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Examining the performance of Shari'ah--compliant versus conventional stock indexes: A comparative analysis pre-, during, and post-COVID-19

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Abstract

This study aims to conduct an empirical comparative analysis of the performance of Shari'ah and conventional stock indexes during the period 2017–2023, which includes the COVID-19 pandemic. Additionally, it aims to investigate investors' preferences and analyse the long-term relationship of these indexes, as well as exploring the potential diversification benefits. The research methodology incorporates stochastic dominance analysis, the VARMAX procedure, and Johansen's co-integration approach. The data utilized consists of 31 conventional and 31 Islamic stock indexes, specifically from the FTSE, DJ, MSCI, and S&P series.

The results show that there are no long-term co-integration links between 30 out of 31 pairs of Islamic and conventional indexes. While conventional indexes tend to outperform Islamic indexes, they also come with a higher

Keywords

- Islamic finance
- indexes
- stochastic dominance
- COVID-19

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risk. On the other hand, Islamic indexes are considered to be less risky, offering potential diversification opportunities that may be attractive for global portfolios, particularly during periods of financial distress.

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Introduction

Islamic finance is grounded in Islamic law, which incorporates moral, ethical, and social dimensions. Screen-based Islamic investing, falling under the category of Socially Responsible Investing (SRI), involves Shari'ah-compliant mutual funds that avoid investing in companies involved in tobacco, gambling, war equipment, and excessive pollution. Faith-based mutual funds, such as Christian and Islamic funds, operate based on religious beliefs and value systems. Islamic mutual funds, in particular, refrain from investing in financial companies like conventional banks due to the prohibition of interest in Islam, as well as in companies involved in unethical sectors such as pornography. Additionally, speculative investing and trading involving excessive uncertainty are not permissible in Islamic investing (Grira et al., 2016; Mumtaz et al., 2015).

Islamic financial products are registering substantial growth. The Islamic finance industry has an estimated value of approximately $2.2 trillion (Standard Chartered, 2023), and industry experts predict that the asset base could grow to $ 4.94 trillion by 2025. Capital inflow into Islamic exchange traded funds is an important development triggering this growth. However, there are also other factors, including the fact that Islamic investing was relatively more immune to the global financial crisis of 2008 (Arouri et al., 2013; Ibrahim, 2015). The total assets of the Islamic finance industry grew 10.6% in 2020 and reached a significant milestone in 2021, according to the S&P Global Ratings and Refinitiv reports (Standard and Poor's, 2022). This growth occurred amidst global challenges stemming from the COVID-19 pandemic and falling oil prices.

The current century has been marked by numerous global events, with COVID-19 having a significant impact on the financial and economic aspects of life. The increased uncertainty resulting from the pandemic has prompted researchers to investigate the effects of COVID-19 on different asset returns, risk parameters, and the overall economy. Several studies found a negative impact of these shocks on financial markets, stocks performance, global economy, and level of risk (Anh & Gan, 2020; Angosto-Fernández & Ferrández-Serrano, 2022; Aslam et al., 2020; Goodell, 2020; Zhang et al., 2020).

Islamic finance attracts interest from researchers due to its unique features, and researchers have been studying various aspects of Islamic finance since its inception in 1975, while comparing it with conventional finance models.[6] Most recently, COVID-19 has generated new interest among academics into whether screen-based Islamic stocks performed differently to conventional stocks. Cheong (2021) reveals that Shari'ah-compliant stocks would be safer due to several restrictions imposed on Islamic investing, which include limits on leverage and prohibition on speculative income. In a review study, Sherif (2020) found that during times of market uncertainty, like the COVID-19 pandemic, Islamic investing attracts increased attention from investors. Nevertheless, empirical research reveals conflicting evidence.

One stream of research concludes that the COVID outbreak produced similar reactions in both groups of indexes in terms of the decline in stock valuations (Hassan et al., 2021a) and the increase in volatility (Hasan et al., 2021b). However, another stream of research found higher market valuation, lower volatility, and faster recovery during post-COVID period among Shari'ah-compliant stock indexes (Chowdhury et al., 2021; Dharani et al., 2022).

The growth in Islamic financial products has led to the development of numerous new indexes to cater to the increasing interest and investment in screened Islamic stocks. The inclusion of a stock in an Islamic stock index involves a screening process that aligns with fundamental Islamic principles concerning business, financial, and accounting practices (Tahir & Ibrahim, 2020; Tanin et al., 2021).

This study intends to analyse individual Shari'ah-compliant and non-compliant (conventional) stocks from the well-known FTSE, DJ, MSCI, S&Ps and Jakarta series. The advantage of focusing on indexes is that it avoids distortion introduced by the transaction costs of the funds, the effects of managerial skill sets, and their timing activities (Ashraf, 2013). Recent research has demonstrated the value of Islamic investing.

AlKhazali et al. (2022) found the existence of size anomalies in Islamic stocks contradicting the efficient market hypothesis. They conclude that the inclusion of Islamic stocks can produce abnormal returns for the investors. Saiti

[6] The Dubai Islamic Bank became the first modern commercial Islamic bank in the world in 1975 (Shaikh, 2010).

et al. (2014) demonstrate that including Islamic stocks in conventional stock indexes produces diversification benefits stemming from the low correlation between two sets of stocks—conventional and Islamic.

In this study, robust statistical techniques, specifically stochastic dominance (SD), are employed. Unlike previous studies that primarily relied on mean-variance (MV) criteria or the capital asset pricing model (CAPM), which utilize parametric statistics and assume normality in the data (despite the presence of fat tails in return data), SD techniques offer distinct advantages. SD techniques, as proposed by Davidson and Duclos (2000), provided a more comprehensive approach to evaluating the performance of mutual funds and portfolio selections. These techniques consider higher moments of the data, capturing key information that is often overlooked by traditional approaches relying solely on the first two moments. By utilizing SD techniques, this study overcomes the limitations of previous research and provides a more robust evaluation of investment performance.

Our research contributes to the existing literature as follows. First, while many studies examined the impact of COVID-19 on different markets and assets, these studies were confined to conventional investing securities. Very few studies have addressed the impact of COVID-19 on the performance of Shari'a--compliant indexes. Second, the research design of this study involves evaluating the comparative performance of conventional indexes versus alternative Islamic indexes, encompassing the most reputable Islamic indexes and up-to-date data from 2017 to 2023. Third, to assess the impact of COVID-19, and the structural changes that occurred in this period, the time span was split into three windows, namely, before, during and after the shock periods, utilizing robust statistical techniques (SD) based on monthly returns. Fourth, the findings of this paper have important implications for investors and portfolio managers, as it examines the potential diversification opportunities that may arise from Islamic indexes. Fifth, given the unique nature of Islamic investing, our study will be of interest to investors, professional money managers, analysts, and policy makers who value the empirical evidence related to different dimensions of alternative Islamic funds.

