarz SC	-6.520500	-10.32517
Mean dependent	0.000284	3.77E-05
S.D. dependent	0.009428	0.001384
Determinant resid covariance (dof adj.)		9.20E-11
Determinant resid covariance		9.14E-11
Log likelihood		14222.30
Akaike information criterion		-17.42771
Schwarz criterion		-17.39462
Number of coefficients		10

Table B3: VAR Estimation for Islamic investment

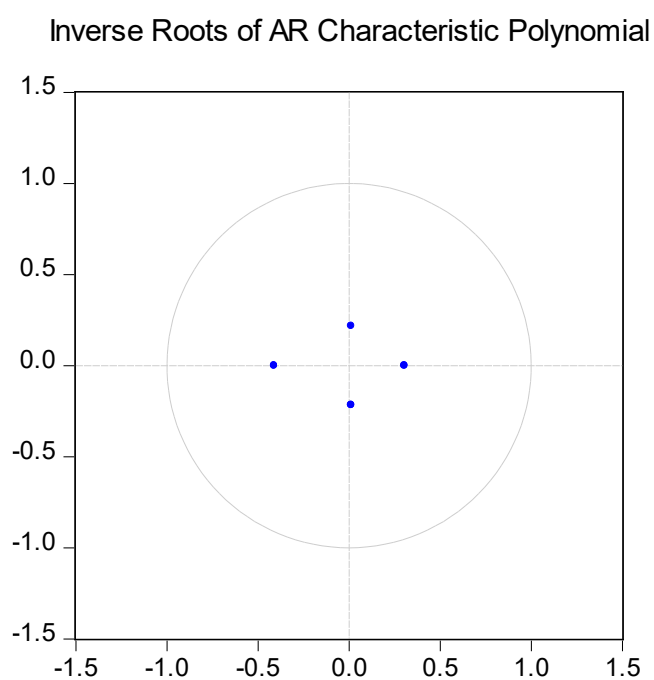
Vector Autoregression Estimates		
	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
DJ_DOM_ISLAMIC(-1)	0.012224	2.077825
	(0.03116)	(0.22176)
	[0.39229]	[9.36970]
DJ_DOM_ISLAMIC(-2)	0.076141	0.695896
	(0.03192)	(0.22715)
	[2.38556]	[3.06357]
MSCI_W_ISLAMIC(-1)	-0.005884	-0.193952
	(0.00439)	(0.03123)
	[-1.34071]	[-6.20967]
MSCI_W_ISLAMIC(-2)	0.006635	-0.100991
	(0.00428)	(0.03044)
	[1.55136]	[-3.31798]
C	3.80E-05	0.000250
	(3.2E-05)	(0.00023)
	[1.18913]	[1.09786]
R-squared	0.012732	0.054816
Adj. R-squared	0.010303	0.052491
Sum sq. resids	0.002704	0.136946
S.E. equation	0.001290	0.009177
F-statistic	5.242324	23.57520
Log likelihood	8540.063	5339.275
Akaike AIC	-10.46605	-6.541110
Schwarz SC	-10.44950	-6.524565

Mean dependent	4.20E-05	0.000284
S.D. dependent	0.001296	0.009428
Determinant resid covariance (dof adj.)		8.66E-11
Determinant resid covariance		8.61E-11
Log likelihood		14271.46
Akaike information criterion		-17.48799
Schwarz criterion		-17.45490
Number of coefficients		10

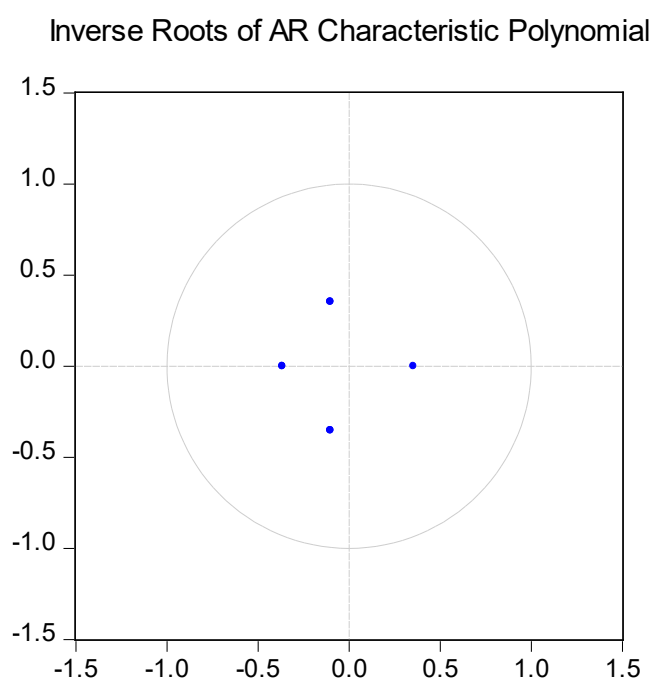
Table B4: VAR Estimation for Non-Islamic Investments

Vector Autoregression Estimates		
Standard errors in () & t-statistics in []		
	MSCI_WORLD	NYSE_COMPOSITE
MSCI_WORLD(-1)	-0.344167	-0.199761
	(0.08095)	(0.07345)
	[-4.25148]	[-2.71964]
MSCI_WORLD(-2)	0.084856	0.134883
	(0.07663)	(0.06953)
	[1.10740]	[1.94003]
NYSE_COMPOSITE(-1)	0.365620	0.103739
	(0.08934)	(0.08106)
	[4.09246]	[1.27975]
NYSE_COMPOSITE(-2)	0.089672	0.005864
	(0.08547)	(0.07755)
	[1.04920]	[0.07562]
C	3.75E-05	2.18E-05
	(3.4E-05)	(3.1E-05)
	[1.10630]	[0.71071]
R-squared	0.028126	0.037414
Adj. R-squared	0.025735	0.035046
Sum sq. resids	0.003032	0.002497
S.E. equation	0.001366	0.001239
F-statistic	11.76395	15.79995
Log likelihood	8446.510	8605.104
Akaike AIC	-10.35133	-10.54581
Schwarz SC	-10.33479	-10.52926
Mean dependent	3.77E-05	2.17E-05
S.D. dependent	0.001384	0.001261
Determinant resid covariance (dof adj.)		2.67E-13
Determinant resid covariance		2.65E-13
Log likelihood		18987.58
Akaike information criterion		-23.27110
Schwarz criterion		-23.23801
Number of coefficients		10

