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Comparative Performance Analysis of USA Islamic Equity Market Indexes with Diverse Screening Criteria

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Abstract: *The performance comparison of Islamic and conventional indexes has often been marred by inconsistent index selection, leading to in-generalizable and misleading conclusions. A common misconception is attributing the performance differences of Islamic indexes primarily to their unique screening criteria without ensuring consistency in index choice. This study addresses this gap by empirically examining the impact of quantitative screens on the performance of Islamic indexes, ensuring consistency in their selection. Monthly data from January 2008 to December 2016 for Islamic indexes provided by MSCI, FTSE, Dow Jones, and S&P is analyzed using performance measures such as the Information Ratio and Sharpe Ratio. Results reveal significant variations in the performance of Islamic indexes' after adjusting for risk. Furthermore, indexes with lower aggregate debt tend to experience smaller gains in bullish markets and more minor losses in bearish markets, indicating a leverage effect. These findings provide insights into the performance dynamics of Islamic indexes and highlight the importance of consistent methodology in comparative studies.*

Key Words: Islamic Indexes, Quantitative Screens, Performance, Leverage Effect

Introduction

Because of the extraordinary growth in Shahriah-compliant investments over the past decade, along with a relentless appetite regarding passive investing (Walkshäusl & Lobe, 2012a), growth in research works on Islamic indexes is increasing steadily and is anticipated to continue to grow in the future. However, It seems that a major component of the research published regarding Islamic indexes as well as funds that are based on these indexes aims at comparing their performance versus their corresponding conventional indexes. On the other hand, only a small number of research works have focused on equally important topics like investment style and interest rate sensitivity of Islamic equity indexes to factors, like interest rates. Even fewer researchers have appreciated the fact that major Islamic indexes are built using nonidentical Shariah screens, let alone researching the performance implications of such practice. Information regarding world Islamic indexes of some big providers reveals that fifty percent of Sharia-compliant firms are on USA stock exchanges and that the majority of these firms are domiciled in the USA. Still, however, only a few research works are available on USA Islamic indexes are negligible. This study conducts an empirical investigation to explore the connection between variations within the quantitative criteria of widely recognized USA Islamic indexes and the consequent variations, if any, in their performance between them as well as their conventional counterparts, while ensuring uniformity in the selection of Islamic as well as conventional indices.

Review of Literature

Derigs and Marzban (2008) were among the first ones to highlight differences in the quantitative criteria used by main Islamic stock market index producers, such as FTSE, MSCI, Dow Jones, and S&P. The study noted that while these providers used similar financial ratios (e.g. receivables, debt, and cash ratios) to

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screen stocks, the calculation methods and permissible limits varied. For instance, MSCI and FTSE employed the book value of total assets as the denominator, whereas S&P and Dow Jones used the market value of equity. Additionally, differences were observed in the maximum allowable limits for the receivable ratio.

To measure the impact of these differences, Derigs and Marzban (2008) examined the stocks included in the S&P 500 index as of September 17, 2007. They began by eliminating stocks that did not pass the qualitative criteria, quantitative screens were then applied to the remaining stocks of different providers for a five-year period. The results showed that the number of firms deemed Shariah-compliant varied annually among providers. Notably, indexes using the market value of equity, for instance, S&P and Dow Jones, identified more Shariah-compliant firms than those using the total assets' book value (e.g., MSCI and FTSE). Differences in the number of firms passing the screens were smaller among providers using the same denominator.

The authors justified their selection of S&P 500 stocks to maintain a consistent investment universe, attributing differences in Sharia-compliant firms solely to variations in quantitative screens. However, this assumption overlooks providers' differences in index construction and maintenance methodologies during the study period (Philips & Kinniry Jr, 2012). For instance, differences in stock selection rules, sector weights, and rebalancing practices could influence index composition. Some quantitative screens may have been more compatible with specific index methodologies, resulting in higher Shariah compliance rates for certain indexes. Therefore, attributing differences in Shariah-compliant stocks solely to quantitative screens disregards the role of index methodologies. Future studies could enhance their practical value by comparing real Islamic indexes with minimal methodological variation, allowing differences to be attributed more accurately to quantitative screens.

Abdul Rahman, Azlan Yahya, and Herry Mohd Nasir (2010) investigated variations in quantitative among Islamic index providers. Using methods like Derigs and Marzban (2008), they applied Dow Jones' quantitative screens to the constituent firms of the Kuala Lumpur Stock Exchange Shariah Index (KLSESI), which does not use cash, debt, or receivables ratios in its screening process. The study found that only 35% of KLSESI's 500 member firms met Dow Jones' quantitative criteria. However, the findings are limited in scope, as they only compare Dow Jones and KLSESI and cannot be generalized to other major providers like S&P, FTSE, and MSCI.

A few studies have explored the performance implications of screening differences. Derigs and Marzban (2009) evaluated the performance of Islamic portfolios formed using quantitative screens in use by major Islamic index providers and Islamic mutual funds. Their findings showed Indexes and funds built by using quantitative screens, in the calculation of which, the denominator was market capitalization (e.g. S&P and Dow Jones) exhibited better risk-adjusted performance, compared to those using total assets for the same purpose (e.g. FTSE and MSCI). The superior performance of market-cap-based portfolios or indexes was attributed to their larger constituent pool. Differences in performance among portfolios using the same denominator were negligible, reflecting minimal variation in constituent stocks.

The study also proposed portfolio-level compliance with quantitative screens as an alternative to stock-level compliance, suggesting that this approach could yield risk-adjusted performance comparable to conventional portfolios. However, like the 2008 study, this analysis did not account for the influence of general index methodologies on portfolio composition and performance. Attributing performance differences solely to quantitative screens remains speculative unless similar results are observed after the same quantitative screens are employed against corresponding conventional indexes from other providers.

Ashraf (2016) further examined the impact of quantitative screens on Islamic indexes' performance by comparing a set of Islamic equity indexes with their conventional counterparts from Dow Jones, MSCI, FTSE, and S&P. The study ensured that each Islamic index and its conventional counterpart were derived from the same provider to avoid methodological conflicts. The findings revealed that Islamic indexes using the book value of total assets as the denominator (e.g. FTSE and MSCI) slightly outperformed those that used the value of equity as reflected by the market (e.g. S&P and Dow Jones).