The overall results suggest that there are no long-term co-integration links between Islamic and conventional indexes. Although conventional indexes outperform Islamic indexes, they also carry higher levels of risk. In contrast, Islamic indexes offer potential diversification opportunities that may be attractive for global portfolios, particularly during times of financial turmoil.

The remainder of this study is as follows: Section 2 discusses the relevant existing literature followed by a detailed explanation of the methodology utilized in Section 3. Section 4 critiques the results and findings of the study, while the final section presents the conclusion.

1. Literature review

The COVID-19 pandemic had a profound impact on every aspect of the economy and finance, prompting academics and practitioners to explore different dimensions of this phenomenon. The existing literature highlights several key areas of research in this field. Firstly, there are studies that analyse the performance of traditional stock indexes. Secondly, researchers have examined the comparative behaviour of returns and volatility between Islamic and conventional stock indexes, including sectoral indexes. Thirdly, there are studies that investigate the impact at the company level, focusing on company-specific characteristics. Lastly, some studies have also explored the effects on regional and country indexes.

Studies that focused on market performance and conventional stock indexes found a negative association between returns and the daily frequency of COVID cases (Al-Awadhi et al., 2020; Anh & Gan, 2020; Topcu & Gulal, 2020; Yarovaya et al., 2021). On the other hand, studies that examined the comparative performance of Islamic and conventional indexes during COVID-19 period revealed mixed results. Hasan et al. (2021a) analysed the comparative performance of a comparable pair of indexes—the Islamic Dow Jones index and FTSE index—over the period of 21st January to 27th November 2020 and found a similar impact on returns volatility. Hasan et al. (2021b) used a global data of 50 countries to evaluate the performance of MSCI conventional equity indexes versus Islamic indexes from January 1 through September 30, 2020. Overall, their results showed a similar decline in returns. Exceptions were a few Asian countries where Islamic indexes yielded superior returns. Sherif (2020), however, showed different results. He found a significant negative impact on the conventional UK stock index, while an insignificant impact was observed on the UK Dow Jones Islamic index.

Moreover, studies that examined the comparative sectoral indexes found similar results. For example, Chowdhury et al. (2021) focused on sectoral indexes data including emerging countries data covering a sample period from January 01, 2020, to August 15, 2020. They report that Islamic sectoral indexes exhibited a relatively smaller decline in returns. However, their recovery was quicker than their counterpart conventional Dow Jones indexes.

Based on a study conducted in the period of September 01, 2019–April 30, 2020, and utilizing daily data from 15 countries by Nomran and Haron (2021), it was found that the COVID-19 pandemic had a negative impact on both Islamic and conventional stock market returns. However, conventional indexes showed a negative trend throughout the sample period, whereas the returns of Islamic indexes had produced a positive trend by mid-April 2020. The study also revealed that the impact of the pandemic was weaker on Islamic stock markets compared to conventional ones. The overall findings of the studies suggest that be-

fore and during the pandemic Islamic indexes performed better, and in the post period they showed a lesser adverse impact compared to conventional ones.

Ding et al. (2020) and Heyden and Heyden (2020) ran firm level analysis. Ding et al. (2020) collected the data for 6,700 companies from 61 countries and found that the negative impact of COVID-19 was smaller for firms with a higher liquid asset base, higher profits but less leverage. Identifying factors that impact profitability can play a crucial role in formulating regulatory policies aimed at promoting the stability and sustainable performance of companies listed on Islamic indexes at the broader level. By gaining insights into these influential factors, policymakers can make informed decisions and implement effective measures to foster long-term profitability and stability within the Islamic finance industry. This approach creates a facilitating environment for companies listed on Islamic indexes to flourish, thus contributing to the overall growth and sustainability of the Islamic finance sector (Alsharari & Alhmoud, 2019). On the other hand, Heyden and Heyden (2020) found that stocks produced significantly negative returns in the COVID period. These returns, however, were a function of company-specific characteristics.

Sherif (2020) conducted a study comparing the Islamic Dow Jones Index with its conventional counterpart in the UK. The analysis used daily data from January 20 to May 20, 2020, focusing on ten industrial sectors. Results showed a significant link between the conventional stock market index performance and the COVID-19 pandemic. While the Dow Jones Islamic Index was negatively impacted, the effect was not statistically significant compared to its UK counterpart. This study provides insights into the relationship between the pandemic and the performance of Islamic and conventional stock market indexes in the UK during the specified period.

In his study, Erdoğan et al. (2020) utilized the DCC-GARCH method to analyse daily data from February 10, 2011, to September 02, 2020, focusing on the Islamic and conventional stock indexes in Turkey. The objective was to investigate the impact of COVID-19 returns on these indexes. His results showed that Islamic indexes yielded greater stability compared to the conventional indexes.

Salisu and Sikiru (2020) focused on the regional index of Asia-Pacific Islamic versus a conventional index to explore the hedging potential against uncertainty over the pre-COVID-19 sample (8/31/2010 to 12/31/2019) and the period of COVID-19 pandemic (01/01–9/15/2020). They found the Islamic index to be a better choice for hedging purposes.

Another stream of research examined whether Islamic funds can serve as safe-haven assets due to the spillover effect from one index to another. Yarovaya et al. (2021) showed a stronger spillover from conventional stock indexes to Islamic indexes during the pandemic. However, Sukuk (Islamic bonds) were less impacted by the spillover from conventional bonds. These results show that Sukuk can be used as a hedge against conventional bonds. On the other hand, Arif et al. (2021) found that Islamic stocks exhibited safe-haven

asset characteristics during the pandemic. They examined the comparative performance of conventional and Islamic indexes of G7 countries.

By and large, past studies employed parametric methods, a short sample period, crisis, or prosperous period only, and did not fully cover the major global stock indexes. This study fills the gap in the literature by using a non-parametric methodology (free of limitations of parametric methodologies), covering the major global Islamic and conventional stock indexes. It also statistically examines indexes' performance over three sub-periods, namely pre, during and post COVID-19 pandemic.

2. Data and methods

This research employs quantitative research methodologies. A sample of 31 Islamic indexes along with 31 conventional indexes (Table 1) were selected and categorized into four primary clusters: Dow Jones, FTSE, MSCI, and S&P indexes. All related data was obtained from Data Stream.

The selection of the indexes sample was not arbitrary. For accurate comparison between Islamic and conventional stock indexes, it is important to consider factors like time dimension and exchange rate fluctuations. This study addresses time-zone bias by selecting trading days when constituent stocks for both indexes were actively traded. The sample period ranges from January 1, 2017, to October 31, 2023, enabling a thorough analysis of index performance. Additionally, using the US dollar as the common currency across all countries ensures comparability in the data set.

Furthermore, to ensure that the Islamic index is comparable to its counterpart the index provider considers each conventional index separately to make sure that it serves as a comparison benchmark for its Islamic counterpart index. The pair of indexes are developed to obtain the largest coverage by country over time. Data constructed by Data Stream enhances cross-country comparability.

