INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 14, Issue 12, (2024) E-ISSN: 2222-6990

Analysis of Unit Trust Funds with Shariah Market Index Returns

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To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v14-i12/23627 DOI:10.6007/IJARBSS/v14-i12/23627

Published Date: 14 December 2024

Abstract

Purpose – This study aims to explore the dynamics indices returns. The objective is to provide a comprehensive understanding of how these relationships evolve over time and across different time scales, which can guide investment decisions in the Unit Trust Funds by providing empirical evidence in examining how the dependence between equity unit trust funds, fixed-income funds and Shariah-compliant index returns changed over time and different across time scales. Design/Methodology/Approach – The study conducted a time-series study using a wavelet coherence analysis approach. The study examined a broad range of unit trust funds using equity funds and fixed-income funds with Shariah-compliant returns data. The study used advanced quantitative techniques to analyze the statistical results across multiple time scales. Findings – The findings reveal that the relationship between equity funds, and fixed-income funds with Shariah-compliant indices returns evolves and differs across time scales. The study also identified several challenges faced by the Federation of Investment Managers Malaysia (FIMM), Securities Commission (SC), and other relevant agencies in Malaysia. The results show that various traditional and modern methodologies were used to understand the market's performance according to previous studies. Originality/Value – This study is unique in its focus on the temporal dynamics and wavelet coherence analysis of fixed-income funds and Shariah-compliant index returns solely. The findings of this study believed that this research would provide a broader and more realistic vision of the academic interest level in this field and identify any existing gaps in the available literature.

Keywords: Market Index, Unit Trust Funds, Shariah-Compliant Returns, Wavelet Coherence Analysis

Introduction

The unit trust industry's first struggles to capture the public's attention and earn their trust to support the new product's growth happened slowly. With the assistance of several

regulators, including the Registrar of Companies (ROC), The Public Trustee of Malaysia, Bank Negara Malaysia (BNM), and the Ministry of Domestic Trade and Consumer Affairs, mutual funds were first introduced with only five-unit trust management, with eighteen funds in the first two decades (Federation of Investment Managers Malaysia, 2022). Among the dissimilar categories of funds, fixed income and equity unit trust funds contributed approximately 70% of the total funds in 2020 (Securities Commission Malaysia, 2021). Thus, addressing the funding and diversification of portfolio components is related to the interest of individual investors. Displaying their skills and expertise in investing, the investors' goals vary in terms of projected returns, risk tolerance, and liquidity needs. It is important to consider a cash supply in addition to moral and religious commitment. Additionally, a variety of product types are available on the market to meet the wide range of requests from the broad pool of unit funds. It also emphasises the fact that Malaysia is recognised as Muslim nation. As a result, there is a need for the unit trust fund to guarantee that the goods do not violate Islamic law. In order to meet this demand, a product called Shariah-Compliance was launched in the Malaysian Capital Market. The Malaysia International Islamic Financial Centre (MIFC) was established in August 2006 with the goal of positioning Malaysia as a global centre for Islamic finance and educational pursuits (Jusoh & Alaoui, 2018).

Therefore, the importance of Shariah-compliant investment products, especially unit trust funds, as a pillar of sustainable financial practices has increased due to the quick expansion of Islamic finance which motivates the research. For investors looking for strong financial performance and ethical compliance, it is essential to comprehend the relationships between unit trust funds and Shariah market index returns in order to make well-informed decisions. By offering empirical insights it contributes into the performance of unit trust funds in comparison to Shariah indexes, this study seeks to close the gap between the literature on Islamic finance and real-world investing methods. By assessing how they interact over a range of investment horizons, the study advances both academia and business by providing insightful advice to fund managers and legislators on how to best manage portfolios while abiding by Shariah.

Our research questions are:
1. To explore the relationship between equity unit trust funds and Shariah-compliant indices returns, by employing time series analysis
2. To explore the relationship between fixed-income funds and the Shariah-compliant indices returns, by employing time series analysis

Even though stocks are among the most popular investment categories, buying and selling them independently for individual investors may be challenging. For this reason, some investors decide to put their money into equities funds, which are just mutual funds that own stocks. The methods and goals of equity funds might vary based on their size, style, and even location. Additionally, the fund may be managed actively or passively, which means that the fund management may choose to track a benchmark index or attempt to outperform the market. For investors who wish to access several markets and industries and diversify their portfolios without having to invest a large amount of money or undertake extensive research, equity funds are a viable alternative.

Consequently, the following are some instances of equity funds that are open to investors. To gain more insight into the fund's accessibility A unit trust fund termed TA Global Technology Fund makes investments in technology firms all around the world. It had an average annual return of 23.45% over the past five years (Bursa Malaysia, 2023), the ASNB finances a well-known fund run by Amanah Saham Nasional Berhad, a Permodalan Nasional Berhad subsidiary. Because of its investment in a variety of markets and industries, this fund is perfect for Bumiputeras.