Nevertheless, reliance on various conventional indexes for benchmarking raises the likelihood of benchmark error (Reilly & Akhtar, 1995; Roll, 1980). Moreover, the study compared Islamic indexes

representing different stock markets without adjusting for macroeconomic variations. Even when comparing Islamic indexes from the same market, differences in stock categories (e.g., large-cap versus mid-cap) could invalidate performance comparisons, as seen with the S&P and FTSE Islamic indexes.

Ashraf and Khawaja (2016) extended this line of research by analyzing Islamic portfolios created by employing quantitative screens used by Dow Jones, MSCI, FTSE, and S&P. These portfolios were extracted from S&P large-cap conventional indexes across Europe, the US, Japan, Canada, and GCC regions. Using a consistent index methodology, the authors aimed to isolate the impact of quantitative screens on performance. Consistent with Ashraf (2016), portfolios based on total assets as the denominator outperformed those using market capitalization. However, this study inherits the limitations of Derigs and Marzban (2008), including a narrow focus on specific regions and periods.

In summary, while existing studies highlight the significance of screening differences in Islamic equity indexes, their findings are often constrained by methodological inconsistencies, limited datasets, and benchmark errors. Future research should address these gaps by ensuring consistent methodologies and exploring the broader implications of screening variations on Islamic index performance.

Data

Due to significant differences in the economic environment, financial markets are found to be separated by countries (Stulz, 2005). This study focuses on Islamic indexes and their conventional counterparts representing the US stock market to ensure fairness in performance comparisons. The US market was selected due to its extensive historical data on Islamic market indexes and its significant global stock market capitalization share, accounting for approximately 54%. Consequently, US Islamic equity indexes and their conventional counterparts from the major providers—MSCI, FTSE, Dow Jones, and S&P—were examined using their monthly return data.

These Islamic indexes differ notably in the financial ratio or quantitative screens used by them, with minor variations in their qualitative screens (Derigs & Marzban, 2008; Walkshäusl & Lobe, 2012a). For example, even after the merger of their providers in 2012, the Dow Jones and S&P Islamic indexes continue to exhibit distinct quantitative screens (Oranzo, 2013). Therefore, both indexes are based on their non-identical quantitative screens.

The Islamic Indexes

Table 1 outlines the quantitative and qualitative criteria that Islamic index providers use to assess Shariah compliance prior to adding (or removing) stocks to (or from) their indexes.

Table 1

Shariah Compliance Criteria

Index Families BB Code	Qualitative Screens	Quantitative Screens				
		Denominator used	The numerator used in ratio and maximum limit			
			Debt	Cash	Receivables	
Dow Jones Islamic Market US IMUST	- Conventional Finance (non-Islamic Banking, Finance and Insurance, etc.)	24 months Trailing average market capitalization			< 33% Account Receivables	< 33%
S&P US BMI Shariah SPSHUSUT	- Alcohol - Pork-related products and non-halal food production.	36 months Trailing average market capitalization	Total Debt < 33%	Total Cash + Interest Bearing Securities	< 33%	< 49%
MSCI USA Islamic MIUS	- Entertainment (Casinos, Gambling, Cinema, Music, Pornography and Hotels) - Tobacco	Total Assets			< 33% Account Receivables plus Cash	< 70%
FTSE Shariah USA TSWUSAU	- Weapons, arms and defense manufacturing	Total Assets			< 33%	< 50%

The extreme left Column in Table 1 presents the names of Islamic indexes and their sponsors. Qualitative criteria of providers, chosen for this study, are largely consistent, restricting involvement in certain businesses (Derigs & Marzban, 2008). Quantitative criteria outlined in the subsequent section concentrate on three main financial ratios: receivables, cash, and debt. However, these ratios vary in the denominator used for calculation. Specifically, Dow Jones and S&P utilize market capitalization, while FTSE and MSCI use total assets as the denominator in their calculations.

All the Islamic indexes examined allow a debt and cash ratio of less than 33%. However, they vary in the admissible limit for the Accounts Receivable (A/R) ratio. Dow Jones as well as S&P compute the A/R ratio using only accounts receivable, while FTSE along with MSCI combine cash and A/R, treating both as equivalent liquid assets in their calculation. This ensures that regardless of the proportion of A/R and cash on a firm's balance sheet, their combined value must not exceed a certain percentage of total assets for inclusion in MSCI and FTSE Islamic indexes.

In 2015, the maximum allowable limit for the A/R ratio in MSCI Islamic indexes was reduced to 33%, aligning it with Dow Jones Islamic indexes (C. S. Ho, 2015). Despite this change, MSCI remains distinct from Dow Jones due to differences in the numerator and denominator used for the A/R ratio calculation. For example, MSCI uses total assets as the denominator and includes the sum of cash and receivables in the numerator, whereas Dow Jones uses market capitalization and only A/R in its numerator. Before 2015, MSCI's maximum allowable limit for the A/R ratio exceeded FTSEs by 20%; after the revision, it became 17% lower. These distinctions support the expectation that the performance of all four Islamic indexes will differ, irrespective of the A/R ratio limit adjustment for MSCI Islamic indexes.

Additional Features of Islamic Indexes

- All four Islamic indexes allow a limited amount of income from prohibited sources, such as interest, as far as it remains below 5% of revenue.
- The value of each Islamic index is determined by the float-adjusted market capitalization of its member stocks, relative to a defined base period.
- Review of Indexes is made quarterly to include eligible stocks or exclude those that no longer meet the criteria.
- Each Islamic index draws its constituent stocks from its corresponding conventional index.

The Conventional Indexes

This section provides an overview of the selected conventional indexes. Utilized for style estimation and comparison with Islamic indexes. These conventional indexes are provided by the same organizations that offer the Islamic indexes, i.e. S&P, MSCI, FTSE, and Dow Jones. The main elements of their methodologies are outlined below:

(a) Methodology of Weighting

All selected conventional indexes use a value-weighted methodology, where the market capitalization of their constituent stocks is adjusted based on the free float.

b) Schedule of Review

MSCI and Dow Jones revise and rebalance their traditional indexes every quarter, while FTSE carries out reviews twice a year. In contrast, S&P does not follow a set schedule, making adjustments as necessary.