Our full sample begins from January 1, 2017 and ends on October 31, 2023. It is intentionally split into three sub-periods. The first period, January 1, 2017 to February 28, 2020 represents the pre-COVID-19 pandemic period. The second period, from March 2, 2020 to April 30, 2022 corresponds to the COVID-19 period, providing an opportunity to assess the impact of the global pandemic on both the Islamic and conventional indexes.[7] The third period, from May 2, 2022 to October 31, 2023 represents the post-COVID-19 pan-

[7] On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic. This designation indicated that the virus had spread globally and posed a significant threat to public health across multiple countries and continents (Mishra et al., 2020).

Table 1. List of Islamic and conventional indexes

#	Islamic index	Conventional index
1	DJ ISLAMIC ASIA/PACIFIC	DJGL ASIA PACIFIC $
2	DJ ISLAMIC Market EUROPE	DJ EUROPE TOTAL STOCK MKT
3	DJ ISLAMIC CANADIAN	DJGL CANADA DJTM CANADA DEAD
4	DJ ISLAMIC JAPAN $	DJGL JAPAN $
5	DJ ISLAMIC MKT CHINA HK TITANS 30 $	DOW JONES CHINA 88
6	DJ ISLAMIC US	DJ US TOTAL STOCK MKT
7	DJ ISLAMIC US LARGE CAP	DJ US LARGE CAP TOTAL STOCK MKT
8	DJ ISLAMIC US MID CAP	DJ US MID CAP TOTAL STOCK MKT
9	DJ ISLAMIC US SMALL CAP	DJ US SMALL CAP TOTAL STOCK MKT
10	DJISLAMIC MARKET INDEX	DJGLOBALINDEX
11	FTSE BURSA MALAYSIA HIJRAH SHARI'AH $	FTSE BURSA MALAYSIA EMAS $
12	FTSE GWA P SHARI'AH DEV $	FTSE GWA ALL-WORLD $
13	FTSE SHARI'AH DEV ASIA PACIFIC	FTSE DEV ASIA PAC $
14	FTSE SHARI'AH DEVELOPED	FTSE GWA DEVELOPED $
15	FTSE SHARI'AH JAPAN 100 $	FTSE W JAPAN
16	FTSE SHARI'AH MULT 150	FTSE MULTINATIONALS ($)
17	FTSE SHARI'AH USA $	FTSE US $
18	MSCI AC AMERICAS IS U$	MSCI AC AMERICAS U$
19	MSCI AC ASIA IS U$	MSCI AC ASIA PACIFIC U$
20	MSCI AC ASIA PACIFIC IS U$	MSCI AC ASIA U$
21	MSCI AC EUROPE IS U$	MSCI AC EUROPE U$
22	MSCI AC FAR EAST IS U$	MSCI AC FAR EAST U$
23	MSCI AC PACIFIC IS U$	MSCI AC PACIFIC U$
24	MSCI AC WORLD IS U$	MSCI AC WORLD U$
25	MSCI GOLDEN DRAGON IS U$	MSCI GOLDEN DRAGON U$
26	MSCI INDIA IS U$	MSCI INDIA
27	MSCI MALAYSIA IS	MSCI MALAYSIA
28	MSCI PAKISTAN IS U$	MSCI PAKISTAN
29	MSCI ZHONG HUA IS U$	MSCI ZHONG HUA U$
30	S&P 500 SHARI'AH $	S&P 500 COMPOSITE
31	S&P JAPAN 500 SHARI'AH $	S&P JAPAN 500

Source: (Abu-Alkheil et al., 2017).

demic period, which is utilized to examine the speed of recovery and potential long-term effects of the pandemic on the market indexes.[8]

This study employs stochastic dominance (SD) and Johansen's co-integration methods for empirical analysis purposes. The SD analysis provides insights into the preference of risk averters and risk-seekers for one index or the other. Johansen's co-integration approach enables us to examine the long-term association and efficiency of conventional indexes as well as the potential diversification benefits and portfolio optimization opportunities. Previous studies have used this approach (Abu-alkheil et al., 2017; Fan, 2003; Fong et al., 2005; Hodges & Yoder, 1996; Lean et al., 2007; Masih & Masih, 2001; Sheng & Tu, 2000) and provide insights into the different sets of investments.

The stochastic dominance method is used to evaluate the likelihood of which of the two returns distributions, in our case, conventional indexes versus Islamic indexes, will produce higher returns for a given level of risk, providing an opportunity to investors to select the optimal portfolio.

Stochastic dominance is a non-parametric method useful for investigating the risk-return characteristic of portfolios. It is free of any risk-free rate assumption, which is ingrained in standard models such as CAPM, making it particularly well-suited for "screen-based" Islamic stocks, where the concept of a risk-free rate is not applicable. Also, unlike CAPM, it does not rely on any specific distributional assumptions. In general, the use of SD methodology allows researchers to gain valuable insights into the risk and return trade-offs of different investment portfolios by overcoming the challenges of estimating asset pricing models that are distribution-specific and use a risk-free rate.

In summary, stochastic dominance (SD) is a statistical tool that enables the comparison of risk and return profiles across various investment choices, aiding investors in selecting the most suitable option based on their risk appetite and return preferences. On the other hand, Johansen's co-integration method is a statistical approach utilized to examine the enduring relationships among multiple time series variables. This method helps researchers determine the presence of a consistent relationship between these variables over time, facilitating predictive analysis and enhancing comprehension of the data's fundamental dynamics.

2.1. Co-integration analysis

Regression analysis has traditionally been a popular method for studying the relationship between financial variables. However, it is important to note that financial variables often exhibit non-stationary behaviour, and applying

[8] As of May 5, 2023, the WHO announced the end of the global Public Health Emergency (PHE) for COVID-19 (WHO, 2023).

regression analysis to non-stationary time series can lead to spurious relationships. In this study, the Engle & Granger (1987) co-integration approach is employed instead in order to investigate whether Islamic and conventional indexes are co-integrated. This approach allows for the exploration of potential diversification benefits and opportunities for portfolio optimization. By utilizing co-integration analysis, this study aims to provide a more robust and accurate understanding of the relationship between Islamic and conventional indexes.[9]

The Augmented Dickey-Fuller (ADF) test is commonly used to investigate the presence of stationarity or non-stationarity of data. The ADF test estimates a general specification controlling for autocorrelation and is based on lagged values, a time trend, the differenced variable, and a residual term. The equation is as follows:

$$\Delta x_t - \alpha + \beta_t + \gamma x_{t-1} + \sum_{i=1}^{P} (\delta_1 \Delta x_{t-1}) + \varepsilon_t \tag{1}$$

Here, X represents the variable under consideration (for stationarity), Δ denotes the difference operator, α is an intercept constant called a drift, β is the coefficient on a time trend, γ is the coefficient presenting process root, i.e. the focus of testing, p is the lag order of the first-differences autoregressive process, and ε is the residual term (Khamlichi et al., 2014). If co-integration is found, the VECM (Vector Error Correction Model) is used to assess the long-term (a stable equilibrium) relationships between variables; however, this model does not determine the causal direction between them.