However, the goal of this study is to go beyond previous research and conventional approaches. We plan to use the Continuous Wavelet Transform (CWT) to modify the funds returns for daily benchmark returns in order to investigate the presence and vice versa of the lead-lag impact among the two markets in both the time and frequency domains. In order to characterise mutual fund performance, our study will employ a quantitative descriptive methodology that makes use of techniques like Wavelet Coherence and mutual fund performance analysis. By comparing the performance of mutual funds with market indices, which serve as our benchmark, we want to derive conclusions about which situations mutual funds performed better or worse for each year between 2014 and 2017. Since our study has the ability to utilise the daily co-movement between mutual fund returns for capital market investing decisions, we will concentrate on both of the funds listed on Bursa Malaysia.

In conclusion, using the theoretical framework proposed in this research, our study aims to contribute to the existing literature by providing a thorough analysis of funds in Malaysia, with a focus on their dynamic relationship with market indices and the effects of capital market investment decisions. This kind of fundamental study adds to the body of literature mostly through further applications of the generated indexes. As a result, this study adds to the body of knowledge on the long-term examination of mutual fund market growth in many nations. Additionally, the new market index provides a more precise measurement of monthly returns and their dispersion, which enhances mutual fund market risk evaluations. Furthermore, mutual fund indices make it possible to do more in-depth research and examine how various industries have fared over time and in various economic environments. Finally, the database produced for this study has a number of different uses.

The remaining part of the paper is organized as follows. In Section 2, information regarding the new unit trust market database gathered for this study is provided, along with a review of the data required to produce an empirical proof for the mutual fund and market index. The primary finding of this investigation, supported by empirical data, is presented in Section 3 along with a comparison with earlier research. Lastly, an analysis is done on the outcome of the wavelet coherence analysis. In closing, Section 4 makes recommendations for more study.

Literature Review

The Bursa Malaysia Shariah Emas Index is an important indicator of the performance and potential of Shariah-compliant securities in Malaysia. The index's goal is to give investors a trustworthy and lucid benchmark for investments that adhere to Shariah. The index can assist investors in lowering risk, diversifying their holdings, and matching their financial decisions to their morals and beliefs. Additionally, the index can help in the development of financial instruments such as index-tracking funds, derivatives, structured products, and exchange-

traded funds. The index has the potential to draw in additional local and international investors to Malaysia's Islamic capital market, which is among the world's most advanced and vibrant. Because it provides a thorough and representative sample of Malaysia's Sharia-compliant assets, the index is a popular option for research. The index evaluates the performance of the main capital and industrial categories and encompasses all stock sizes on the market. Leading global index provider FTSE Russell works with Bursa Malaysia and the Securities Commission's Shariah Advisory Council to calculate the index. Consistency, openness, and objectivity are guaranteed by the FTSE Bursa Malaysia Index Ground Rules, which are adhered to by the index.

They can thus acquire an equity fund and possess shares in several different firms all at once. The fund's economies of scale and the fund manager's experience can both be advantageous to investors. Numerous research that has been done using this equity fund provide evidence in favour of this claim. For instance, (Abdullah & Shari, 2020; Ding et al., 2014; Ishak et al., 2022; Kamil et al., 2014; Mahat et al., 2020; Masih & Umirah, 2017; Noordin & Uluyol, 2018; Shari & Mahat, 2020; Stotz, 2009; Amanah et al., 2020; Atilgan et al., 2015). Furthermore, because equity funds may provide both capital growth and dividend income, the studies mentioned above had a wide range of variation, which has been highlighted in light of the fact that each study had a different set of results and objectives that this fund was able to meet.

Using various GARCH models and news impact curves, a recent study that employed Islamic stock funds offered a model of volatility persistence and asymmetry of equity fund returns in Saudi Arabia, Malaysia, and Pakistan. The research examines the body of knowledge about Islamic portfolio volatility, volatility anomalies, volatility spillover, and volatility timing. Since this study's methodology involved using daily e-data from three distinct mutual fund sectors from January 2010 to June 2021, the results on the performance and diversifying advantages of Islamic equities funds relative to conventional ones are inconclusive. Thus, to assess the volatility dynamics of the fund returns, the unit root tests, correlogram, ARCH/GARCH models, sign and size bias tests, and news impact curves are used.

Despite the fact that these unconditional results suggest a link between volatility and flow, the relationship's structure is not made evident and other variables that may affect volatility and flow are not taken into consideration. Our analysis varies from the previous one in this section since it only focuses on Islamic equity funds from three distinct industries and uses data from three separate countries, which might obscure our findings.