(c) Market Coverage

- The S&P index includes all publicly traded securities that meet the eligibility criteria for its standard index.
- Dow Jones evaluates all U.S. stocks with accessible pricing information.
- MSCI's standard index encompasses roughly 99.5% of the U.S. equity market.
- FTSE's standard index accounts for over 99.5% of the U.S. equity market.

(d) Stock Choices

- S&P focuses on stocks that best represent the U.S. stock market.
- MSCI and Dow Jones include REITs and common stocks, with MSCI also incorporating non-U.S.-domiciled stocks that trade in the U.S.
- FTSE considers publicly traded U.S. stocks with a market capitalization above $20 million, including REITs and other eligible securities.

(e) Stock Liquidity

To ensure liquidity:

- S&P requires at least 250,000 shares traded within six months before evaluation.
- Dow Jones imposes similar liquidity thresholds.
- MSCI requires stocks to maintain a specific price level.
- FTSE mandates a minimum market capitalization of $10 million between index reviews.

Methodology

Measures of Performance

All the methods used in this study are associated with evaluating three key performance aspects of a portfolio: risk, return, and the risk-return trade-off, and are thus described in those terms.

Measures of Return

The Excess Return (ER) for the analyzed indexes will be calculated. It represents how much the return of an asset or portfolio surpasses that of a passive benchmark. A negative ER signifies under-performing, whereas a positive ER indicates out-performing the benchmark. The ER for the selected indexes is calculated as follows.

$$ER = (AR\ (Index) - AR(Mkt\ )) \quad (1)$$

Whereas

ER = Excess return

AR = Annualized returns

Index = the observed index (Islamic/Conventional index)

Mkt = the market

Annualized Return (AR), which is basically the geometric mean of returns, is calculated for every index selected for this study in the following manner:

$$AR\ = [\prod_{i=1}^{n}(1 + r_i)]^{1/_{NYr}} - 1 \quad (2)$$

Where

AR = Annualized Return

r_i = i − th month's return of the observed index

Nyr = Number of years covered by the monthly returns of the index

Measures of Risk

The measures used for computing returns measures are not adjusted for risks involved to achieve these. Here, metrics engaged to evaluate the related risks of the considered indexes are outlined.

Standard Deviation-A measure of Volatility

Standard deviation (SD) measures the volatility in returns. A high SD suggests that the returns of an asset or portfolio are highly unpredictable. Consequently, investors typically aim to minimize SD. This measure is computed for the investigated indexes as given below,

$$SD = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(r_{i-}\ \bar{r})} \quad (3)$$

SD = Abbreviation Standard deviation

n = Total monthly returns spanning the analysis period

r_i = The investigated index's *with* monthly return

$\bar{r}$ = The Investigated index's average monthly return

Sensitivity to Market Risk- Beta

Beta measures the extent to which an asset's returns are influenced by the returns of a passive benchmark, usually a broader market index. Such sensitivity is known as systemic risk. In a way, Beta reflects the part of an asset's total risk that is attributable to fluctuations in benchmark returns. It is expressed as below:

$$\beta = \frac{\sum_{i-1}^{n}(m_i - \bar{m}) * (b_i - \bar{b})}{\sum_{i-1}^{n}(b_i - \bar{b})^2} \quad (4)$$

Terms in the aforesaid equation are defined as under,

n = Total monthly returns spanning the period of analysis.

m_i = The analyzed index's with the monthly return.

$\bar{m}$ = The analyzed index's average monthly return.

b_i = The markets *with* monthly return.

$\bar{b}$ = The market's average monthly return.

The R-squared Measure

This metric is employed to gauge dependability exhibited by a performance metric, such as Beta, that references a standard benchmark index. In short, R-squared estimates the level of correlativity between returns on an asset and that of the selected benchmark. It can be anywhere between 0% and 100%. A higher R-squared shows that the performance metrics based on the chosen benchmark are more reliable. For the indexes analyzed here, R-squared is determined as follows:

$$R - Squared = \left(\frac{\sum_{i}^{n}(r_i - \bar{r}) * (m_i - \bar{m}}{\sqrt{\sum_{i=1}^{n}(r_i - \bar{r})^2} * \sqrt{\sum_{i=1}^{n}(m_i - \bar{m})^2} \right)^2 \quad (5)$$

Whereas

n = Count of monthly returns

r_i = The analyzed index's *with* monthly return

$\bar{r}$ = The analyzed index's average monthly return

m_i = The market's *i*th monthly return

$\bar{m}$ = *The market's* mean monthly return

Tracking Error

This measure evaluates the stability of excess returns. It is determined by estimating the deviation of monthly returns of a portfolio, from those of the market. A low tracking error of a portfolio shows it contains more assets like the benchmark, while a higher tracking error indicates a smaller number of such assets. It can be computed as follows:

$$TE = Std\{r_{index,t} - r_{Mkt,t}\} * \sqrt{N} \quad (6)$$

Where

TE = Abbreviation for tracking error

Std = Abbreviation for standard deviation.

$_{Index,t}$ = month *t's* return of the investigated index.

$_{Mkt,t}$ = month *t's* return of the market.

N = count of periods in per year.

Measures of Return Adjusted for Risk Involved

The Alpha

Alpha represents that component of return on a portfolio, which does not rely on broader market fluctuations. Using the method outlined in Kidd (2012), Alpha is calculated for the analyzed Islamic indexes along with their corresponding conventional indexes in the following manner:

$$Alpha = r_{index} - (\beta * r_{Mkt}) \quad (7)$$

Whereas

r_{index} = The analyzed index's monthly return

β = Beta of the analyzed index

r_{Mkt} = Return on Market

The Information Ratio

The Information Ratio, developed by Treynor and Black (1973), evaluates two important aspects of an asset's performance in relation to a benchmark: (1) Did the asset outperform or underperform the selected benchmark? (2) Has the portfolio's performance been consistent over time? For the indexes analyzed, this is measured as under:

$$IR = \frac{(AR_{index} - AR_{Mkt})}{Annualized\ SD(ER)} \quad (8)$$

IR = Abbreviation for the Information ratio
AR_{index} = Returns on the considered index, annualized
AR_{Mkt} = Returns on the considered index, annualized
SD = Abbreviation standard deviation
ER = Abbreviation for excess returns of the considered index in relation to the market.