To evaluate the direction of causality (from X to Y or Y to X or both), the error correction term (ECT) is analysed, which estimates how quickly variables, after being shocked, move back to their long-term equilibrium. Specifically, a statistically insignificant ECT suggests that the corresponding dependent variable is unaffected by the other variables in the system. That is, it is an exogenous variable in the long run. On the other hand, if the ECT is found to be statistically significant, it shows that the dependent variable is endogenous. That is, it is impacted by the other variables in the system.

After observing the presence of co-integration among the indexes, this study applies the VECM to determine the endogeneity or exogeneity of the variables, thus enabling us to understand the long-term relationships and dynamics between them.

[9] Islamic indexes derived from conventional ones (Saiti, 2014) may show a high correlation but not necessarily high cointegration (Khamlichi et al., 2014). Co-integration indicates long-term equilibrium between indexes, offering predictive insights. Understanding cointegration is essential for grasping the dynamics among Islamic indexes (Masih et al., 2010).

2.2. Stochastic Dominance (SD) analysis and risk preferences

Stochastic dominance (SD) offers value to ascertain the investors' risk preferences when the data exhibits non-normal distribution (which is often the case with financial time series) and/or when it is complex and challenging to define specific utility functions. The presence of a negative or positive domain of the return distribution determines the shape of utility function (Levy & Levy, 2003; Levy & Wiener, 1998; Post et al., 2008; Wong & Chan, 2007). If stochastic dominance is convex, it shows risk-seeking behaviour, whereas if it is concave, it shows risk-averse behaviour. If the SD utility function is S-shaped, it demonstrates risk-seeking behaviour below the desired level of return/risk, but it exhibits risk-aversion behaviour beyond the aspired level of return/risk. On the other hand, a reverse S-shaped utility function suggests a particular pattern of risk preferences. In the positive domain, where outcomes are favourable, individuals exhibiting a reverse S-shaped utility function would display risk-seeking behaviour. This means they are more inclined to take on higher levels of risk in pursuit of potentially greater gains. On the other hand, in the negative domain where outcomes are unfavourable, individuals with a reverse S-shaped utility function would exhibit risk-aversion. This implies a preference for avoiding or mitigating losses by opting for less risky alternatives.

Overall, the shape of the utility function influences risk preferences and decision-making behaviour in different domains (Clark et al., 2015; Denuit et al., 2013). For any investment level, if the expected return of X is greater than or equal to the expected return of Y, this implies it is first-order stochastic dominance (FSD). This would mean that stock X is expected to yield at least as great a return as stock Y.

This study compares the entire return distribution of X with Y to determine second-order stochastic dominance (SSD). If the cumulative distribution function (CDF) of X lies above the CDF of Y, regardless of the level of investment, it would indicate that X stochastically dominates Y and thus has a higher probability of achieving higher returns than Y.

In the third-order stochastic dominance (TSD), this study focuses on the entire distribution of returns together with the higher moments of the returns, as this series imposes a more stringent criteria. Under TSD, X stochastically dominates Y if two conditions are met: For any investment level (1), the CDF of X lies above the CDF of Y (2) and the higher moments of X, such as skewness and kurtosis, are more favourable than those of Y. The performance of different portfolios can be compared with the use of these three orders of stochastic dominance. Portfolio X is considered to perform better than Y if it stochastically dominates portfolio Y in all three orders, and vice versa.

The comparative performance of equity portfolios can be determined by assessing the stochastic dominance of different pairs of return series. For as-

sessment purposes, this study uses the nonparametric SD test proposed by Davidson and Duclos (2000). As discussed earlier, this method offers a robust and distribution-free approach, while considering higher moments of the return distribution (Cheong et al., 2007) to evaluate portfolio performance:

$$X \succ_1 Y \Rightarrow P(X \leq A) \leq P(Y \leq A) \tag{2}$$

In the given context, the notation $P(X \leq A)$ represents the cumulative distribution function (CDF) of variable X, while $P(Y \leq A)$ represents the CDF of variable Y. It is important to note that first-order stochastic dominance (FSD) does not rely on any assumptions about the decision-maker's utility function under uncertainty. FSD assumes that the CDF is a continuous function that monotonically increases with an increasing X (non-decreasing) (Whitmore & Findlay, 1978).

Furthermore, the research paper can have significant implications for the distribution of stock returns, trading volume, and demand for risky assets by considering the observed first-order risk aversion and the influence of investors' risk attitudes, which are influenced by the past performance of investments (Gomes, 2005). These implications can provide valuable insights into understanding the behaviour of investors and the dynamics of financial markets.

Moreover, the condition for a second-order stochastic dominance (SSD) constraint can be expressed by the formula:

$$X \quad {}_2 Y \Rightarrow \int_{-\infty}^{A} P(X \leq B)dB \leq \int_{-\infty}^{B} P(Y \leq B)dB \tag{3}$$

Second-order stochastic dominance (SSD) necessitates the presence of non-stationarity in time series. Additionally, it assumes that the decision-maker possesses a utility function that is inclined towards risk aversion. It is important to note that first-order stochastic dominance (FSD) is typically a prerequisite for second-order dominance (of X over Y). While there is limited emphasis on third-order dominance conditions (TSD) in the existing literature, it is still feasible to derive TSD.

3. Results and discussion

The descriptive statistics for the returns of the 62 indexes for the entire period are reported in Table 2. The descriptive results show that the means and standard deviations of the returns vary significantly across the 62 indexes. The returns for each sector are negatively skewed, indicating that they are flatter on the left side compared to a normal distribution. The kurtosis,

Table 2. Descriptive statistics of monthly returns for Islamic and conventional indexes in the period 2017–2023