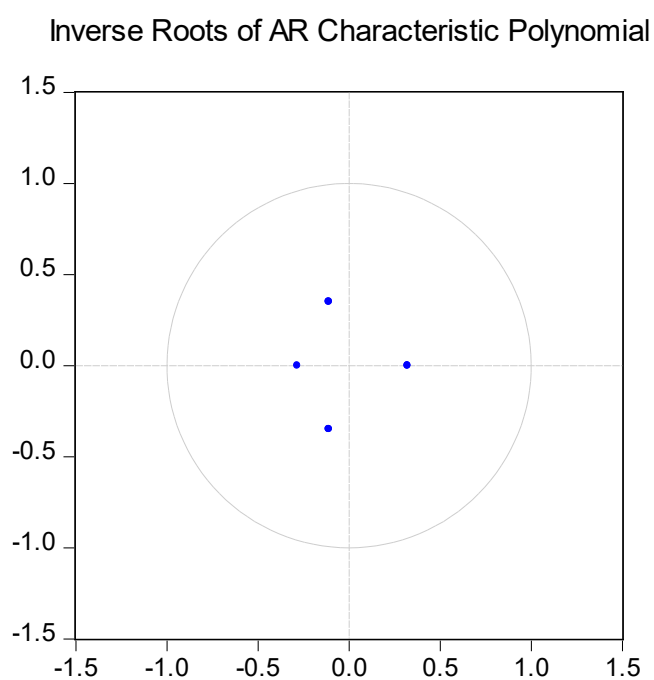
Appendix C



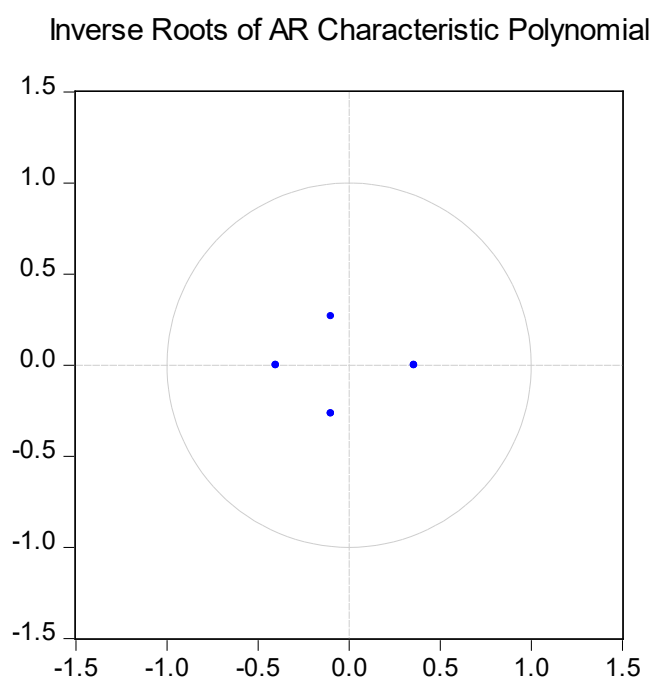
Graph C1: The Inverse Roots of AR Characteristic Polynomial Domestic Investment



Graph C2: The Inverse Roots of AR Characteristic Polynomial for International Investment



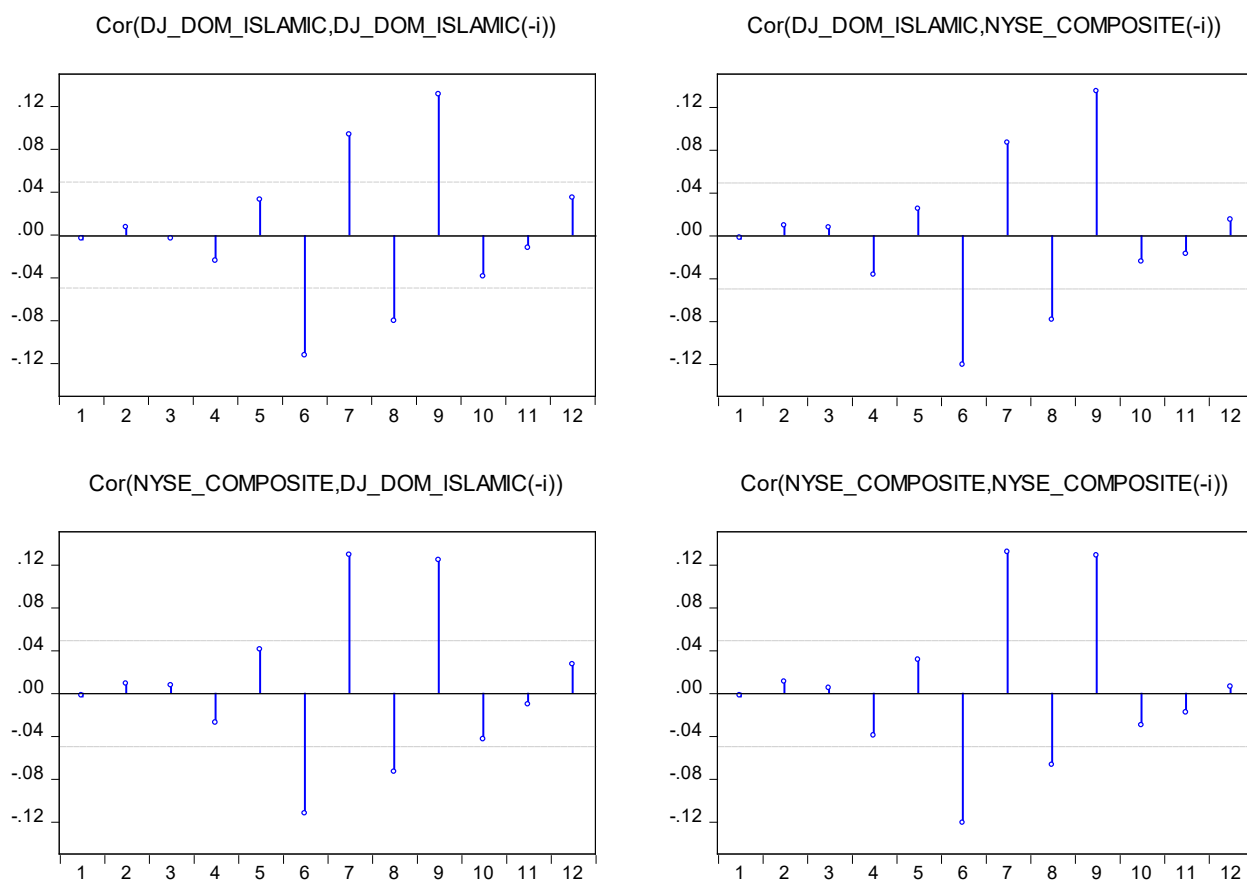
Graph C3: The Inverse Roots of AR Characteristic Polynomial for Islamic investment



