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The Efficiency of Sukuk Indices by Different Tenures: An Analysis From the 2008-Financial Crisis

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Abstract
The sukuk market in the Islamic capital market has undergone significant evolution and development. During the 2008 global financial crisis, the deteriorating economic condition of countries, especially Malaysia, as the biggest sukuk market in the world, has adversely affected the value of sukuk investments. The decrease of 33 percent in the total global sukuk issuance after the 2008 crisis generated a complicated situation among sukuk investors (classified sukuk as a risky investment), who then had increased the number of sukuk defaults. The high volatility affects long-term efficiency. The daily data of all sukuk indices are collected from Dow Jones Sukuk 1-3 Year Total Return Index (DJSUK3TR) and Dow Jones Sukuk 7-10 Year Total Return Index (DJSUK10TR). Accordingly, this research investigates the types of sukuk market efficiency before, during and after the 2008 global financial crisis utilising the GARCH-in-Mean (GARCH-M) model. The analyses are based on the Efficient Markets Hypothesis (EMH) and the Random Walk model. The results conclude that the sukuk index with a long-term tenure (DJSUK10TR) is the best market performance analysis. Overall, the sukuk market is recorded as an inefficient market. In short, the findings will provide valuable information, guidelines and give confidence to issuers, policymakers, regulatory bodies, and investors to invest and issue sukuk. The empirical contributions in this study show the importance of sukuk to encourage investors to invest in sukuk in order to increase economic growth and investment.
Keywords: Sukuk, Market Efficiency, Sukuk Indices, Tenures, GARCH-M

Introduction

For the Malaysian government, sukuk market has exhibited an impressive growth over the years. In 2016, the global sukuk market witnessed a rebound after three consecutive years of decline following its peak in 2012. The primary sukuk market is expected to gain momentum in 2017, with issuances coming predominantly from corporate issuances in Malaysia and GCC, and MENA sovereigns (IIFM Sukuk Report, 2016; MIFC Sukuk Report, 2017). While the issuance numbers are expected to remain stable for the remainder of 2017, some of the large transactions seen in the first half of the year are unlikely to be repeated in 2018 (S&P Global,

2018). Kamso and Ng (2013) pointed out that the 2008 global financial crisis and the 2009 Dubai debt crisis erroneously gave the international investment community a poor impression of sukuk investment. In fact, investing in sukuk enhances potential returns relative to conventional fixed income investing and reduces portfolio volatility.

Alam and Rizvi (2016) have described that a Muslim investor decides whether to pay for the delegated asset management cost, engage in frequent trading, or have a simple buy-and-hold strategy; the characterisation of the form of market efficiency is vital. Fama (1965) defines market efficiency as: "In an efficient market, competition among the many intelligent participants leads to a situation where, at any point in time, actual prices of individual securities already reflect the effects of information-based, both on events that have already occurred and on events which, as of now, the market expects to take place in the future". Notably, this research goes beyond informational efficiency to explore the relationship between risk and return by examining the volatility, focusing specifically on the impact of the 2008 global financial crisis. As most studies have investigated the efficiency of the stock market with little focus and limited evidence on the sukuk market efficiency, this study will concentrate on the effectiveness of the sukuk market.

Price fluctuation and uncertainty influence the financial sector's performance, especially in terms of the returns of sukuk. During the 2007/2008 global financial crisis, records indicated that the return of the sukuk market encountered a decline from USD46.65 billion in 2007 to only USD15.8 billion in 2008 (Ahmad & Radzi, 2011). The decrease in total global sukuk issuance after the 2008 global financial crisis had generated a complicated situation among sukuk investors (Rahim & Ahmad, 2016).