The Sharpe Ratio

Proposed by William Sharpe in his 1966 paper titled "Mutual Fund Performance," the Sharpe ratio assesses a portfolio's performance in relation to risk-free assets, such as T-bills. The ratio aims to determine whether risky assets outperform risk-free assets. It also allows for the comparison of different portfolios by estimating the return produced by them for a unit of risk bore in the process. Thus, the Sharpe ratio for the analyzed indexes is measured as under:

$$SharpeRatio = \frac{(AR_{index} - AR_{Treasury\ Bills})}{Annualized\ SD\ (R_{index})} \quad (9)$$

AR_{index} = Return on the investigated index, annualized.
$AR_{Treasury\ Bills}$ = Return on T − Bills, annualized
D = standard deviation
R_{index} = The considered index's monthly returns

Comment on Islamic Indexes' Performance

Here, the performance of Islamic indexes over short as well as long terms is evaluated. For the Islamic indexes studied, Tables 2 to 5 display performance data (annualized), estimated on 12 12-month trailing basis, including periods between 1 and 9 years.

The FTSE and MSCI Islamic indexes underperformed the market benchmark in three out of five periods. On the other hand, the Dow Jones and S&P Islamic indexes underperformed the market benchmark in two and one of the periods, respectively. This underperformance was observed in the latest periods, although they were not statistically significant, still they had notable economic implications.

The following sections provide a comparison of Islamic indexes' performance over the short, which is 3 years, as well as long term, which is 9 years.

Table 2

MSCI Islamic performance

MSCI Islamic Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	T-Stat
1 year	-0.78%	10.12%	0.64%	0.86	90.58%	3.47%	-0.23	0.93	-0.23
3 years	-0.75%	10.75%	-0.35%	0.94	92.60%	2.99%	-0.25	0.51	-0.44
5 years	-1.12%	10.42%	-0.40%	0.95	93.49%	2.71%	-0.41	1.07	-0.93
7 years	0.01%	12.58%	0.63%	0.94	95.87%	2.68%	0.01	0.85	0.01
9 years	1.72%	14.56%	2.21%	0.87	94.00%	4.18%	0.41	0.44	1.24
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Index	9.63%	-3.59%	11.28%	30.64%	10.98%	4.23%	14.81%	25.39%	-30.27%
Market	10.41%	-1.47%	10.45%	30.95%	13.98%	-0.92%	14.75%	25.46%	-38.70%
Excess Return	-0.78%	-2.12%	0.83%	-0.31%	-3.00%	5.15%	0.06%	-0.07%	8.43%

Table 3

FTSE Islamic performance

FTSE Islamic Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	T-Stat
1 year	-0.25%	10.34%	0.36%	0.94	95.54%	2.37%	-0.11	0.92	-0.11
3 years	-0.08%	11.14%	0.01%	0.99	95.14%	2.46%	-0.03	0.55	-0.06
5 years	-0.43%	10.59%	-0.07%	0.97	95.44%	2.28%	-0.19	1.12	-0.43
7 years	0.12%	12.68%	0.61%	0.95	96.87%	2.34%	0.05	0.85	0.14
9 years	1.88%	14.84%	2.27%	0.89	95.18%	3.74%	0.5	0.44	1.52
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Index	10.16%	-3.69%	12.99%	29.75%	13.09%	3.57%	12.78%	27.75%	-31.06%
Market	10.41%	-1.47%	10.45%	30.95%	13.98%	-0.92%	14.75%	25.46%	-38.70%
Excess	-0.25%	-2.22%	2.54%	-1.20%	-0.89%	4.49%	-1.97%	2.29%	7.64%

Table 4

Dow Jones Islamic Index-performance

Dow Jones Islamic Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	T-Stat
1 year	-2.91%	10.82%	-2.01%	0.93	92.82%	2.99%	-0.97	0.67	-0.97
3 years	0.26%	11.09%	0.31%	0.99	96.27%	2.14%	0.12	0.58	0.21
5 years	-0.15%	10.76%	-0.06%	0.99	96.45%	2.04%	-0.07	1.13	-0.16
7 years	0.31%	13.06%	0.48%	0.98	97.52%	2.07%	0.15	0.84	0.4
9 years	1.80%	15.18%	2.09%	0.91	96.04%	3.34%	0.54	0.43	1.63
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Index	7.50%	0.36%	12.18%	30.66%	12.66%	2.81%	13.55%	28.12%	-32.48%
Market	10.41%	-1.47%	10.45%	30.95%	13.98%	-0.92%	14.75%	25.46%	-38.70%
Excess Return	-2.91%	1.83%	1.73%	-0.29%	-1.32%	3.73%	-1.20%	2.66%	6.22%

Table 5

S&P Islamic performance

S&P Islamic Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	T-Stat
1 year	-1.77%	11.08%	-1.33%	0.97	95.83%	2.29%	-0.77	0.76	-0.77
3 years	1.11%	11.17%	1.04%	1	97.40%	1.80%	0.62	0.65	1.07
5 years	0.81%	10.71%	0.81%	0.99	97.14%	1.81%	0.44	1.22	0.99
7 years	1.28%	12.95%	1.41%	0.98	98.00%	1.86%	0.69	0.92	1.82
9 years	2.49%	15.33%	2.70%	0.92	96.43%	3.15%	0.79	0.47	2.38
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008

S&P Islamic Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	T-Stat
Index	8.65%	1.60%	12.31%	32.91%	12.80%	3.44%	14.94%	28.95%	-32.98%
Market	10.41%	-1.47%	10.45%	30.95%	13.98%	-0.92%	14.75%	25.46%	-38.70%
Excess Return	-1.76%	3.07%	1.86%	1.96%	-1.18%	4.36%	0.19%	3.49%	5.72%

Comparison of Islamic Indexes' Performance - Short Term

S&P, as well as Dow Jones Islamic indexes, exceeded the market's performance in the short term, the market represented by the Russell 3000, while the MSCI and FTSE Islamic indexes performed below market. The S&P Islamic Index stood out with 1.1% excess return, the topmost excess return, whereas the MSCI remained at the bottom with -0.75% excess return. Despite its outperformance, the S&P Islamic index exhibited the highest standard deviation (11.17%), indicating greater volatility. Conversely, despite underperforming, the MSCI Islamic index displayed the lowest standard deviation (10.75%). The Islamic indexes of FTSE and Dow Jones were in third and second position, respectively, but swapped ranks with respect to volatility. Notably, the variation in standard deviations among Islamic indexes was narrower than that in their excess returns, suggesting greater diversity in returns than in overall risk.