Conventional indexes	Mean	Standard deviation	Skewness	Kurtosis	Islamic indexes	Mean	Standard deviation	Skewness	Kurtosis
DJGL ASIA PACIFIC $	0.0028	0.04066	–1.077	4.222	DJ ISLAMIC ASIA/PACIFIC	–0.001	0.0400	–1.160	4.884
DJ EUROPE TOTAL STOCK MKT	0.0010	0.04566	–0.881	3.412	DJ ISLAMIC Market EUROPE	–0.001	0.0320	–1.152	5.021
DJGL CANADA DJTM CANADA DEAD	0.0019	0.04722	–1.000	3.661	DJ ISLAMIC CANADIAN	–0.006	0.0442	–1.185	5.364
DJGL JAPAN	0.0009	0.05275	–0.954	2.766	DJ ISLAMIC JAPAN	–0.004	0.0473	–1.070	4.336
DOW JONES CHINA 88	0.0016	0.04455	–0.881	2.211	DJ ISLAMIC MKT CHINA HK TITANS 30	–0.002	0.0410	–1.142	6.441
DJ US TOTAL STOCK MKT	0.0020	0.04670	–1.001	3.541	DJ ISLAMIC US	0.0020	0.0447	–1.182	5.002
DJ US LARGE CAP TOTAL STOCK MKT	0.0027	0.05804	–0.754	2.622	DJ ISLAMIC US LARGE CAP	0.0006	0.0522	–0.901	3.876
DJ US MID CAP TOTAL STOCK MKT	0.0056	0.07122	–0.822	1.561	DJ ISLAMIC US MID CAP	0.0057	0.0657	–0.700	1.764
DJ US SMALL CAP TOTAL STOCK MKT	0.0005	0.04512	–1.321	7.333	DJ ISLAMIC US SMALL CAP	0.0005	0.0292	–1.183	6.766
DJGLOBALINDEX	0.0042	0.08221	–0.546	5.561	DJISLAMIC MARKET INDEX	0.0086	0.0603	–0.562	2.243
FTSE BURSA MALAYSIA EMAS	0.0042	0.05115	–0.541	7.342	FTSE BURSA MALAYSIA HIJRAH SHARI'AH	0.0078	0.0366	–0.644	3.226
FTSE GWA ALL-WORLD	0.0052	0.09732	–2.555	8.666	FTSE GWA P SHARI'AH DEV	0.0088	0.0703	–2.173	9.563
FTSE DEV ASIA PAC $	0.0040	0.05011	–0.891	2.400	FTSE SHARI'AH DEV ASIA P.	0.0046	0.0503	–0.884	2.555
FTSE GWA DEVELOPED	0.0036	0.04101	–0.900	1.901	FTSE SHARI'AH DEVELOPED	0.0044	0.0400	–0.843	1.848

Conventional indexes	Mean	Standard deviation	Skewness	Kurtosis	Islamic indexes	Mean	Standard deviation	Skewness	Kurtosis
FTSE W JAPAN $	0.0070	0.05299	–0.967	3.301	FTSE SHARI'AH JAPAN 100	0.0066	0.0527	–1.014	2.334
FTSE MULTINATIONALS ($)	0.0068	0.05702	–0.571	1.600	FTSE SHARI'AH MULT 150	0.0055	0.0544	–0.588	1.202
FTSE US $	0.0030	0.04886	–0.781	4.102	FTSE SHARI'AH USA	0.0044	0.0448	–1.111	3.768
MSCI AC AMERICAS U$	0.0041	0.08712	–1.212	5.522	MSCI AC AMERICAS	0.0033	0.0611	–1.155	3.425
MSCI AC ASIA PACIFIC U$	–0.0010	0.04256	–1.144	4.900	MSCI AC ASIA IS	0.0022	0.0341	–0.446	0.774
MSCI AC ASIA U$	0.0025	0.04341	–0.456	0.801	MSCI AC ASIA PACIFIC	0.0011	0.0432	–0.653	1.543
MSCI AC EUROPE U$	0.0042	0.04322	–0.761	1.823	MSCI AC EUROPE	0.0055	0.0431	–0.867	6.164
MSCI AC FAR EAST U$	0.0031	0.07011	–0.322	3.111	MSCI AC FAR EAST	0.0012	0.0306	–0.589	3.744
MSCI AC PACIFIC U$	0.0040	0.04333	–0.566	5.104	MSCI AC PACIFIC	0.0046	0.0423	–1.144	4.255
MSCI AC WORLD U$	0.0022	0.04734	–1.100	2.934	MSCI AC WORLD	0.0004	0.0415	–1.162	5.707
MSCI GOLDEN DRAGON U$	0.0010	0.04155	–0.988	4.602	MSCI GOLDEN DRAGON	0.0002	0.0338	–0.644	3.262
MSCI INDIA	0.0011	0.04622	–0.544	1.444	MSCI INDIA	0.0005	0.0418	–0.672	4.482
MSCI MALAYSIA	0.0032	0.04121	–0.871	2.403	MSCI MALAYSIA	0.0020	0.0340	–0.801	8.412
MSCI PAKISTAN	0.0005	0.01065	1.661	1.704	MSCI PAKISTAN	0.0011	0.0067	–1.001	5.154
MSCI ZHONG HUA U$	–0.0050	0.05019	–1.551	4.007	MSCI ZHONG HUA	–0.0080	0.0401	–0.833	3.441
S&P 500 COMPOSITE	0.0030	0.02891	–0.945	3.003	S&P 500 SHARI'AH	0.0017	0.0270	–1.071	7.436
S&P JAPAN 500	0.0095	0.06431	–1.401	9.012	S&P JAPAN 500 SHARI'AH	0.0158	0.0253	–1.201	6.383

Source: own work.

which measures the degree of excess, is higher than 3 for 26 Islamic indexes and 24 conventional indexes, suggesting a leptokurtic distribution. However, there are 6 Islamic indexes and 8 conventional indexes with kurtosis values lower than 3, indicating a platykurtic distribution.

Previous studies on equity markets in both developed and emerging markets have also documented excess kurtosis in stock returns. These findings suggest that the return distributions of the 31 indexes are not normal. Therefore, this study utilizes non-parametric SD analysis, as it does not rely on the assumption of normality (Worthington & Higgs, 2004).

3.1. Unit Root Test and returns behaviour

Table 3 presents the outcomes of the ADF tests for non-stationarity and first differences. It contains an example of 62 tests on 31 pairs of Islamic and

Table 3. Sample results of the ADF test for non-stationarity and first differences of each series—a Unit-Root Test over the period 2017–2023

Type	Lags	Rho	Pr < Rho	Tau	Pr < Tau	F	Pr > F
Dependent variable: DJ ISLAMIC ASIA/PACIFIC							
Zero mean	2	0.2083	0.642	0.5312	0.7607		
Single mean	2	–1.746	0.6831	–0.584	0.7461	0.5005	0.8734
Trend	2	–6.554	0.5547	–2.025	0.5621	2.7361	0.6076
Dependent variable: DJGL ASIA PACIFIC							
Zero mean	2	0.2275	0.604	0.5633	0.6714		
Single mean	2	–0.530	0.7152	–0.334	0.7274	0.2152	0.6678
Trend	2	–5.624	0.6435	–1.746	0.5762	3.5240	0.4672
Dependent variable: first difference DJ ISLAMIC ASIA/PACIFIC							
Zero mean	2	–56.32	<0.0001	–4.726	<0.0001		
Single mean	2	–56.55	0.0006	–4.761	0.0003	10.6754	<0.0010
Trend	2	–63.24	0.0001	–5.024	0.0005	11.445	<0.0010
Dependent variable: first difference DJGL ASIA PACIFIC							
Zero mean	2	–34.34	<0.0001	–3.554	0.0002		
Single mean	2	–54.55	0.0006	–3.726	0.0048	6.7234	<0.0010
Trend	2	–46.66	0.0001	–3.654	0.0271	6.7143	0.0246

Source: own work.

conventional indexes, using both level and first difference data. The aim of these tests is to ascertain if the time series of these indexes display stationarity or non-stationarity (Hendry & Juselius, 2001).