The global financial crisis affected Malaysia's markets (as the leader of the global sukuk market) in both the short- and long-term, which supposedly was due to the exposures undertook by global portfolio managers in these capital markets (Ab Hamid, Zakaria & Ab Aziz, 2014). However, a multi-horizon analysis has shown an interesting observation of an increase in inefficiency for long-term investors. This situation may contribute to the increasing number of retail and short-horizon investors. On the other hand, while a surge in short-horizon investors is likely to increase the short-term efficiency, it may adversely affect long-term efficiency (Rizvi & Arshad, 2015). The investigation of the sukuk market's efficiency in the sample period of study is essential since volatility will impact the market's efficiency in the long-term.

This study investigates the types of sukuk market efficiency following the 2007/2008 global financial crisis (pre, during and after the crisis) using selected sukuk indices for the period under study. This research considers only one Islamic capital market instrument, namely sukuk, as it covers almost 90 percent of the global Islamic capital market (Haider & Azhar, 2010). The study's findings may provide information on how sukuk investors behave under different economic conditions based on the performance of these sukuk indices. It is essential to decrease uncertainty and increase the confidence among the investors and issuers (Muslim or non-Muslim) on sukuk investment. More importantly, the study results would record the consistency and sustainability of Islamic financial instruments during an economic downturn. Furthermore, an analysis of the market reactions either in the weak form, semi-strong form, or strong form efficiency (Ojo & Azeez, 2012; Abdalla, 2012; Sheefeni, 2015) of the selected sukuk indices- before, during and after the 2008 global financial crisis, is important and reflects the total international sukuk issuances.

Theoretical Framework

1. Efficient Markets Hypothesis (EMH)

In an efficient market, the efficient market hypothesis (EMH) affirms that at all times, the prices comprehensively reflect the available information that is relevant to their valuations. The ability of a particular stock exchange to integrate information into prices demonstrates its competency level. The EMH could be more accurately defined in the information items. Based on the price information, Fama (1965) has categorised the information items into three levels, which are subjected to how quick the information is, they are: (1) weak-form EMH, (2) semi-strong form EMH, and (3) strong-form EMH.

In strong-form efficiency, the EMH postulates that a market is perceived as efficient and resourceful if all the information is relevant to the value of a share, notwithstanding its availability to existing or potential investors and whether it is accurate and quick in displaying the market price. The prices that are shown should reflect the information that is retrieved from both the public and private sectors, which are more concerned with the disclosure of efficiency of the information in the market than the securities' pricing efficiency (Fama, 1970). Second, in the semi-strong form efficiency, according to the EMH, a market is efficient if all applicable, valid, and publicly available information reflects the market price for a short period. In this case, no investors could earn excess returns from the trading rules that are based on the publicly available information; the fast reaction that has been shown in the stock price movement proves that no investors can earn an above-normal return (Fama, 1970). Third, the EMH is restricted to past data or historical information regarding the share prices that are in weak-form efficiency. There should be no established relationship between the current and previous prices resulting from the new data. The movement in the share prices in response to further information is not distinguishable from the last price (Fama, 1970).

According to the market efficiency theory, sukuk investors are aware of their intrinsic risks and price to incorporate their risks. Therefore, the researcher can track the common market risk of an individual sukuk from its sensitivity to movements in the sukuk market, i.e., assuming that the market knows more about the sukuk behaviour, whether its price moves closely in step with the market as compared to those that do not correlate. Thus, it is easier to value a sukuk with a beta closer to one (sukuk market beta) than those with significantly higher or lower values, because the former returns are driven predominantly by market movements.

2. Random Walk Theory

The Random walk theory states that variables contain random series of actions that differ from previous values. They are independently and identically distributed (i.i.d) in size. It anticipates that all future values would match the last observed values. A random walk that is defined by the price changes is independent of one another (Brealey et al., 2005). A random walk model, which is assumed to be independent, is valid as long as knowledge of the changes in the price behaviour in the past could not be used to increase the expected gains. Specifically, no problem is incurred from the timing of the purchases and sales of that security should the price changes for the given securities be independent.