An important part of Malaysia's investing landscape is fixed-income funds, a kind of mutual fund that mainly invests in fixed-income securities such as corporate and government bonds, sukuk, treasury bills, and other debt instruments. As per Bank Negara Malaysia, (2023), the Malaysian fixed-income funds market comprises government and corporate debt securities in both conventional and Islamic forms. For development goals, the Malaysian government issues long-term interest-bearing debt instruments called Malaysian Government Securities (MGS) on the local capital market. Compared to equities funds, fixed-income funds seek to give investors a consistent income stream while posing less risk. The mutual fund market in Malaysia offers a wide range of fixed-income funds. These include corporate fixed-income

funds, government bond/sukuk funds, and mixed bond/sukuk funds. They all serve various investor risk profiles and investment goals.

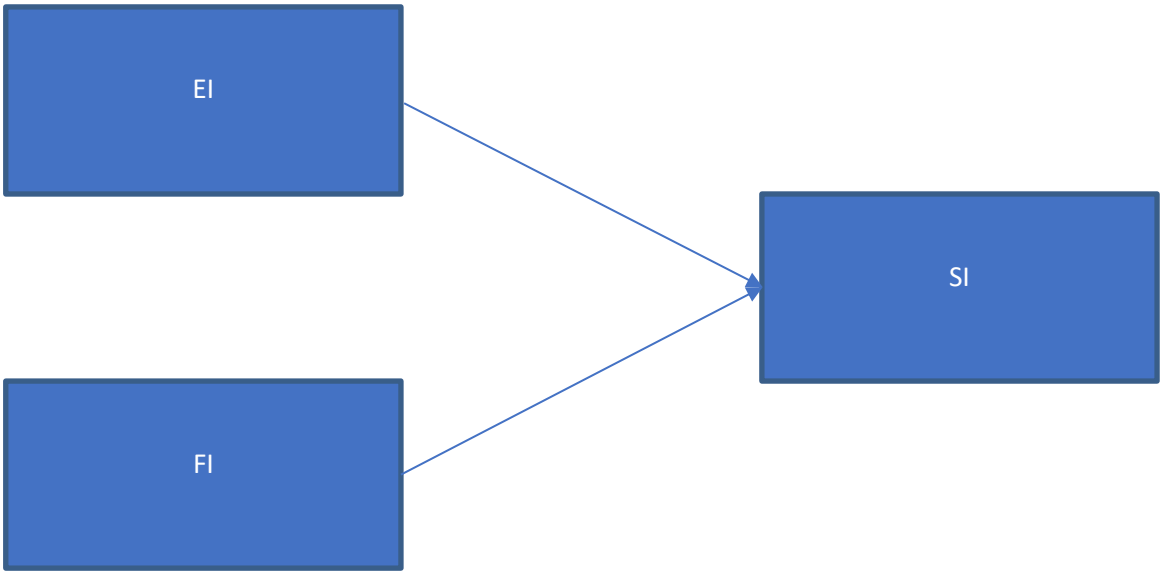

Figure 1: Theoretical Framework

This study's empirical difficulty comes from a clear vacuum in the literature, particularly with regard to the dynamic relationship between mutual fund volatility and return. This study is interesting since it just focuses on contemporary ways, as opposed to combining old and modern methods. The study closes this gap by concentrating only on contemporary approaches, which offer new insights into the complexities of the industry.

This novel technique adds much to our understanding of mutual funds and strengthens the research's robustness. Because of its complexity and wide range of influences, the interdependence connection is a focus of specific study and research. However, the majority of previous studies have relied on traditional methods such as correlation analysis (Nasreen et al., 2020), regression analysis (Atichasari et al., 2023), and time series analysis (Kallberg & Pasquariello, 2008). This can miss the non-stationary and non-linear relationship between volatility and return. Although helpful, these techniques might not be able to manage the complexity present in financial markets, such as abrupt changes in the market or non-linear correlations between variables.

The study highlights the need to analyse the performance of equity unit trust funds and fixed-income funds in order to fill a research gap on the market volatility of equities and fixed-income funds in Islamic nations. It recognises that the performance of both kinds of funds may be impacted by market conditions. By considering conventionally compliant funds, the study seeks to broaden its focus beyond Shariah-compliant mutual funds and offer a more comprehensive understanding of the mutual fund industry. It delves deeper into how Shariah oversight affects Malaysian Islamic mutual fund performance and agent expenses. Through the utilisation of indexes like the Bursa Malaysia Emas Shariah Index.

Additionally, a distinct approach that supports an effective strategy in this study is required to lessen or avoid the traps and limitations in acquiring data and producing a pertinent

discussion. Hence, the data will be analysed by wavelet squared coherence (WTC) analysis via "R" programming. This is because the method is suitable as it allows a better understanding of co-movement among financial markets (Shahzad et al., 2017). With the ability to examine the interdependence of sector-based fund returns at various time and frequency domains, it is a unique time-varying framework. The method breaks down time series into time-frequency space, which is known as multiresolution decomposition.