In every test, the study does not find sufficient evidence to reject the null hypothesis of a unit root, suggesting non-stationarity (unit root) in the time series. This is because the calculated p-values are above the 5% significance level. However, when considering the first difference, the null hypothesis of a unit root is rejected, as the computed p-values are lower than the significance level. These findings suggest that the Islamic and conventional indexes are non-stationary, but they become stationary after taking the first difference. This allows us to proceed with additional analysis, such as the Johansen tests of co-integration.

The Johansen co-integration framework is utilized to determine whether a co-integrating relationship exists, indicating a long-term equilibrium connection between the paired indexes. Based on the results of the unit root tests, it is suggested that there is no co-integrating relationship among the combinations of paired indexes over the sample period and the three subperiods, except for China and Hong Kong (MSCI Zhong Hua) (as indicated in Table 4). The exception for China and Hong Kong (MSCI Zhong Hua) implies the presence of one co-integrating vector, indicating that the series are linked by common factors. This suggests that these indexes move together in the long term, even if they may exhibit different short-term movements.

The overall findings indicate that there is no long-run equilibrium relationship among the various paired indexes, except for China and Hong Kong. This suggests that including such indexes in a portfolio may provide international diversification benefits and increase the potential for abnormal gains, apart from China and Hong Kong (MSCI Zhong Hua). These results are consistent with previous studies by (Abbes & Trichilli, 2015; Khamlichi et al., 2014; Kok et al., 2009). However, they are in contrast with the findings of Ilhan and Marih (2014).

Moreover, Table 5 shows that there is at least one co-integration equation among Islamic indices in all periods except during the financial crisis. Conversely, there is no co-integration observed among conventional indices in any period. Additionally, the absence of co-integration among conventional indexes implies that they do not move together in the long run, making it difficult to predict one index based on another. This contrasts with the Islamic indices, which exhibit a tendency to move in tandem over time. Prior to and following COVID-19, Islamic indexes remained unaffected; however, during the crisis, these indices appeared to diverge from each other. Furthermore, the results presented in Table 4 indicate a lack of co-integration between Islamic and conventional indexes, suggesting that diversification benefits increased during the crisis period.

Table 4. Johansen Cointegration Rank Test between series using trace—overall period from January 1, 2017 till October 31, 2023

Conventional index	Islamic index	Eigen-value		Trace	Conventional index	Islamic index	Eigen-value	Trace	Conventional index	Islamic index	Eigen-value	Trace
DJGL ASIA PACIFIC $	DJ ISLAMIC ASIA/ PACIFIC	0	0.0166	25.726	FTSE GWA ALL-WORLD $	FTSE GWA P SHARI'AH DEV	0.0371	2.460	MSCI AC PACIFIC U$	MSCI AC PACIFIC IS	0.0107	34.156
		1	0.0003	0.0283			0.0005	0.046			0.0057	12.016
DJ EUROPE TOTAL STOCK MKT	DJ ISLAMIC Market EUROPE	0	0.0235	21.664	FTSE DEV ASIA PAC	FTSE SHARI'AH DEV ASIA PACIFIC	0.0322	3.136	MSCI AC WORLD U$	MSCI AC WORLD IS	0.0422	38.014
		1	0.003	0.2746			0.0153	1.221			0.0008	0.0641
DJGL CANADA DJTM CANADA DEAD	DJ ISLAMIC CANADIAN	0	0.033	32.614	FTSE GWA DEVELOPED	FTSE SHARI'AH DEVELOPED	0.0522	5.406	MSCI GOLDEN DRAGON U$	MSCI GOLDEN DRAGON IS	0.0173	28.161
		1	0.005	0.3251			0.0056	0.461			0.0005	0.1206
DJGL JAPAN	DJ ISLAMIC JAPAN	0	0.016	38.046	FTSE W JAPAN $	FTSE SHARI'AH JAPAN 100	0.0672	7.322	MSCI INDIA	MSCI INDIA IS	0.0164	16.214
		1	0.004	0.5623			0.0124	0.841			0.0014	0.1405
DOW JONES CHINA 88	DJ ISLAMIC MKT CHINA HK TITANS 30	0	0.028	40.204	FTSE MULTI-NATIONALS ($)	FTSE SHARI'AH MULT 150	0.1447	10.615	MSCI MALAYSIA	MSCI MALAYSIA IS	0.0251	46.144
		1	0.001	0.3671			0.0034	0.254			0.0041	0.5224
DJ US TOTAL STOCK MKT	DJ ISLAMIC US	0	0.071	63.155	FTSE US	FTSE SHARI'AH USA	0.0533	3.377	MSCI PAKISTAN	MSCI PAKISTAN IS	0.0706	62.705
		1	0.027	22.164			0.0016	0.126			0.0001	0.0154

DJ US LARGE CAP TOTAL STOCK MKT	DJ ISLAMIC US LARGE CAP	0	0.017	28.436	MSCI AC AMERICAS U$	MSCI AC AMERICAS IS	0.0352	10.124	MSCI ZHONG HUA U$	MSCI ZHONG HUA IS	0.0604	11.132
		1	0.001	0.1433			0.0243	4.031			0.0034	0.6163
DJ US MID CAP TOTAL STOCK MKT	DJ ISLAMIC US MID CAP	0	0.030	44.587	MSCI AC ASIA PACIFIC U$	MSCI AC ASIA IS	0.0213	2.455	S&P 500 COMPOSITE	S&P 500 SHARI'AH	0.0114	13.832
		1	0.008	13.533			0.0056	0.504			0.0013	0.2357
DJ US SMALL CAP TOTAL STOCK MKT	DJ ISLAMIC US SMALL CAP	0	0.028	6.2410	MSCI AC ASIA U$	MSCI AC ASIA PACIFIC IS	0.0437	4.132	S&P JAPAN 500	S&P JAPAN 500 SHARI'AH	0.1343	38.863
		1	0.002	0.3771			0.001	0.074			0.0527	13.561
DJGLOBALINDEX	DJISLAMIC MARKET INDEX	0	0.022	54.433	MSCI AC EUROPE U$	MSCI AC EUROPE IS	0.0267	1.523				
		1	0.007	18.622			0.0016	0.130				
FTSE BURSA MALAYSIA EMAS $	FTSE BURSA MALAYSIA HIJRAH SHARI'AH	0	0.017	45.410	MSCI AC FAR EAST	MSCI AC FAR EAST IS	0.2233	6.688				
		1	0.000	0.0211			0.0002	0.020				

Notes: 1] The discrepancies in the ECM are all designated as "NOINT," suggesting the absence of a constant term in the ECM mechanism. Conversely, a constant term is present in the long-term relationship. 2] In the hypothesis testing scenario, where the null hypothesis (H0) asserts that the rank equals r, and the alternative hypothesis (H1) argues that the rank exceeds r, the index pair value is (0 = 10.32; 1 = 3.19) for all indices at a 5% critical level.

Source: own work.