The S&P Islamic index also exhibited the highest Alpha (1.04%), followed by the Dow Jones (0.31%), FTSE (0.01%), and MSCI (-0.35%) Islamic indexes. With a Beta of 1, the S&P Islamic index demonstrated the highest market-linked risk, followed by Dow Jones, FTSE (0.99), and MSCI (0.94). This pattern suggests that indexes with higher market risk exposure tend to achieve higher Alphas. The rankings of the Islamic indexes based on their Alphas closely mirrored their rankings in excess returns.

Beta measures the responsiveness of portfolio returns to market movements. While the MSCI Islamic index's lower Beta reflects reduced market risk exposure, it does not imply less overall risk. Similarly, the S&P Islamic index's Beta of 1 does not mean exclusive exposure to market risk. The reliability of Beta is better understood through the coefficient of determination (R^2), which measures the correlation of portfolio returns with market returns. Higher R^2 values indicate that return variations are primarily explained by market movements, enhancing the reliability of Beta.

The R^2 values of the analyzed Islamic indexes ranged from 92.60% to 97.40%, signifying a substantial linkage between their returns and the market. The Islamic index of S&P had the highest R^2 of 97.40%, suggesting that only 2.60% of its return variations were unrelated to the market. The MSCI Islamic index, with the lowest R^2 (92.60%), indicated a larger proportion of returns influenced by factors outside the market. The FTSE and Dow Jones Islamic indexes had intermediate R^2 values (95.14% and 96.27%, respectively).

The MSCI Islamic index exhibited the highest tracking error (approximately 3%), implying the most significant extra-market risk. This was followed by the Islamic index of FTSE with R^2 of 2.49%, Dow Jones with R^2 of 2.14%, and S&P with R^2 of 1.80%. The Tracking errors, however, do not directly indicate if an index under or outperforms the market relative to extra-market risk. This is addressed by the Information Ratio (IR), which measures an index's performance relative to its outside-the-market risk.

The S&P Islamic index recorded the highest IR (0.62), followed by Dow Jones (0.12%), FTSE (-0.03%), and MSCI (-0.25%). These results demonstrate that the S&P and Dow Jones Islamic indexes outperformed the market based on their extra-market risk, while FTSE and MSCI underperformed. Furthermore, the S&P Islamic index outperformed the Dow Jones index more significantly, while the FTSE index's underperformance was less severe than that of MSCI.

Interestingly, the rankings of Islamic indexes based on IR contrasted with those based on tracking errors. Indexes with lower extra-market risk tended to perform better, while those with higher extra-market risk performed worse. Calendar year returns for the 3-year time period revealed that whereas the FTSE and MSCI Islamic indexes prominently exceeded the market in 2015, the Dow Jones and S&P indexes

did well. However, in 2016, all Islamic indexes underperformed the market, with the Dow Jones and S&P indexes experiencing the greatest underperformance. These results align with Shariq and Sukor (2017), who found that the Dow Jones Islamic index was more closely aligned with the S&P, while the FTSE index was nearer, in terms of style, to MSCI.

The Sharpe ratio is used for the performance measurement of Islamic indexes against the T-bills (a risk-free asset). A higher Sharpe ratio indicates better performance. The S&P Islamic index again led with the topmost Sharpe ratio of 0.65, chased by Dow Jones with that of 0.58, FTSE 0.55, and lastly by MSCI (0.51). This suggests that the S&P Islamic index delivered the best returns relative to its risk-free alternative. To conclude, the performance of Islamic indexes over the short term was positively correlated with their total risk but negatively associated with their extra-market risk. The rankings of the Islamic indexes remained consistent across all risk-adjusted performance measures. The S&P Islamic index consistently outperformed, while the MSCI Islamic index lagged. These results highlight the importance of both market-linked and extra-market risk in determining the performance of Islamic indexes.

Performance Comparison of Islamic Indexes Over Longer Term

Over the long term, some measures of performance become more insightful as they show broader trends. For instance, the use of Betas (and as a result Alphas) to forecast movements in investment return is widespread. Shorter-period Betas provide more accurate forecasts because they reflect recent market conditions. However, over longer periods, the trajectory of performance measures can disclose significant patterns (Kidd, 2012).

Analysis of the Islamic indexes shows that all chosen indexes outperformed the market during heightened standard deviations over periods of 1, 3, 5, 7, and 9 years. The correlation between standard deviations and excess returns stayed positive across periods. Overall, the S&P Islamic index consistently exhibited the highest standard deviation, followed by the Dow Jones, FTSE, and MSCI Islamic indexes.

For Islamic indexes, Betas gradually increased over the period before returning close to levels prior to the increase. In contrast, tracking errors initially decreased and then returned to levels prior to the decrease. Generally, the Islamic version of the S&P index had the largest Beta, whereas that of the MSCI Islamic index was the smallest. Conversely, the MSCI Islamic index had the highest average tracking error, whereas the S&P index (Islamic) had the lowest. The Islamic indexes of Dow Jones and FTSE secured second and third positions with respect to average Beta but switched positions with respect to tracking error rankings. This consistency in relative rankings suggests that the relationship between market risk and extra-market risk among the indexes observed in the 3-year period persisted over longer durations.

For the 9-year period, the R^2 values of MSCI and FTSE Islamic indexes were 94% and 95.18%, respectively, higher than their 3-year R^2 values of 92.60% and 95.14%. However, the increase in R^2 for FTSE was smaller than for MSCI. In contrast, the 9-year R^2 values of 97.40% and 96.27% for S&P and Dow Jones Islamic indexes respectively were lesser than their 3 years R^2 values of 96.43% and 96.04%, respectively. The relatively stable R^2 values of Dow Jones compared to S&P suggest that the degree of outside investments for S&P Islamic indexes grew over the long term, while FTSE and MSCI Islamic indexes showed a decline in outside-the-market investments. However, FTSE and MSCI Islamic indexes continued to have bigger outside-the-market investments than Dow Jones and S&P.