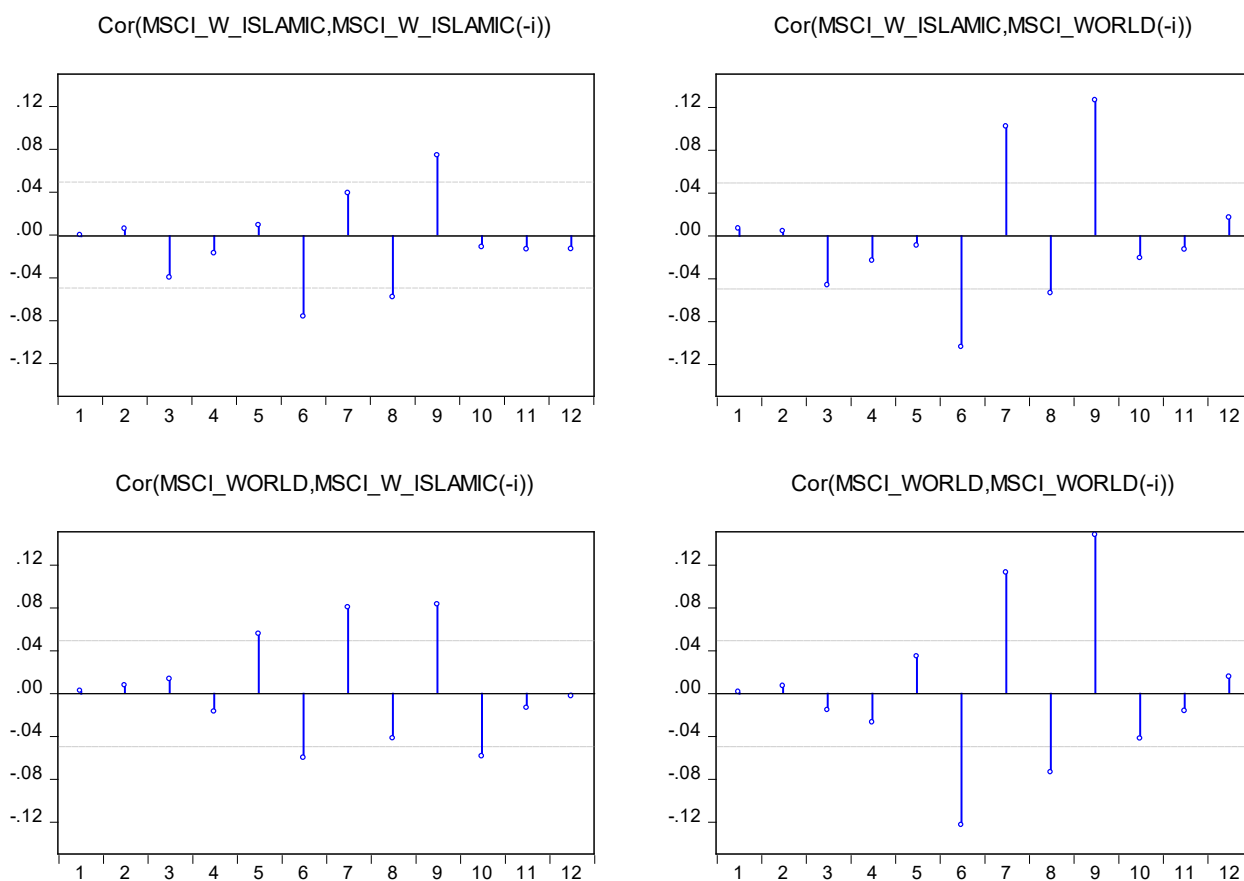
Graph C4: The Inverse Roots of AR Characteristic Polynomial for Non Islamic Investments