The random walk assumption imposes the actual degree of dependency in a series of price changes that is inadequate to make the expected profits under a simple buy-and-hold policy. The efficient market implies that successive price changes in individual securities will be independent. Thus, a random walk market is defined as a market where successive price changes in individual securities are independent. The theory of random walks translates into

a series of stock price changes and has no memory of its past prices. This means that the history of the series cannot be used to forecast the future. The future path of the price level of security is as predictable as a series of cumulated random numbers. Moreover, the market price of a security in a random walk efficient market reflects the presently available information on the prospects of that security. The premise is that investors react spontaneously to any informational resources that are gathered, consequently reducing profit opportunities.

Therefore, prices wholly reflect the information at all times, and no profit can be gained from information-based trading (Lo & MacKinley, 1999). This assumption leads to a random walk postulate- the more efficient the market, the more random the price changes. Nevertheless, it should be noted that the EMH and Random walks theory do not evaluate the same issue. This is demonstrated by the fact that a random walk does not presume that the stock market is efficient and filled with rational investors.

Literature Review

'Sukuk' is a classic Arabic word and the plural form of a word called 'sakk', which means a legal document or an instrument that represents obligations in compliance with Islamic law or 'Shari'ah' (Haider & Azhar, 2010). From the Islamic perspective, the emergence of sukuk is suitably based on a hadith that explains historical facts regarding this concept. The Al-Muwatta' by Imam Malik records a reference mentioning the term sukuk: "Yahya narrated to me from Malik that he had heard that sukuk was given to people in the time of Marwan ibn al-Hakam for the produce of the market at al-Jar. People had bought and sold the sukuk among them before they delivered the goods. Zayd bin Thabit and one of the Companions of Rasulullah (saw) went to Marwan and said, "Marwan! Do you make usury permissible?" He said: "I seek refuge with Allah! What is that?" He said, "These sukuk, which people buy and sell before they take delivery of the goods." Therefore, Marwan sent a guard to follow them and take them from people's hands and return to their owners." (ISRA, 2011; Bank Islam Malaysia Berhad, 2012; Shahida & Sapiyi, 2013).

Definition of Sukuk

There are several international standard setters in Islamic finance and capital markets. The most notable among them are the Accounting and Auditing Organisation for Islamic Financial Institutions (AAOIFI) and the Islamic Financial Services Board (IFSB). In Malaysia, the Securities Commission Malaysia (SC) provides guidelines on sukuk issuances. In this study, sukuk is defined based on the Securities Commission Malaysia for two reasons. Firstly, according to the literature, the SC's definition is considered to be the broadest and all-encompassing, relative to other definitions. Secondly, Malaysia is the primary driver of sukuk issuance historically, and this trend continues.

The Securities Commission Malaysia (2011) defines sukuk as "certificates of equal value which evidence exclusive ownership or investment in the property using Shari'ah principles and concepts approved by the Shari'ah Advisory Council (SAC)." According to IFSB, sukuk refers to, "a certificate that represents the holder's proportionate ownership in an entire part of an underlying asset where the owner assumes all rights and obligations to such asset." Meanwhile, the AAOIFI defines sukuk to be, "a certificate of equal value, representing undivided interests in the ownership of the underlying assets (applicable to both tangible and intangible assets), usufruct, services, or investment, particularly ventures or some special investments" (AAOIFI, 2008).

Sukuk Market Developments in Malaysia

The global sukuk market reaches a new high, with a total sukuk issuance of USD174.2 billion (2019: USD157.8), and a total sukuk outstanding of USD572.6 billion. Malaysia will continue to lead the global sukuk market in 2020, with the largest market share of the total global sukuk outstanding. According to the Islamic Finance Development Report 2020, Malaysia will continue to be the most developed Islamic finance country globally in 2020. Fitch Ratings classifies Malaysia as a developed Islamic finance market because Islamic banking has achieved systemic importance and mainstream relevance (MIFC, 2020).

Malaysia commands a market share of 45.1% of the global sukuk outstanding as at end Dec 2020. The sukuk market in Malaysia is driven by the corporate with a 57.5% share of the total issuance for the year, and Malaysia has also contributed 45.4% market share of the total global corporate issuance in 2020.