Furthermore, it gives several timelines in addition to capturing time-varying data on the interdependence of unit trust fund returns. This allows the researchers to pinpoint the precise timescales that are most responsible for the variability and fluctuations of domains across time. To put it differently, wavelet analysis provides useful insight into empirical problems, enabling one to identify interdependence and contagion by using time-frequency space analysis (Yang et al., 2016).

Methodology

Secondary Data

The study also addresses the challenges associated with secondary data analysis and offers novel concepts and alternative approaches. These articles discuss the value of secondary data in research as well as the biases and challenges that researchers should be aware of when using it. The paper provides a comprehensive review of the performance of funds and indexes over a ten-year period, encompassing several market cycles, from January 2013 to December 2023. Focusing on the past 10 years makes it reasonable and is pertinent to our research. A decade is sufficient to encompass various market cycles, including periods of rising prices (bull markets), falling prices (bear markets), and market volatility, enabling the study to examine fund and index performance across different market conditions (Alqaralleh & Canepa, 2021). A 10-year timeline offers a long-term perspective, which is essential for financial market research. Long-term data can highlight trends and patterns that are hidden in short-term data. The larger the dataset (longer in this case), the more dependable the statistical analysis. The substantial volume of information gathered over a ten-year period boosts the statistical significance of the study's findings. Many investing strategies, especially those that use mutual funds, are predicated on a long-term investment horizon. As such, institutional investors are just as interested in a ten-year horizon as individual investors are.

Variables

The selection of 10 years increases the study's breadth and application, which raises the value of its findings for regulators, financial institutions, and investors. Selecting daily data enables a more comprehensive analysis, spotting fleeting fluctuations and ensuring a reliable look at the volatility of indexes and funds. The main source of trustworthy and thorough data for this research is Thomson Reuters DataStream. By using the Shariah Index, the research is consistent with the current interest in Islamic finance. The study is founded on the most recent findings in the field and is based on research done between 2019 and 2024. It is important that these parameters be chosen for the investigation. The parameters used for this study are highly significant. The information obtained from the returns of the independent variables, fixed-income unit trust funds and equity unit trust funds, is informative.

The equity fund provides insight into the performance and trends in the stock market, which is useful for assessing market dynamics and investing strategies. Determining the stability and potential risks of fixed-income securities requires an understanding of the second form of investment, called fixed-income funds. Additionally, the Shariah Emas Index (SI), one of the dependent variables, provides crucial insights into the performance and trends within the Shariah-compliant business sectors by tracking the performance of the top 40 Shariah-compliant businesses listed on Bursa Malaysia. Recent studies have emphasised the need to consider a variety of control factors when analysing the influence of mutual funds on return. These control factors consist of the CPI, CSI, and GDP.

Gross Domestic Product (GDP): The whole monetary or market worth of all completed products and services produced inside a nation's boundaries during a certain time period is represented by the Gross Domestic Product (GDP). GDP acts as a thorough assessment of the state of a nation's economy. It gives information on the size and growth rate of an economy by measuring the total amount of production produced domestically.

Consumer Sentiment Index (CSI): A useful economic indicator, the Consumer Sentiment Index (CSI) measures consumer attitudes and spending patterns. It also indicates how confident or pessimistic people are about the state of the economy and their own financial circumstances.

Consumer Price Index (CPI): The monthly variation in prices that American consumers pay is measured by the CPI. Based on a representative basket of goods and services, it represents the overall change in consumer prices. CPI is a popular tool for monitoring inflation. Financial markets, corporations, consumers, and policymakers carefully watch it.

Econometric Methodology

In econometrics, specifying the mathematical structure of a model to reflect economic theories or hypotheses is known as model specification. In this work, the correlation between two-time series in the frequency domain is measured using a squared wavelet coherence model. Econometric techniques are applied to the specification of the model to get quantitative measurements of the economic connections being studied through parameter estimation. Researchers can evaluate the viability of theories about economic linkages by using the econometric approach, which makes hypothesis testing easier. This involves testing the significance of estimated parameters and evaluating the overall fit of the model (Polikar, 1999). Furthermore, forecasting is made possible by econometric models, which project future values of independent variables and dependent variable values based on estimated parameters. Policy evaluation is another application of econometric models, allowing for the assessment of the effects of changes in economic policy or market conditions on dependent variables (Younis et al., 2020).