Through the entire 9-year period, all Islamic indexes outperformed the market. This contrasts with the 3 years performance, in which only the Dow Jones and S&P Islamic indexes outperformed. Risk-adjusted performance rankings over the 9-year period were mostly consistent with the 3-year period rankings, except for the Islamic index of Dow Jones, which showed a slight decline in some metrics. For instance, the Dow Jones Islamic index's Alpha fell lower than those of the FTSE and MSCI Islamic indexes over the 9-year term. Despite that, the general rankings of Islamic indexes with respect to performance, after adjusting for risk, stayed stable.

For the same Islamic indexes, Shariq and Sukor (2017) highlighted investments in similar classes of assets but with different factor loading. Differences in performance, adjusted for risk, are thus expected. Additionally, the grading of Islamic indexes in terms of performance, after adjusting for risk, aligns with their estimated debt levels, as indicated in Shariq and Sukor (2017). For example, the S&P Islamic index, with the highest aggregate debt, achieved the highest average risk-adjusted performance. In contrast, the

MSCI Islamic index, with the lowest aggregate debt, had the lowest performance. This pattern reflects the impact of the leverage effect: indexes with higher aggregate debt capture more upside during bull markets but incur greater losses during downturns. Conversely, indexes with lower aggregate debt exhibit weaker leverage effects, resulting in smaller gains during bull markets and smaller losses during downturns.

The leverage effect is further illustrated by the performance of Islamic indexes during the 2008 financial crisis and subsequent bull markets. Relative to other Islamic indexes, the MSCI Islamic index lost the least during the 2008 crisis but gained the least during the bull markets (e.g., 2015). By contrast, the S&P Islamic index incurred the greatest losses during downturns and achieved the highest gains during upturns.

As with their styles, the MSCI and FTSE Islamic indexes were more similar regarding risk-adjusted performance, while the Dow Jones and S&P Islamic indexes showed more remarkable similarities. These observations support Shariq and Sukor (2017), who concluded that differences in the quantitative screens used by these indexes are a key determinant of their styles and performance differences.

The following tables present a summary of performance differences between each Islamic index and its corresponding conventional index over both shorter and longer time periods. Tables 6 to 9 present annualized performance statistics for trailing periods between 1 and 9 years.

Table 6

MSCI Conventional

MSCI Conventional Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	T-Stat
1 year	1.19%	10.56%	1.62%	0.94	99.60%	0.92%	1.3	1.07	1.3
3 years	2.32%	10.82%	2.30%	0.98	99.15%	1.02%	2.28	0.79	3.94
5 years	2.18%	10.44%	2.20%	0.98	99.31%	0.89%	2.45	1.39	5.47
7 years	2.09%	12.76%	2.21%	0.97	99.55%	0.95%	2.2	1	5.83
9 years	2.00%	15.80%	2.03%	0.97	99.67%	1.06%	1.89	0.42	5.71
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Index	11.61%	1.32%	13.36%	32.61%	16.13%	1.99%	15.45%	27.14%	-37.14%
Market	10.41%	-1.47%	10.45%	30.95%	13.98%	-0.92%	14.75%	25.46%	-38.70%
Excess Return	1.20%	2.79%	2.91%	1.66%	2.15%	2.91%	0.70%	1.68%	1.56%

Table 7

FTSE Conventional

FTSE Conventional Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	T-Stat
1 year	2.12%	11.15%	1.96%	1	99.94%	0.27%	7.91	1.1	7.91
3 years	2.04%	11.00%	1.92%	1	99.94%	0.27%	7.49	0.75	12.97
5 years	2.18%	10.62%	1.96%	1	99.95%	0.24%	8.98	1.36	20.08
7 years	2.18%	13.06%	2.05%	0.99	99.96%	0.28%	7.84	0.98	20.74
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Index	12.54%	0.47%	12.49%	33.37%	16.37%	1.15%	17.04%	28.37%	-37.04%
Market	10.41%	-1.47%	10.45%	30.95%	13.98%	-0.92%	14.75%	25.46%	-38.70%
Excess Return	2.13%	1.94%	2.04%	2.42%	2.39%	2.07%	2.29%	2.91%	1.66%

Table 8

Dow Jones Conventional

Dow Jones Conventional Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	T-Stat
1 year	2.19%	11.24%	1.94%	1.01	99.97%	0.21%	10.48	1.1	10.48
3 years	2.08%	11.03%	1.94%	1	99.97%	0.19%	10.81	0.75	18.72
5 years	2.21%	10.65%	1.96%	1	99.97%	0.19%	11.63	1.36	26
7 years	2.25%	13.10%	2.08%	1	99.97%	0.22%	10.42	0.98	27.56
9 years	2.23%	16.21%	2.15%	0.99	99.98%	0.25%	9.04	0.43	27.25
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Index	12.60%	0.48%	12.56%	33.39%	16.34%	1.18%	17.40%	28.43%	-37.13%
Market	10.41%	-1.47%	10.45%	30.95%	13.98%	-0.92%	14.75%	25.46%	-38.70%
Excess Return	2.19%	1.95%	2.11%	2.44%	2.36%	2.10%	2.65%	2.97%	1.57%

Table 9

S&P Conventional

S&P Conventional Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	T-Stat
1 year	2.58%	10.67%	2.79%	0.95	99.77%	0.72%	3.56	1.19	3.56
3 years	2.55%	10.81%	2.51%	0.98	99.68%	0.64%	4.01	0.81	6.95
5 years	2.36%	10.44%	2.34%	0.98	99.71%	0.60%	3.95	1.4	8.83
7 years	2.31%	12.86%	2.31%	0.98	99.84%	0.59%	3.88	1	10.26
9 years	2.23%	16.00%	2.21%	0.98	99.88%	0.64%	3.49	0.43	10.52
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Index	12.99%	1.01%	13.05%	32.77%	16.13%	1.72%	16.39%	27.24%	-36.72%
Market	10.41%	-1.47%	10.45%	30.95%	13.98%	-0.92%	14.75%	25.46%	-38.70%
Excess Return	2.58%	2.48%	2.60%	1.82%	2.15%	2.64%	1.64%	1.78%	1.98%

A review of the tables shows that, with respect to performance measures, adjusted for risk, for instance, Information Ratio, Sharpe Ratio, and Alpha, the traditional indexes of S&P and MSCI are minimally distinct from one another. Similarly, conventional indexes of Dow Jones and FTSE appear to share more similarities. This contrasts with the findings for Islamic indexes, where FTSE and MSCI were less dissimilar, while S&P and Dow Jones Islamic indexes exhibited more in common. These observations align with the findings of Shariq and Sukor (2017), which highlighted that the pairs of conventional indexes with similar styles differ from those of Islamic indexes with comparable styles.