Table 5. Johansen Cointegration Rank Test between series using trace—average values over the three sub-periods—all indexes

Cointegration	Pre-COVID-19 January 1, 2017–February 28, 2020		During COVID-19 March 2, 2020–April 30, 2022		Post-COVID-19 May 2, 2022–October 31, 2023	
	Max. Eigen	Trace	Max. Eigen	Trace	Max. Eigen	Trace
Islamic indexes	8.81	16.01**	10.34	10.74	14.22*	21.1***
Conventional indexes	9.25	11.28	12.26	11.34	9.26	13.4

Note: *, ** and *** significant at 1%, 5% and 10%. Lag 4 was used for both Islamic and non-Islamic indexes.

Source: own work.

Table 6 presents the Granger causality analysis results for all the indexes. It is evident that there exists a significant bidirectional causal relationship between Islamic indexes and their conventional counterparts throughout the entire period and the three sub-periods, conforming strong lead lag association between the two indexes. This implies that the movement of one market can be predicted by observing the movement of the other market. These findings contribute valuable insights to the current literature by offering new evidence on the causal connections between Islamic and conventional stock indexes. This information provides an additional avenue for investors, both domestic and international, to enhance portfolio diversification and potentially optimize their investment strategies.

Table 6. Granger Causality Test results for all indexes—overall period and the three sub-periods

Granger causality	Overall period January 1, 2017–October 31, 2023	Pre-COVID-19 January 1, 2017–February 28, 2020	During COVID-19 March 2, 2020–April 30, 2022	Post-COVID-19 May 2, 2022–October 31, 2023
Islamic ≠_conventional	144.1*	67.43*	44.08*	63.4*
Conventional ≠_Islamic	14.77*	463.81*	17.01*	57.48*

Note: *, ** and *** significant at 1%, 5% and 10%.

Source: own work.

3.2. Stochastic dominance results

Based on the context provided, the results from Figure 1 to Figure 4 show stochastic dominance results (SD) for three sub-periods. Specifically, for the first sub-period (January 1, 2017 to February 28, 2020) and the second sub-period (March 2, 2020 to April 30, 2022), the results indicate that the conventional indexes have a higher first-order SD compared to the Islamic indexes (Figure 1–2), respectively.

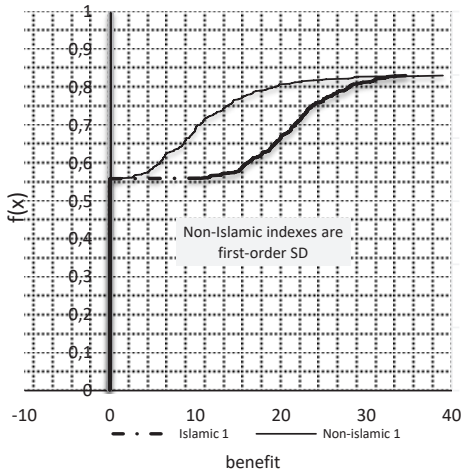

Figure 1. Stochastic dominance results of Islamic and conventional indexes over the period: January 1, 2017–February 28, 2020

Source: own work.

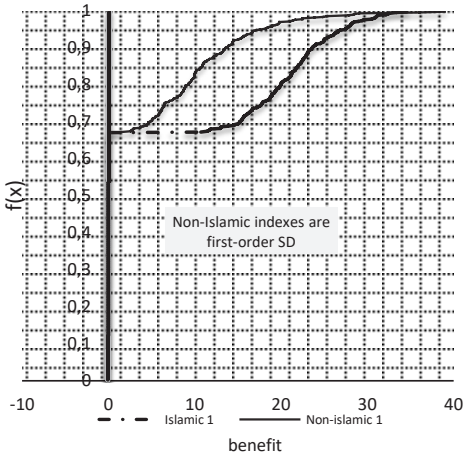

Figure 2. Stochastic dominance results of Islamic and conventional indexes over the period: March 2, 2020–April 30, 2022

Source: own work.

Islamic indexes do not invest in all sectors (industries) in the economy, due to the "screening process". They are typically concentrated in certain sectors. This may contribute to their relatively lower performance compared to conventional indexes. Nevertheless, it is important to note that the superior performance of conventional indexes does not imply that they are inherently superior in terms of their ethical or social impact for socially, ethically oriented, and faith-based investors.

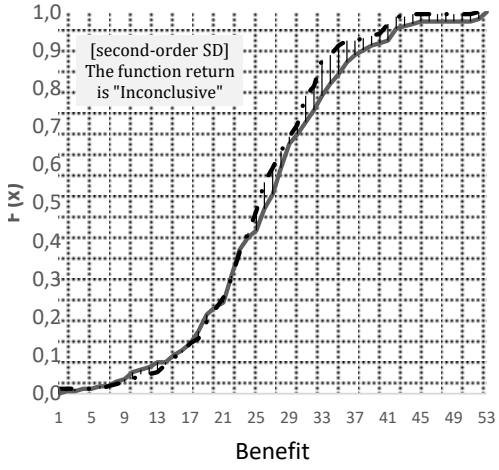

Figure 3. Stochastic dominance results of Islamic and conventional indexes over the period: May 2–October 31, 2023

Source: own work.

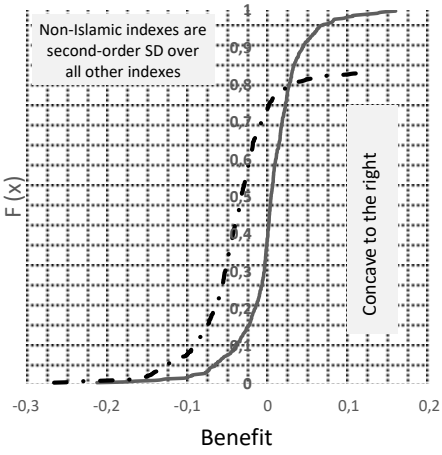

Figure 3. Stochastic dominance results of Islamic and conventional indexes over the period: January 1, 2017–October 31, 2023

Source: own work.

Moreover, during the third sub-period from May 2, 2022 to October 31, 2023, the results are inconclusive. The function returns an "Inconclusive" status because the area below the cross point is smaller than the area above it, indicating no clear pattern of dominance between Islamic and conventional indexes at the lower orders (Figure 3). Throughout the period spanning from 2017 to 2023, clear indications exist of an *S*-shaped second-order stochastic dominance of traditional indexes. This is largely due to the greater size of the area below the intersection point compared to the area above it (Figure 4).

The results mentioned suggest that conventional indexes perform better in terms of returns compared to Islamic indexes. This could be because conventional indexes include companies that may have higher levels of leverage, which can result in potentially higher returns but also higher risk. On the other hand, Islamic screening criteria prohibit use of derivative contracts and investment in interest-based institutions and companies with leverage (beyond certain minimum) as well as businesses which are mostly harmful to society and considered unethical according to Islamic principles. Also, one potential reason for the underperformance of Islamic indexes is the cost associated with implementing ethical screens. These screens require monitoring companies to ensure they comply with Islamic principles, which can lead to additional costs.