The empirical analysis in this study started with an examination of the co-movement patterns and their temporal variations between risky and non-risky assets. Three methods may be used to determine the dependency between two-time series in the frequency and time domains. The cross-wavelet power evaluates the covariance of the time series, the wavelet power spectrum (WPS) controls the frequency and time dependences between two-time series, and the wavelet transform evaluates the variance of a single wavelet that detects and measures the relations between two time series. According to Aguiar-Conraria et al. (2008)

defined wavelet coherence (WTC) as "the ratio of the cross-spectrum to the product of the spectrum of each series and can be thought of as the local correlation (both in frequency and time), between two-time series". The wavelet coherence is expressed in terms of the coefficient of correlation of time-frequency space. The squared wavelet coherence coefficient is defined as follows:

$$R^2(u,s) = \frac{|S(s^{-1}W_{xy}(u,s)|^2}{S\,(s^{-1}|W_x(u,s)|2)\cdot S(W_y(u,s)|^2)} \qquad (4)$$

R^2: Wavelet coherency
S: Smoothing operator in both time and scale
s: Wavelet scale
Wx (S): The continuous wavelet transforms of the time series X
Wy (S): Is a continuous wavelet transform of the time series Y

Where $R^2(u,s)$ represents wavelet coherence and (s) is for a smoothing operator. Interestingly, the value of wavelet coherence ranges from 0 to 1. It is a localised correlation coefficient in time-frequency space and is a useful technique for the analysis of co-movements across two-time series (Younis et al., 2020). The wavelet coherence can be interpreted similarly to the correlation coefficient suggesting strong dependence when the value is close to 1 and weak dependence when the value is close to 0 (Zavanelli, 2023). Similar to this, covariance, which captures the cross wavelet power between two-time series at each scale or frequency, and the wavelet power spectrum both describe the variance of a time series. If the variance of a time series becomes large, the wavelet suggests the existence of a sizable power spectrum (Alqaralleh & Canepa, 2021).

Conversely, the red zone may indicate that similar events or variables are expected to affect the two markets or assets under comparison. This could be interpreted as a higher risk situation for an investor who has diversified their portfolio across these two markets or assets, as a downturn in one is likely to be mirrored in the other (Torrence & Compo, 1998). Thus, in terms of mutual fund market performance, the resulting red and blue zones might offer insights into the fund's market-related risk (also known as its beta) if the mutual fund's returns and the market indices are to be evaluated using wavelet coherence. A mutual fund that consistently shows a red zone when compared with a market index could be seen as having a high beta, meaning it's likely to rise and fall in correlation with the market (Sanusi et al., 2013).

Consequently, the red zone's opposite is shown by the blue zone. The coherence squared between the Shariah Emas Index (Y) and the equity unit trust fund returns (X) is what this study measures. Strong synchronisation or co-movement between the fund returns and the index is indicated by high coherence squared values. Examine how the coherence varies with time (n) in order to distinguish between short- and long-term dynamics. Relationship stability may be inferred from risk and volatility where coherence is squared. Thus, a relationship that is steady and predictable is suggested if coherence is regularly strong. Conversely, a large variation in coherence might be a warning of increased risk or volatility. must keep an eye on how coherence shifts in response to economic developments or market turmoil. The Wavelet coherence plots are our principal tool for analyzing the integration of risks (time-varying

conditional volatility) among equity funds, fixed-income funds, and market indices in Malaysia (Ukwuoma et al., 2023).

Empirical Results

Unit Root Test

The Unit Root Test is a crucial econometrics instrument that is frequently utilised in scholarly research. It is crucial for figuring out if a time series dataset is stationary or has a unit root, which is necessary for accurate forecasting and modelling in statistical analysis. A unit root shows that a variable is unstable or does not follow a consistent long-term trend since it gradually returns to its mean following sporadic shocks. Time-varying statistical characteristics of non-stationary series, particularly those with a unit root, can lead to erroneous regression conclusions and forecasts.

Unit root tests thereby reinforce statistical analysis, boost prediction accuracy, and offer a strong foundation for economic research and policy formation. These tests also establish if the time series is covariance stable, which assists in addressing autocorrelations. A Dickey and Fuller test or the construction of an AR model with autocorrelation detection can be used to accomplish this.

Table 1

Augmented Dickey-Fuller (ADF) and Philips-Perron Test (PP)

	Augmented Dickey-Fuller (ADF)		**Philips-Perron Test (PP)**	
	Level			
Variables	Constant Without Trend	Constant With Trend	Constant Without Trend	Constant With Trend
EI	-1.170 (1)	-0.921 (1)	-1.226 (6)	-0.914 (6)
FI	-1.502 (4)	-1.494 (4)	-1.554 (25)	-1.461 (25)
SI	-2.586 (1)*	-3.399 (1)*	-2.662 (7)*	-3.453 (7)**
	First Difference			
EI	- 49.893 (0)***	- 49.901 (0)***	- 49.934 (3)***	- 49.949 (2)***
FI	-19.969 (3)***	- 19.994 (3)***	- 45.194 (3)***	- 45.146(23)***
SI	- 50.883 (0)***	- 50.884 (0)***	- 50.910 (2)***	- 50.911 (2)***

Note ***, ** &* denotes significance at 1%, 5% and 10% levels respectively the figures in parentheses (...) represent the optimum lag length selected based on the minimum value of the chosen information criterion.