Tables 10, 11, 12, and 13 illustrate the dissimilarities in statistics regarding performance between every selected Islamic index and its corresponding conventional index. Dissimilarities in performance estimates, measured in percentages, were computed by deducting the values for each Islamic index (from Tables 2 to 5) from those of its conventional counterpart (from Tables 6 to 9). For compatibility, variances in Sharpe ratio, Information ratio, and Betas—initially not expressed as percentages —were re-computed as percentage terms. Negative percentage differences associated with Information Ratios show times at which Information Ratios of the respective Islamic indexes were negative.

The ensuing subsections, Tables 9 to 12 are examined to underline differences in performance-related stats between each conventional index and that of its Islamic equivalent over both shorter and longer terms.

Table 10

Difference in performance of MSCI indexes

MSCI Islamic versus Conventional Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	Trailing Period
1 year	1.97%	0.44%	0.98%	9.30%	9.02%	-2.55%	-665.22%	15.05%	1 year
3 years	3.07%	0.07%	2.65%	4.26%	6.55%	-1.97%	-1012.00%	54.90%	3 years
5 years	3.30	0.02%	2.60%	3.16%	5.82%	-1.82%	-697.56%	29.91%	5 years
7 years	2.08%	0.18%	1.58%	3.19%	3.68%	-1.73%	21900.00%	17.65%	7 years
9 years	0.28%	1.24%	-0.18%	11.49%	5.67%	-3.12%	360.98%	-4.55%	9 years
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Excess Return	1.98%	4.91%	2.08%	1.97%	5.15%	-2.24%	0.64%	1.75%	-6.87%

Table 11

Variance in performance of FTSE indexes

FTSE Islamic versus Conventional Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	Trailing Period
1 year	2.37%	0.41%	1.60%	6.38%	4.40%	-2.10%	-7290.91%	19.57%	1 year
3 years	2.12%	-0.14%	1.91%	1.01%	4.80%	-2.19%	-25066.67%	36.36%	3 years
5 years	2.61%	0.03%	2.03%	3.09%	4.51%	-2.04%	-4826.32%	21.43%	5 years
7 years	2.06%	0.38%	1.44%	4.21%	3.09%	-2.06%	15580.00%	15.29%	7 years
9 years	0.31%	1.41%	-0.15%	11.24%	4.49%	-2.80%	364.00%	-4.55%	9 years
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Excess Return	2.38%	4.16%	-0.50%	3.62%	3.28%	-2.42%	4.26%	0.62%	-5.98%

Table 12

Variance in performance of FTSE indexes

Dow Jones Islamic versus Conventional Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	Trailing Period
1 year	5.10%	0.42%	3.95%	8.60%	7.15%	-2.78%	-1180.41%	64.18%	1 year
3 years	1.82%	-0.06%	1.63%	1.01%	3.70%	-1.95%	8908.33%	29.31%	3 years
5 years	2.36%	-0.11%	2.02%	1.01%	3.52%	-1.84%	-16714.29%	20.35%	5 years
7 years	1.94%	0.04%	1.60%	2.04%	2.45%	-1.85%	6846.67%	16.67	7 years
9 years	0.43%	1.03%	0.06%	8.79%	3.94%	-3.09%	1574.07%	0.00%	9 years
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Excess Return	5.10%	0.12%	0.38%	2.73%	3.68%	-1.63%	3.85%	0.31%	-4.65%

Table 13

The difference in the performance of Dow Jones indexes

S&P Islamic versus Conventional Index									
Trailing Period	Excess Return to Market	Standard Deviation	Alpha	Beta	R- Squared	Tracking Error	Information Ratio	Sharpe Ratio	Trailing Period
1 year	4.35%	-0.41%	4.12%	-2.06%	3.94%	-1.57%	-562.34%	56.58%	1 year
3 years	1.44%	-0.36%	1.47%	-2.00%	2.28%	-1.16%	546.77%	24.62%	3 years
5 years	1.55%	-0.27%	1.53%	-1.01%	2.57%	-1.21%	797.73%	14.75%	5 years
7 years	1.03%	-0.09%	0.90%	0.00%	1.84%	-1.27%	462.32%	8.70%	7 years
9 years	-0.26%	0.67%	-0.49%	6.52%	3.45%	-2.51%	341.77%	-8.51%	9 years
Annual Period	2016	2015	2014	2013	2012	2011	2010	2009	2008
Excess Return	4.34%	-0.59%	0.74%	-0.14%	3.33%	-1.72%	1.45%	-1.71%	-3.74%

Performance comparison of Islamic and conventional indexes over the short-term

This detailed analysis compares the performance of conventional indexes and their Islamic counterparts over short and long periods, shedding light on their risk-adjusted returns, market exposure, and overall performance metrics. Here is a summary of the key findings:

Short-Term Performance (3-Year Period)

- **Excess Returns**: Conventional indexes exceeded their corresponding Islamic indexes in terms of excess returns compared to that of the market. Only two Islamic indexes (Dow Jones and S&P) generated positive excess returns.
- **Risk (Standard Deviation)**: Conventional indexes generally had lower volatility than their Islamic counterparts. The MSCI conventional index showed the largest excess return (3.07%), with a marginally higher risk (0.07% more than its Islamic counterpart).
- **Alpha and Beta**: Conventional indexes consistently showed higher alphas, indicating better risk-adjusted returns. Betas for conventional indexes were higher for most providers, suggesting greater exposure to market risk than their Islamic counterparts.
- **R^2 and Tracking Errors**: Conventional indexes had higher R^2 values, confirming more reliable market risk exposure. They also had lower tracking errors, indicating less deviation from the market. FTSE's conventional index had the largest gap in tracking error compared to its Islamic index (2.19%).
- **Information Ratio (IR)**: Conventional indexes performed better in terms of IR, indicating higher returns per unit of risk. The IR of the conventional index of FTSE is 250 times that of its Islamic index.
- **Sharpe Ratio**: Conventional indexes had higher Sharpe ratios, reflecting better returns per unit of total risk. MSCI's conventional index led in this regard (54.90% higher than its Islamic index).