APPENDIX D: Residual test correlograms

Autocorrelations with Approximate 2 Std.Err. Bounds

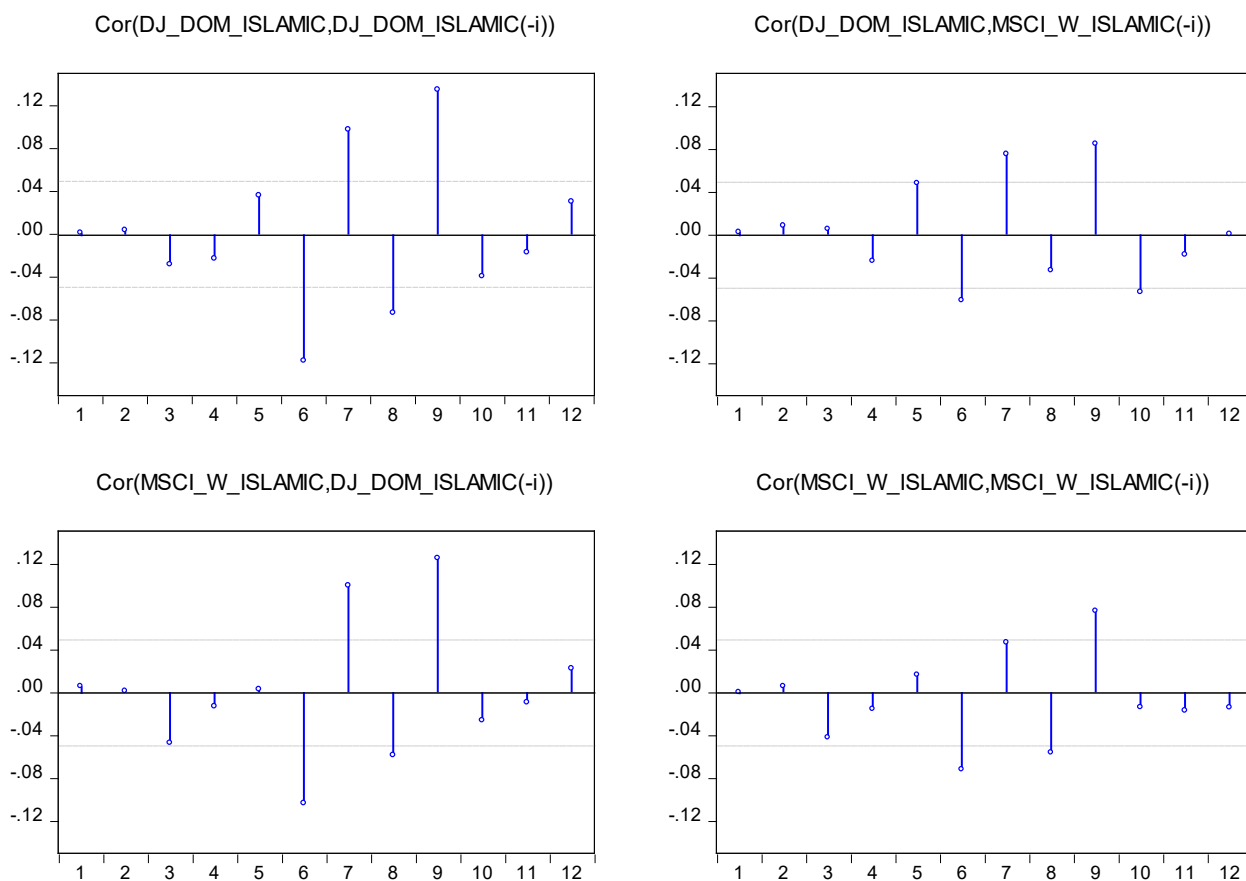
**Graph D1:** Residual test correlograms for Domestic Investment

Autocorrelations with Approximate 2 Std.Err. Bounds



Graph D2: Residual test correlograms for International Investment

Autocorrelations with Approximate 2 Std.Err. Bounds



Graph D3: Residual test correlograms for Islamic investment

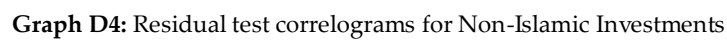


Table E1: Residual Serial Correlation for Domestic Investment

Table E2: Residual Serial Correlation for International Investment

VAR Residual Serial Correlation LM Tests						
Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	7.402746	4	0.1161	1.852227	(4, 3246.0)	0.1161
2	4.979591	4	0.2894	1.245469	(4, 3246.0)	0.2894
3	8.949712	4	0.0624	2.239824	(4, 3246.0)	0.0624
Null hypothesis: No serial correlation at lags 1 to h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	7.402746	4	0.1161	1.852227	(4, 3246.0)	0.1161
2	12.05905	8	0.1486	1.508789	(8, 3242.0)	0.1486
3	17.34282	12	0.1372	1.446872	(12, 3238.0)	0.1372
*Edgeworth expansion corrected likelihood ratio statistic.						

Table E3: Residual Serial Correlation for Islamic investment

VAR Residual Serial Correlation LM Tests						
Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	6.521076	4	0.1635	1.631405	(4, 3246.0)	0.1635
2	4.069367	4	0.3967	1.017666	(4, 3246.0)	0.3967
3	8.483892	4	0.0754	2.123092	(4, 3246.0)	0.0754
Null hypothesis: No serial correlation at lags 1 to h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	6.521076	4	0.1635	1.631405	(4, 3246.0)	0.1635
2	9.287497	8	0.3186	1.161525	(8, 3242.0)	0.3186
3	12.34200	12	0.4186	1.028871	(12, 3238.0)	0.4186
*Edgeworth expansion corrected likelihood ratio statistic.						

Table E4: Residual Serial Correlation Non-Islamic Investments

VAR Residual Serial Correlation LM Tests						
Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	5.674515	4	0.2248	1.419432	(4, 3246.0)	0.2248
2	7.565497	4	0.1089	1.892996	(4, 3246.0)	0.1089
3	6.406413	4	0.1708	1.602691	(4, 3246.0)	0.1708
Null hypothesis: No serial correlation at lags 1 to h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	5.674515	4	0.2248	1.419432	(4, 3246.0)	0.2248
2	14.62201	8	0.0669	1.830182	(8, 3242.0)	0.0669
3	17.30240	12	0.1386	1.443491	(12, 3238.0)	0.1386
*Edgeworth expansion corrected likelihood ratio statistic.						