The outcomes of the unit roots tests for Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) applied to different financial assets are shown in Table 1. After running the tests both with and without trend considerations, the t-values are compared to critical values to

ascertain stationarity. The findings of the ADF and PP tests, as well as this conclusion, are consistent with the theory that the log return time series exhibits stationary starting differences. This stationarity is crucial since it ensures that the series may be simulated to provide the white noise residuals needed to evaluate conditional correlations. The series passes the autocorrelation and unit root tests, indicating that it is appropriate for further study.

Descriptive Statistics

One area of statistics that deals with the display and summarization of data is called descriptive statistics. It offers concise descriptions of the measurements and the sample. These summaries can be visual (charts, graphs, etc.) or quantitative (mean, median, mode, etc.). When working with big volumes of data, descriptive statistics are incredibly helpful in helping us comprehend the data. Included in this are the returns on equity funds and fixed income (Emas Shariah Index). Prior to conducting any more research, it provides insights into the distribution and key patterns of our data, which is essential. To comprehend the central tendency of our returns, for example, we could look at their mean or median. Similarly, we could look at their standard deviation to comprehend the volatility or dispersion of our returns.

Table 2
Descriptive Statistics for the Daily Returns

Variables	Observation	Minimum	Maximum	Mean	Std. Deviation	VIF
EI	2853	-153.5053	160.1935	0.014618	7.761022	2.742420
FI	2865	-94.97655	103.9701	-0.004063	3.820154	1.204079
SI	2868	-2.316652	2.514504	-0.000716	0.300040	
CPI	48	-143.1798	46.53829	-18.98699	40.33463	1.254191
CSI	48	-4.575749	162.2214	94.16975	36.38773	8.270570
GDP	40	299.4317	473.6110	375.3739	34.79013	8.776208

The descriptive statistics for the daily returns of different financial assets are displayed in Table 2, where they are divided into three categories: independent, dependent, and constant variables. The table displays the values of the Variance Inflation Factor (VIF) for each of the significant variables. To determine if independent variables are multicollinear, these values are crucial. A first test indicates that multicollinearity is not a concern for most variables because their VIF values are well below the critical threshold of 10. This ensures that the regression findings are consistent and free of bias, leading to reliable conclusions. The table's results are important for future research since wavelet coherence analysis relies on the absence of multicollinearity in the data. The data ensures that the survivorship calculated from the data is unbiased as it covers all active and inactive funds within the specified period.

Wavelet Coherence Analysis

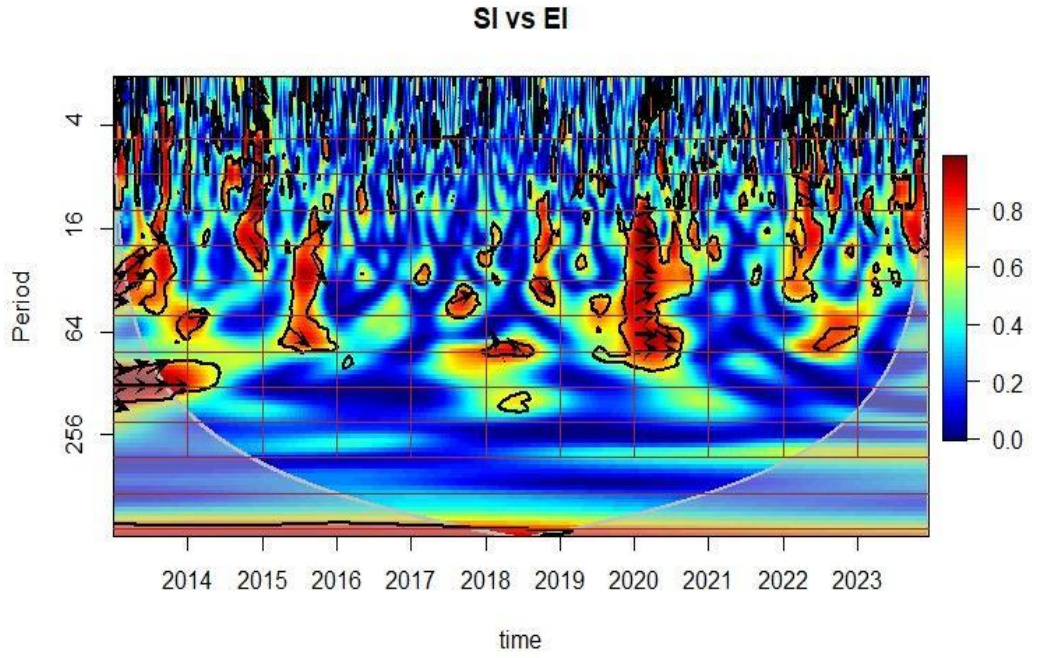

Figure 1: Equity Index vs Shariah Index

Wavelet coherence for the Shariah index and equities index is seen in Figure 4.1. The study discovered that a careful examination of the dynamic interaction between the Shariah Index (SI) and the Equity Unit Trust Fund (EI) was conducted. This dynamic co-movement is graphically depicted by the wavelet coherence plot, which shows red clusters at specific times. These red clusters show strong positive co-movement between EI and SI and great coherence. On the other hand, poor coherence, or weaker links at those times, is shown by the blue clusters. This dynamic behaviour highlights the necessity for investors to take SI changes into account when making decisions about their investments based on EI and thus supports our research question (RQ1).