During COVID-19, it is impossible to have a safe investment. However, it is important to consider the risk-return trade-off and individual investor's preferences when evaluating the performance of different indexes. Conventional indexes may provide higher returns due to their higher risk (high volatility in stock returns proxied by the standard deviation values, as shown in Table 2), whereas Islamic indexes offer a more conservative and ethical investment methodology. Islamic indexes provided shelter when there was a collapse everywhere due to COVID-19.

Investors often engage in some level of risk-return testing to attain their desired (targeted) returns. They typically assess risks using an *S*-shaped utility function, which means they are more willing to take risks when they are below their desired level of returns (risk-seekers) and become more risk-averse once they surpass that level. This approach helps investors balance their appetite for risk and their desired outcomes (Hamo & Heifetz, 2001). When all outcomes are positive, investors with a more S-shaped profile (indicating more gains) have already secured a higher risk premium, leading to a reduced demand for the risky asset. In contrast, when all outcomes are negative, investors with a more S-shaped profile (indicating more losses) have obtained a lower risk premium, resulting in a higher demand for the risky asset.

Based on this, and since the results show a clear *S*-Shape of second–order dominance, it is suggested that risk-averse investors who exhibit a preference for leftward convexity may choose Islamic indexes over conventional indexes if the Islamic indexes surpass their predetermined desired level.

Moreover, by identifying empirically the preferences of investors, our study points out to the investors that they have diversification opportunities in either direction. Risk-seekers in conventional indexes, who have already attained the desired level (higher gains—higher S), may consider incorporating Islamic indexes to lower the risk. Moreover, conventional indexes that offer higher gains (higher S) come with various risks that should be considered due to their positive probability. Risk-averse investors in Islamic indexes, who are facing losses (many in the concave area), can diversify by adding conventional indexes to attain higher returns. Also, as Islamic indexes are less risky and offer lower return (overall), whereas conventional indexes are dominated with high return and high risk, conventional investors can add Islamic indexes to their conventional portfolios, particularly not to become vulnerable during turbulent times.

Risk-averse investors tend to avoid high-risk indexes in their portfolio, which may result in missing out on potentially higher rates of return. This cautious approach can strategically position them for the future by minimizing potential losses. On the other hand, risk-seeking investors who are "concave to the right" are more comfortable with taking risks, and may therefore prefer conventional indexes. They believe that there is a chance to recover from previous losses and potentially earn higher returns (Elowitz et al., 1980). However, investors tend to be hesitant to realize losses in the stock market and may hold onto losing investments for longer periods, hoping for a rebound (Odean, 1998).

Both Islamic and conventional indexes seem to exhibit a volatility pattern, more prominent in 2020–2022, which shows the impact of COVID-19 pandemic and its spillover to global markets. Figure 5 shows that conventional indexes are ''relatively'' riskier than the Islamic indexes, as the solid line (convention-

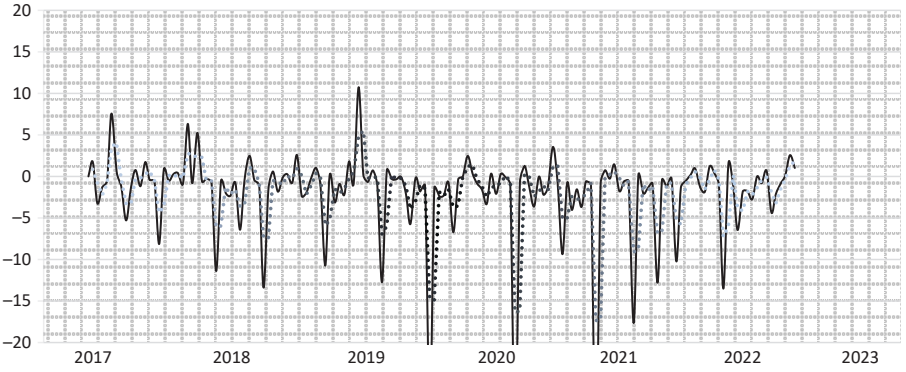

Figure 5. Volatility performance of Islamic and conventional returns over the period from January 1, 2017 till October 31, 2023 (% change)

Note: Solid line represents non-Islamic indexes.

Source: own work.

al indexes) is predominantly above the dotted line (Islamic indexes), particularly during the COVID-19 pandemic. This aligns with the common perception among investors that Islamic investments are relatively less risky due to their adherence to ethical and Sharia'h principles, such as avoiding excessive leverage. These findings are also consistent with previous studies and suggest that risk-averse investors may benefit from switching their investments from conventional to Islamic indexes to develop a low-risk portfolio (Miniaoui et al., 2015; Habib et al., 2014). This also indicates that some investors who took positions in conventional indexes may add Islamic indexes to develop an overall low-risk portfolio, particularly after learning some lessons from turbulent and volatile periods, including global financial crisis, European debt crisis, and recently, COVID-19. However, risk-seekers may continue to invest more in risky conventional indexes.

Conclusions

This study evaluates the performance of Islamic versus conventional stock indexes based on global data. It also explores the investors' preferences of Islamic or conventional indexes based on their attitude towards risk—risk aversion or risk-seeking. Given the growth and increased interest in Islamic investing globally, the performance and risk relationship of both Islamic and conventional stock indexes is a significant topic among investors, portfolio managers, index providers, and policy makers. Utilizing the VARMAX procedure, stochastic dominance analysis, and Johansen's co-integration approach, this study examines the long-term relationship between indexes and the potential benefits of diversification. The research design involves the analysis of 31 conventional and 31 Islamic stock indexes from various series, including FTSE, DJ, MSCI, S&P, and Jakarta. The sample period ranges from January 1, 2017 to October 31, 2023. The overall period of analysis was subdivided into three sub-periods: pre-, during, and post-COVID-19.

Our findings indicate that there is no long-term co-integration among 31 pairs of indexes, except for China and Hong Kong (MSCI Zhong Hua), which presents diversification opportunities. The results suggest that conventional indexes have outperformed Islamic indexes in the pre- and during COVID-19 sub-periods. However, no clear dominance order is observed in the post-pandemic period. Over the entire sample period, most conventional indexes demonstrate second-order stochastic dominance over Islamic indexes, establishing an S-Shape dominance relationship.

The research suggests that investors should consider their risk attitudes and past performance when making investment decisions. Opting for Islamic

indexes over conventional ones can be advantageous for risk-averse investors seeking lower risk. Additionally, diversification opportunities exist for both risk-seeking and risk-averse investors across various index types. Integrating Islamic indexes into conventional portfolios can help mitigate vulnerability during turbulent market conditions. While Islamic indexes offer lower risks and returns, transitioning investments from conventional to Islamic indexes may benefit risk-averse investors in uncertain market environments. However, the costs of implementing ethical screens for Islamic indexes could impact their overall performance, potentially reducing returns. Investors should weigh the benefits of ethical investing against these costs and consider both the ethical and financial implications when investing in Islamic indexes.

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