Appendix F

Table F1: Granger causality test for Domestic Investment

VAR Granger Causality/Block Exogeneity Wald Tests			
Dependent variable: DJ_DOM_ISLAMIC			
Excluded	Chi-sq	df	Prob.
NYSE_COMPOSITE	7.892780	2	0.0193
All	7.892780	2	0.0193
Dependent variable: NYSE_COMPOSITE			
Excluded	Chi-sq	df	Prob.
DJ_DOM_ISLAMIC	1.932147	2	0.3806
All	1.932147	2	0.3806

Table F2: Granger causality test for International Investment

VAR Granger Causality/Block Exogeneity Wald Tests			
Dependent variable: MSCI_W_ISLAMIC			
Excluded	Chi-sq	df	Prob.
MSCI_WORLD	83.09031	2	0.0000
All	83.09031	2	0.0000
Dependent variable: MSCI_WORLD			
Excluded	Chi-sq	df	Prob.
MSCI_W_ISLAMIC	1.075912	2	0.5839
All	1.075912	2	0.5839

Table F3: Granger causality test for Islamic investment

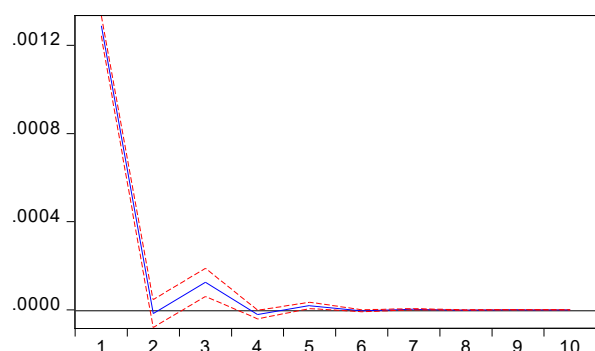
VAR Granger Causality/Block Exogeneity Wald Tests			
Dependent variable: DJ_DOM_ISLAMIC			
Excluded	Chi-sq	df	Prob.
MSCI_W_ISLAMIC	4.996451	2	0.0822
All	4.996451	2	0.0822
Dependent variable: MSCI_W_ISLAMIC			
Excluded	Chi-sq	df	Prob.
DJ_DOM_ISLAMIC	90.05271	2	0.0000
All	90.05271	2	0.0000

Table F4: Granger causality test for Non-Islamic Investments

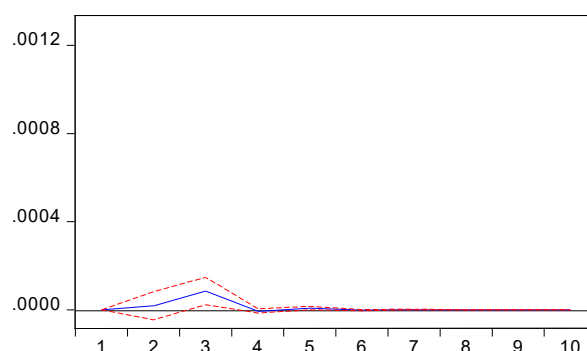
VAR Granger Causality/Block Exogeneity Wald Tests			
Dependent variable: MSCI_WORLD			
Excluded	Chi-sq	df	Prob.
NYSE_COMPOSITE	16.79198	2	0.0002
All	16.79198	2	0.0002
Dependent variable: NYSE_COMPOSITE			
Excluded	Chi-sq	df	Prob.
MSCI_WORLD	12.49540	2	0.0019
All	12.49540	2	0.0019

Appendix GResponse to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.

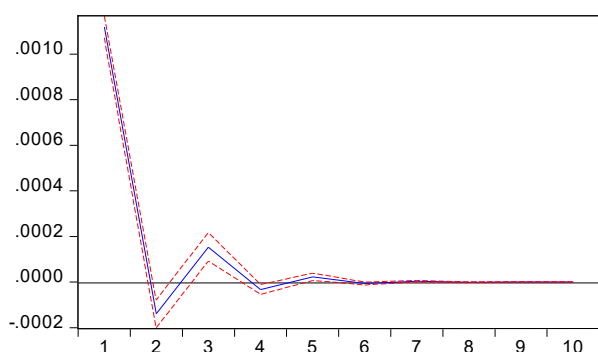
Response of DJ_DOM_ISLAMIC to DJ_DOM_ISLAMIC



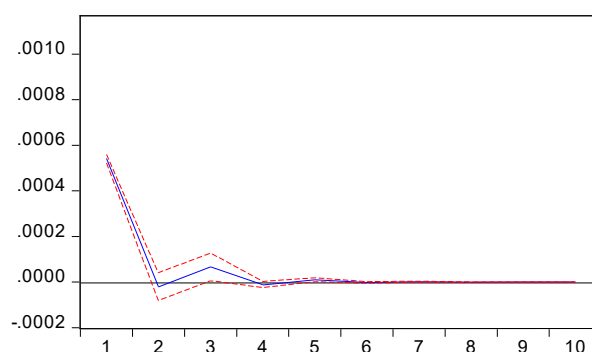
Response of DJ_DOM_ISLAMIC to NYSE_COMPOSITE