Risk management comes next in order to comprehend the different levels of co-movement across indices, modify portfolio allocations according to the strength of co-movement, and take SI variations into account when controlling risk exposure. Consequently, to improve risk-adjusted returns, portfolio optimisation may be achieved by mixing assets with low correlation. Distribute funds in accordance with the dynamic relationship between SI and EI and adjust portfolio weights in response to changes in co-movement patterns. Additionally, the insights into market sentiment may be used to assess investor sentiment through the analysis of coherence patterns during market occurrences. Therefore, modify tactics, as necessary. For example, ethical investing considers Shariah-compliant investments and keeps an eye on SI dynamics to ensure that it adheres to ethical standards. Next, flexibility is the capacity to analyse and modify investment plans on a frequent basis when coherence patterns change over time.

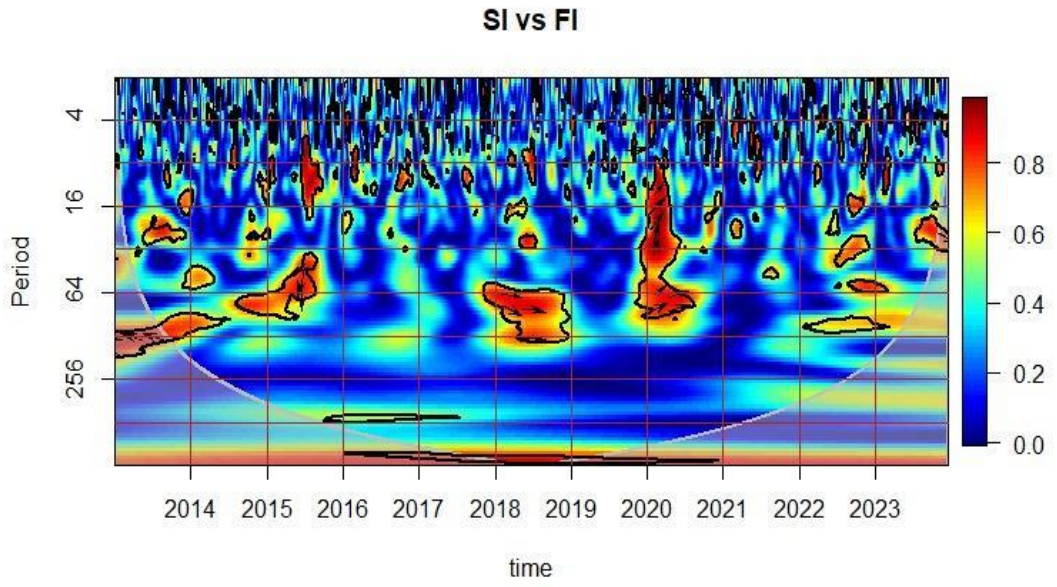

Figure 2 Fixed income funds (FI) vs Shariah market index (SI)

Wavelet coherence plots for Fixed-income funds (FI) and the Shariah market index are shown in Figure 2, with several blue areas from day four to day 256 emphasising the low-risk characteristics of both investments. This weak co-movement pattern indicates a significant possibility for diversification and is more prominent than in Figure 4.1. The investigation shows a modest association between the daily returns of the FI fund and the Shariah index for different investment periods, ranging from 0.0 to 0.3 across 4 to 256 trading days. More specifically, for durations ranging from 2 to 16 days, short-term correlations are minimal, providing investors with a short investment horizon with a diversification benefit. Comparing the Shariah Index (SI) and Fixed-Income Index (FI): A Dynamic Co-Movement The FI and SI figure shows dynamic co-movement; blue clusters imply weaker co-movement as the red clusters are necessary to show strong positive co-movement. These trends suggest that SI variations should be taken into consideration when making investment decisions based on FI, which is relevant to research question RQ2.

Empirical Validation and Portfolio Management by Azaliney et al., (2020) examined the co-movement between fixed-income funds and Shariah-compliant indices, finding a significant relationship where these funds' returns align with Shariah-compliant indices' performances. The advantages of diversity depend on this co-movement, which makes the research hypothesis less likely to be accepted. When taken as a whole, these studies confirm that plot patterns are coherent and emphasise how crucial it is to take SI dynamics into account when making fixed-income-based investment decisions. The different co-movement degrees shown in the FI vs. SI plot support RQ2 and emphasise the necessity of a thorough portfolio management strategy that takes SI dynamics into account. If changes in the Shariah Index (SI) have an effect on the overall risk profile of fixed-income assets, then the impact on such investments may be substantial. Volatility in SI can cause market uncertainty, which can impact investor attitude and risk tolerance. Therefore, the yield on fixed-income instruments might be impacted by SI dynamics. For instance, favourable moves in SI may encourage investors to look for safer assets, such fixed-income securities, which would raise demand.