Long-Term Performance (5-Year and 9-Year Periods)

- **Market Risk and Leverage**: Conventional indexes experienced higher betas than their Islamic counterparts over most periods, suggesting higher exposure to market risk. However, their performance in the financial crisis of 2008 was lower, likely due to higher leverage.
- **Tracking Error and R^2**: Tracking errors remained lower for conventional indexes, suggesting they incurred less extra-market risk. The difference in R^2 between conventional and Islamic indexes was more pronounced over the 9-year period.
- **Excess Returns and Alphas**: While conventional indexes had higher excess returns over the 3-year period, the gap narrowed in the longer period. The 9-year period showed the smallest excess returns difference, and conventional indexes had lower alphas than their Islamic counterparts, particularly during the financial crisis.
- **Leverage Effect and Debt Exposure**: As indicated by their aggregate debt levels, the difference in leverage between conventional and Islamic indexes significantly affects their performance.

Conventional indexes tend to have higher aggregate debt, which could explain their performance disparities, especially in financial instability.

Key Observations

- **Islamic vs Conventional Indexes**: Islamic indexes typically show less market risk but more exposure to extra-market risks. Despite having higher exposure to market risk, the conventional indexes generate higher excess returns per unit of outside-the-market risk.
- **Diversity and Benchmarking**: The variation in performance, after adjusting for risk, of Islamic indexes presents an opportunity for shariah-compliant investors to diversify their portfolios. However, using different Islamic indexes for benchmarking might lead to varying results due to their differing risk-return profiles.

Conclusion

The analysis demonstrates that conventional indexes outperform their Islamic counterparts regarding excess returns, Sharpe ratios, and overall performance metrics in the short term. However, the performance of conventional indexes was impacted by higher leverage and market exposure, particularly during the 2008 financial crisis. Over the long term, Islamic indexes showed more stable performance, with less exposure to market risk but higher extra-market risk. These differences emphasize the importance of knowing the risk profiles and the leverage effects inherent in both indexes.

References

Abdul Rahman, A., Azlan Yahya, M., & Herry Mohd Nasir, M. (2010). Islamic norms for stock screening: A comparison between the Kuala Lumpur stock exchange Islamic index and the Dow Jones Islamic market index. *International Journal of Islamic and Middle Eastern Finance and Management*, *3*(3), 228-240.

Ashraf, D., & Khawaja, M. (2016). Does the Shariah screening process matter? Evidence from Shariah compliant portfolios. *Journal of Economic Behavior & Organization*, *132*, 77–92. https://doi.org/10.1016/j.jebo.2016.10.003

Derigs, U., & Marzban, S. (2008). Review and analysis of current Shariah-compliant equity screening practices. *International Journal of Islamic and Middle Eastern Finance and Management*, *1*(4), 285–303. https://doi.org/10.1108/17538390810919600

Derigs, U., & Marzban, S. (2009). New strategies and a new paradigm for shariah-compliant portfolio optimization. *Journal of Banking & Finance*, *33*(6), 1166-1176. https://doi.org/10.1016/j.jbankfin.2008.12.011

Ho, C. S. (2015). International comparison of Shari'ah compliance screening standards. *International Journal of Islamic and Middle Eastern Finance and Management*, *8*(2), 222-245. https://doi.org/10.1108/imefm-07-2014-0065

Ho, C. S., Abd Rahman, N. A., Yusuf, N. H., & Zamzamin, Z. (2014). Performance of global Islamic versus conventional share indices: International evidence. *Pacific-Basin Finance Journal*, *28*, 110-121. https://doi.org/10.1016/j.pacfin.2013.09.002

Kidd, D. (2012). Risk-Adjusted Performance Measures: A Case Study. *Investment Risk and Performance Feature Articles*, *2012*(1), 1-4.

Oranzo, M. (2013). How Indexing Impacts Shariah-Compliant Investing. http://us.spindices.com/documents/education/shariah-pe-0913.pdf

Philips, C. B., & Kinniry Jr, F. M. (2012). Determining the Appropriate Benchmark: A Review of Major Market Indexes. *Vanguard Research*.

Reilly, F. K., & Akhtar, R. A. (1995). The benchmark error problem with global capital markets. *The Journal of Portfolio Management*, *22*(1), 33-52. https://doi.org/10.3905/jpm.1995.409547

Roll, R. (1980). Performance evaluation and benchmark errors (I). *The Journal of Portfolio Management*, *6*(4), 5-12. https://doi.org/10.3905/jpm.1980.408760

Shariq, M., & Abd Sukor, M. E. B. (2021). SENSITIVITY OF USA ISLAMIC EQUITY MARKET INDEXES TO CHANGES IN INTEREST RATES: A COMPARATIVE ANALYSIS. *International Journal of Accounting*, *6*(32), 229-246.

Sharpe, W. F. (1966). Mutual fund performance. *The Journal of Business*, *39*(S1), 119. https://doi.org/10.1086/294846

Sharpe, W. F. (1992). Asset allocation: Management style and performance measurement. *The Journal of Portfolio Management*, *18*(2), 7-19. https://doi.org/10.3905/jpm.1992.409394

STULZ, R. M. (2005). The limits of financial globalization. *The Journal of Finance*, *60*(4), 1595-1638. https://doi.org/10.1111/j.1540-6261.2005.00775.x

Treynor, J. L., & Black, F. (1973). How to use security analysis to improve portfolio selection. *The Journal of Business*, *46*(1), 66. https://doi.org/10.1086/295508

Walkshäusl, C., & Lobe, S. (2012). Islamic Equity Investing: Alternative Performance Measures and Style Analysis. *The Journal of Investing*, *21*(4), 182–189. https://doi.org/10.3905/joi.2012.21.4.182

Walkshäusl, C., & Lobe, S. (2012). Islamic investing. *Review of Financial Economics*, *21*(2), 53-62. https://doi.org/10.1016/j.rfe.2012.03.002