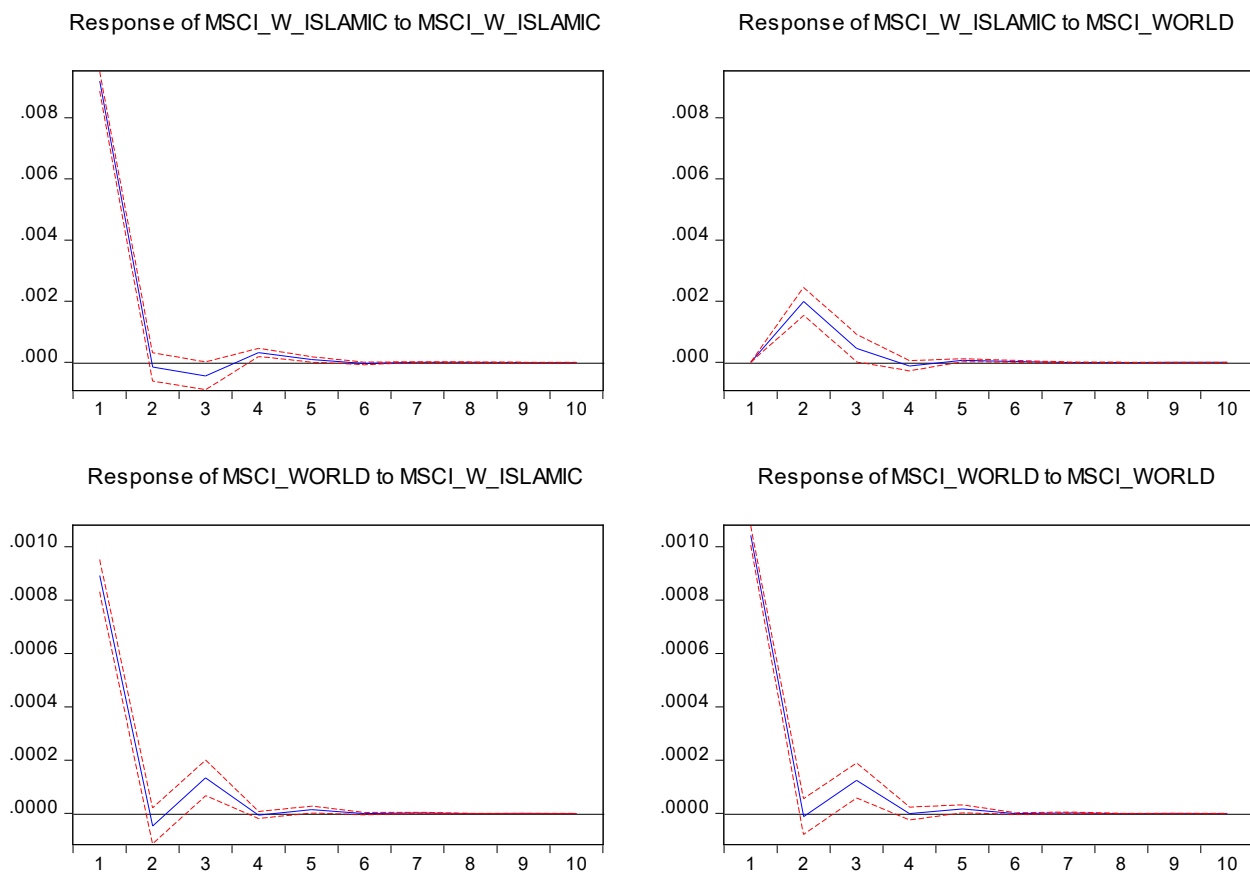


Response of NYSE_COMPOSITE to DJ_DOM_ISLAMIC

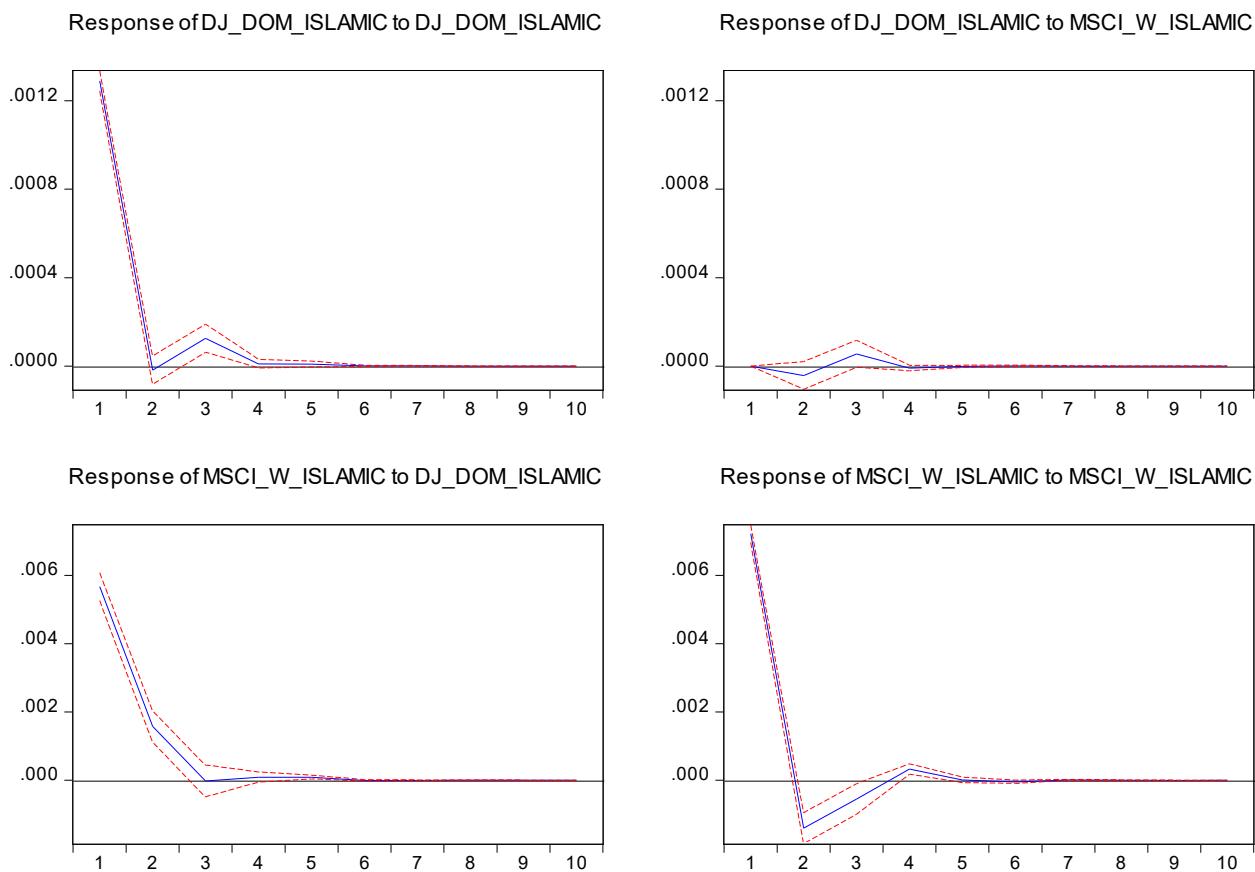


Response of NYSE_COMPOSITE to NYSE_COMPOSITE

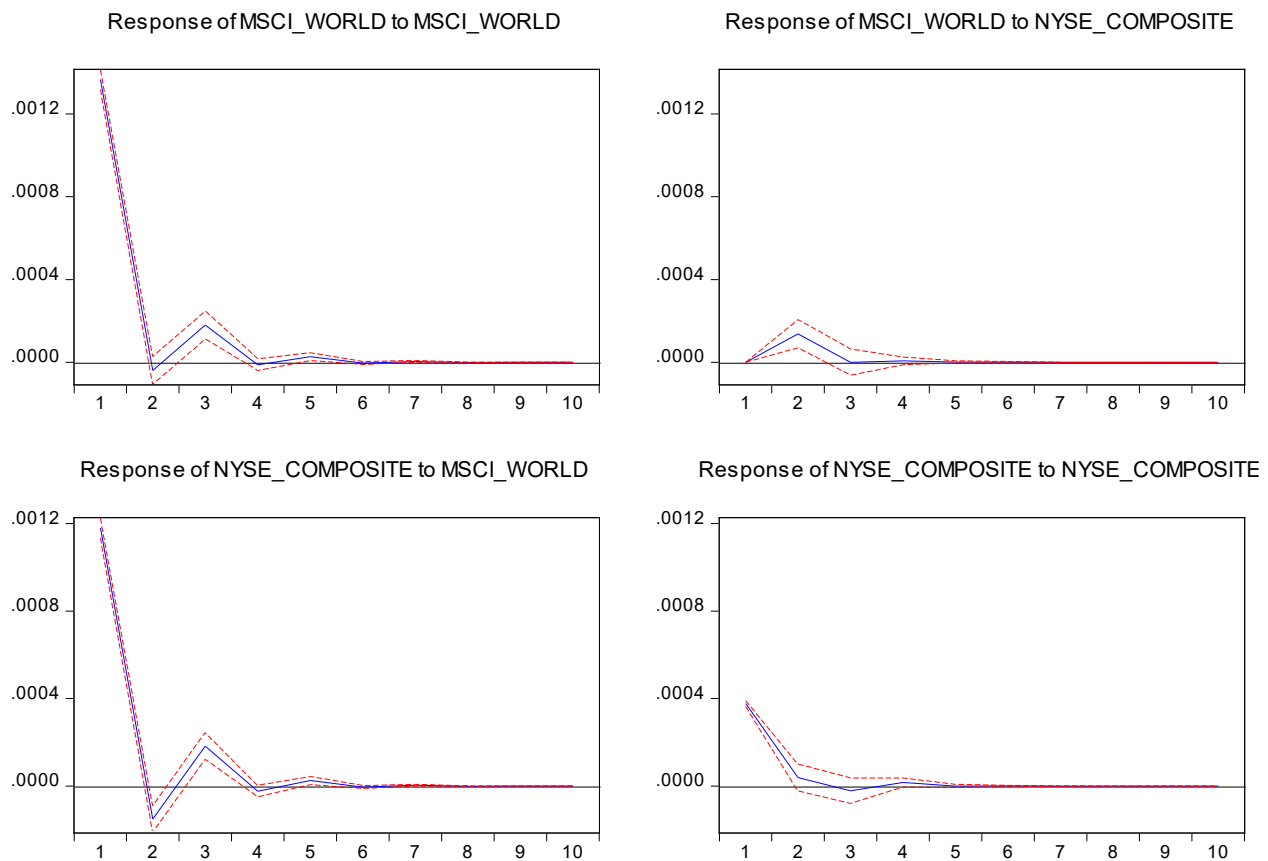
**Graph G1:** Impulse response function for Domestic Investment

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.

Graph 2: Impulse response function for International Investment
Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.



Graph G3: Impulse response function for Islamic investment

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.

Graph G4: Impulse response function for Non-Islamic Investments

Appendix H**Table H1:** Variance decomposition for Domestic Investment

Variance Decomposition of DJ_DOM_ISLAMIC:			
Period	S.E.	DJ_DOM_ISLAMIC	NYSE_COMPOSITE
1	0.001288	100.0000	0.000000
2	0.001289	99.98007	0.019933
3	0.001297	99.54942	0.450578
4	0.001298	99.54789	0.452113
5	0.001298	99.54499	0.455009
6	0.001298	99.54485	0.455151
7	0.001298	99.54476	0.455240
8	0.001298	99.54475	0.455246
9	0.001298	99.54475	0.455248
10	0.001298	99.54475	0.455248
Variance Decomposition of NYSE_COMPOSITE:			
Period	S.E.	DJ_DOM_ISLAMIC	NYSE_COMPOSITE