Bond prices and yields may rise as a result of this increased demand. Negative changes in SI, on the other hand, would cause investors to look for other avenues for their money, which might lower demand for fixed-income securities and have an effect on rates. Furthermore, changes in SI frequently mirror the mood of the market as a whole. Investors may have a favourable economic outlook when SI performs well, which would raise demand for fixed-income securities. On the other hand, in the event that SI declines, investors can grow risk apprehensive and turn to fixed-income securities for safety. Bond yields and prices may be impacted by this increased demand.

As a result, to reduce risk, fixed-income investors frequently diversify their holdings. A component of this diversification approach is SI dynamics. Combining SI with fixed-income assets can increase the advantages of diversification in a portfolio if their correlation is minimal. By avoiding interest-based transactions (riba) and other banned behaviours, as well as by owning assets that react differently to market conditions such as Shariah-compliant fixed-income instruments investors can lower risk. Such instruments are not as readily available or as appealing when SI fluctuates. Positive SI moves might increase the number of Shariah-compliant bonds issued, giving moral investors additional alternatives for where to put their money. Furthermore, SI dynamics are frequently associated with certain nations or areas. Currency risk affects fixed-income assets denominated in local currencies. The stability of local currencies may be impacted if SI is volatile as a result of geopolitical events or changes in the local economy. Foreign investors' fixed-income returns are impacted as a result. To summarise, fixed-income investors must keep an eye on SI movements. It offers perceptions into the mood of the market, degrees of risk, and chances for diversification. A well-balanced portfolio that satisfies both ethical and financial objectives can be achieved by combining SI-aware techniques with fixed-income allocations.

Discussions

The results of the wavelet coherence plots show that there is a dynamic co-movement between the Equity Index (EI), Fixed-Income Index (FI), Shariah Index (SI), This suggests that the relationships between these indices are not static, but rather vary over time and across different scales. The periods represented by the blue clusters in the plots are periods of low coherence, indicating weaker or negative co-movement between the indices; in all of the results, the colour blue signifies low correlation, suggesting that it is good for diversification. The market's unpredictability raises investors' potential risk in the event of an event. Consequently, this finding demonstrates that unit trust investments may be transferred by simply making trade-offs and spreading out the risk.

When managing FI portfolios, investors should take SI variations into account. Investors should adjust their risk management plans and market conditions in accordance with the dynamic nature of this connection. Diversification is still essential for risk management, particularly in erratic market circumstances. Therefore, consider the fact that The Securities Commission Malaysia (SC) actively develops solutions to handle obstacles in the financial industry.

Although our research has yielded significant insights into the established mutual fund industry in Asia, it is important to acknowledge some limitations. The mutual fund industry in Malaysia was the main subject of our investigation. It's possible that the conclusions don't

apply entirely to other areas with distinct market dynamics or legal frameworks. As a result, while we stressed the necessity for innovation, our study did not go into great detail on any one contemporary strategy. To improve mutual fund operations, more study might look into cutting-edge technology like blockchain and smart contracts. This is due to the fact that regulators, fund managers, and investors must comprehend the advantages and disadvantages of smart contracts.

Since many Malaysians withdrew $33 billion in emergency withdrawals from their pension funds during the COVID-19 outbreak, we advise more research into the recurrence of patterns resulting from abrupt market changes. Given that the pension fund was a key component in maintaining the nation's capital market and financial investment assets, this enormous withdrawal has had a substantial effect on the markets in the nation. The increasing number of jewellery pawns, especially gold ones during the gold price surge, showed a recurring pattern. People often take advantage of financial crises to sell off valuables in order to meet short-term cash demands. Although precise statistics on the effects of this technique on the Malaysian mutual fund market is lacking, it would be logical to surmise that it may exacerbate market volatility. This is due to the fact that mutual funds with a gold theme financial instruments that mimic actual gold may perform differently depending on the price of gold sold.

Conclusion

In summary, the research study makes a substantial contribution to the subject of international finance, especially when it comes to Goal 9 of the Sustainable Development Agenda. The analysis is in line with the emphasis on infrastructure, innovation, and industry. It helps financial institutions create investment plans that may result in more spending on innovation and infrastructure. This research has practical consequences for several stakeholders, in addition to its intellectual contributions. It encourages development and innovation in Malaysia's financial sector, strengthening and enlarging the financial market. The study sheds light on how unit trust funds' volatility and return interact dynamically. By having a greater understanding of the risks associated with their investments, investors may make more educated choices. Thus, investors may efficiently diversify their assets by being aware of the mutual fund industry's income generating and economic contributions.

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