1	0.001243	81.02118	18.97882
2	0.001251	81.23600	18.76400
3	0.001262	81.29067	18.70933
4	0.001263	81.29660	18.70340
5	0.001263	81.29795	18.70205
6	0.001263	81.29817	18.70183
7	0.001263	81.29821	18.70179
8	0.001263	81.29822	18.70178
9	0.001263	81.29822	18.70178
10	0.001263	81.29822	18.70178
Cholesky Ordering: DJ_DOM_ISLAMIC NYSE_COMPOSITE			

Table H2: Variance decomposition for International Investment

Variance Decomposition of MSCI_W_ISLAMIC:			
Period	S.E.	MSCI_W_ISLAMIC	MSCI_WORLD
1	0.009196	100.0000	0.000000
2	0.009411	95.51202	4.487979
3	0.009433	95.29357	4.706433
4	0.009439	95.28526	4.714737
5	0.009439	95.28047	4.719528
6	0.009440	95.27942	4.720577
7	0.009440	95.27942	4.720579
8	0.009440	95.27942	4.720577
9	0.009440	95.27942	4.720581
10	0.009440	95.27942	4.720581
Variance Decomposition of MSCI_WORLD:			
Period	S.E.	MSCI_W_ISLAMIC	MSCI_WORLD
1	0.001372	42.24413	57.75587
2	0.001373	42.30828	57.69172
3	0.001385	42.50500	57.49500
4	0.001385	42.50603	57.49397
5	0.001385	42.50600	57.49400
6	0.001385	42.50600	57.49400
7	0.001385	42.50604	57.49396
8	0.001385	42.50604	57.49396
9	0.001385	42.50604	57.49396
10	0.001385	42.50604	57.49396
Cholesky Ordering: MSCI_W_ISLAMIC MSCI_WORLD			

Table H3: Variance decomposition for Islamic investment

Variance Decomposition of DJ_DOM_ISLAMIC:			
Period	S.E.	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
1	0.001290	100.0000	0.000000
2	0.001290	99.89172	0.108279
3	0.001298	99.70941	0.290588
4	0.001298	99.70502	0.294976
5	0.001298	99.70491	0.295087
6	0.001298	99.70479	0.295214
7	0.001298	99.70478	0.295218
8	0.001298	99.70478	0.295221
9	0.001298	99.70478	0.295221
10	0.001298	99.70478	0.295221
Variance Decomposition of MSCI_W_ISLAMIC:			
Period	S.E.	DJ_DOM_ISLAMIC	MSCI_W_ISLAMIC
1	0.009177	38.17329	61.82671
2	0.009417	39.06979	60.93021
3	0.009433	38.93933	61.06067
4	0.009439	38.89691	61.10309
5	0.009439	38.90290	61.09710
6	0.009440	38.90202	61.09798
7	0.009440	38.90198	61.09802
8	0.009440	38.90198	61.09802
9	0.009440	38.90198	61.09802
10	0.009440	38.90198	61.09802
Cholesky Ordering: DJ_DOM_ISLAMIC MSCI_W_ISLAMIC			

Table H 4: Variance decomposition for Non Islamic Investments

Variance Decomposition of MSCI_WORLD:			
Period	S.E.	MSCI_WORLD	NYSE_COMPOSITE
1	0.001366	100.0000	0.000000
2	0.001373	98.98648	1.013518
3	0.001385	99.00358	0.996422
4	0.001385	99.00096	0.999041
5	0.001385	99.00120	0.998803
6	0.001385	99.00107	0.998929
7	0.001385	99.00108	0.998921
8	0.001385	99.00108	0.998924
9	0.001385	99.00108	0.998923
10	0.001385	99.00108	0.998923
Variance Decomposition of NYSE_COMPOSITE:			
Period	S.E.	MSCI_WORLD	NYSE_COMPOSITE
1	0.001239	90.68890	9.311105
2	0.001249	90.73446	9.265540
3	0.001262	90.90376	9.096244
4	0.001263	90.89120	9.108797
5	0.001263	90.89486	9.105144
6	0.001263	90.89494	9.105059
7	0.001263	90.89503	9.104967
8	0.001263	90.89503	9.104966
9	0.001263	90.89504	9.104964
10	0.001263	90.89504	9.104964
Cholesky Ordering: MSCI_WORLD NYSE_COMPOSITE			

Appendix I**Table I1:** Simulation Results

		Before Covid 19 economic recession		During Covid 19 economic recession		After Covid 19 economic recession	
p_i		Rp	sigma p	Rp	sigma p	Rp	sigma p
Conventional Investment	100% local	1.65E-05	0.000844	4.16E-05	0.001737	9.85E-06	0.001051
	75% local	1.94E-05	7.23E-07	5.02E-05	3.03E-06	1.06E-05	1.2E-06
	50% local	2.24E-05	7.55E-07	5.88E-05	3.08E-06	1.14E-05	1.32E-06
	25% local	2.53E-05	8.08E-07	6.74E-05	3.16E-06	1.22E-05	1.46E-06
	100% international	2.82E-05	0.000939	0.000076	0.001807	0.000013	0.001279
Islamic Investment	100% local	3.84E-05	0.000944	9.06E-05	0.001594	3.38E-06	0.001272
	75% local	6.66E-05	6.22E-06	0.000173	1.4E-05	7.25E-05	7.71E-06
	50% local	9.47E-05	1.88E-05	0.000256	3.88E-05	0.000142	2.18E-05
	25% local	0.000123	3.87E-05	0.000339	7.71E-05	0.000211	4.39E-05
	100% international	0.000151	0.008113	0.000422	0.01135	0.00028	0.008603
International Investment	100% conventional	2.82E-05	0.000939	0.000076	0.001807	0.000013	0.001279
	75% conventional	5.89E-05	7.04E-06	0.000163	1.52E-05	7.98E-05	7.86E-06
	50% conventional	8.96E-05	1.99E-05	0.000249	4.01E-05	0.000147	2.2E-05
	25% conventional	0.00012	3.95E-05	0.000336	7.8E-05	0.000213	4.4E-05
	100% Islamic	0.000151	0.008113	0.000422	0.01135	0.00028	0.008603
National Investment	100% conventional	1.65E-05	0.000844	4.16E-05	0.001737	9.85E-06	0.001051
	75% conventional	2.2E-05	7.16E-07	5.39E-05	2.81E-06	8.23E-06	1.17E-06
	50% conventional	2.75E-05	7.47E-07	6.61E-05	2.66E-06	6.62E-06	1.28E-06
	25% conventional	3.29E-05	8.06E-07	7.84E-05	2.57E-06	5E-06	1.43E-06
	100% Islamic	3.84E-05	0.000944	9.06E-05	0.001594	3.38E-06	0.001272

It is important to note that $P_{conventional}$ represents the proportion of p_i allocated to the conventional index, $P_{Islamic}$ denotes the proportion of p_i allocated to the Islamic index, P_{Local} corresponds to the proportion of p_i invested in the local index, and $P_{international}$ indicates the proportion of p_i allocated to the global index.

Table I1: Optimal allocations

Optimal proportions		Before economic recession	During economic recession	After economic recession
Conventional Indices	P local	19%	8%	25%
	P international	81%	92%	75%
Islamic indices	P local	98%	97%	97%
	P international	2%	3%	3%
International indices	P conventional	98%	97%	97%
	P Islamic	2%	3%	3%
National indices	P conventional	21%	0%	27%
	P Islamic	79%	100%	73%