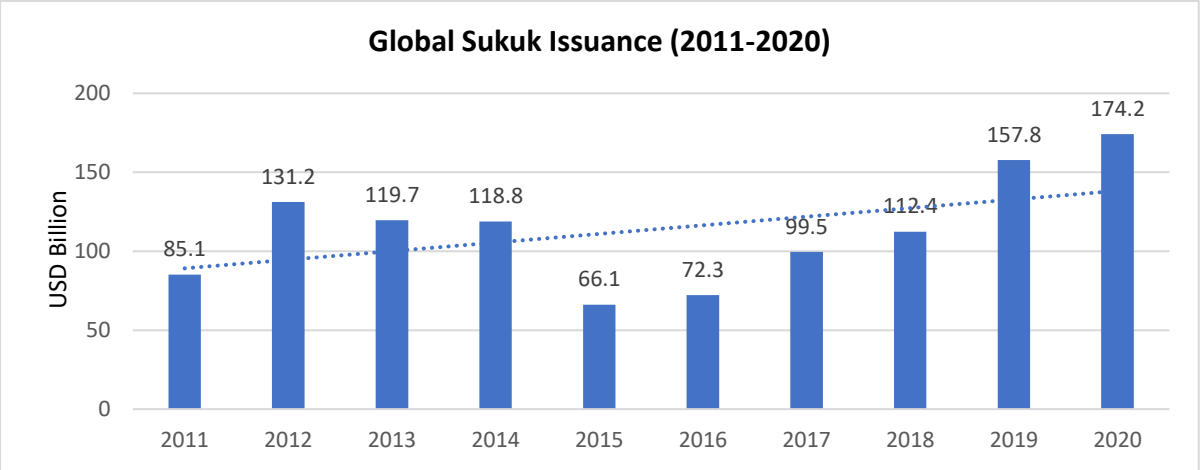


Figure 1. Global Sukuk Issuance (2011-2020) MIFC (2020).

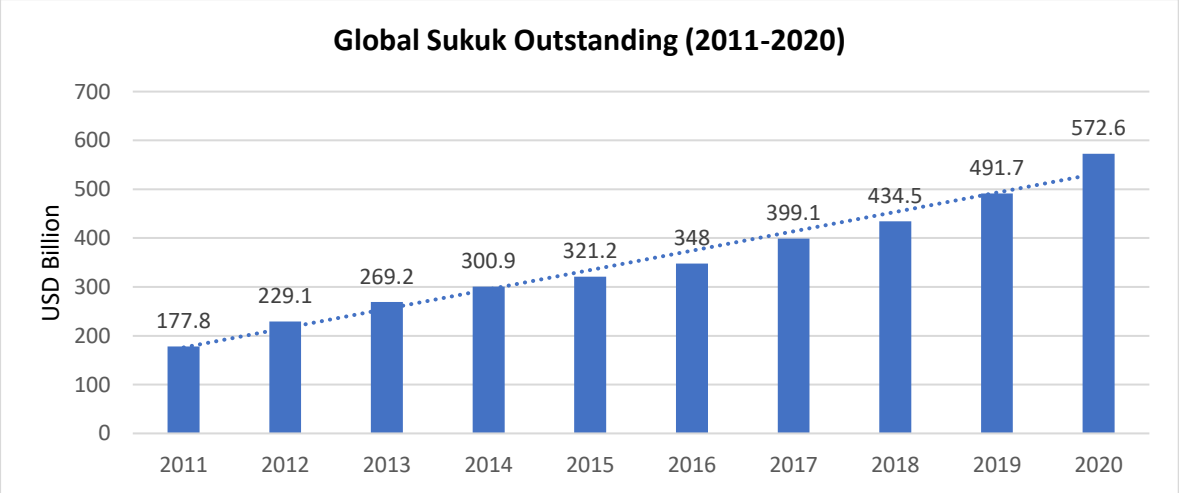
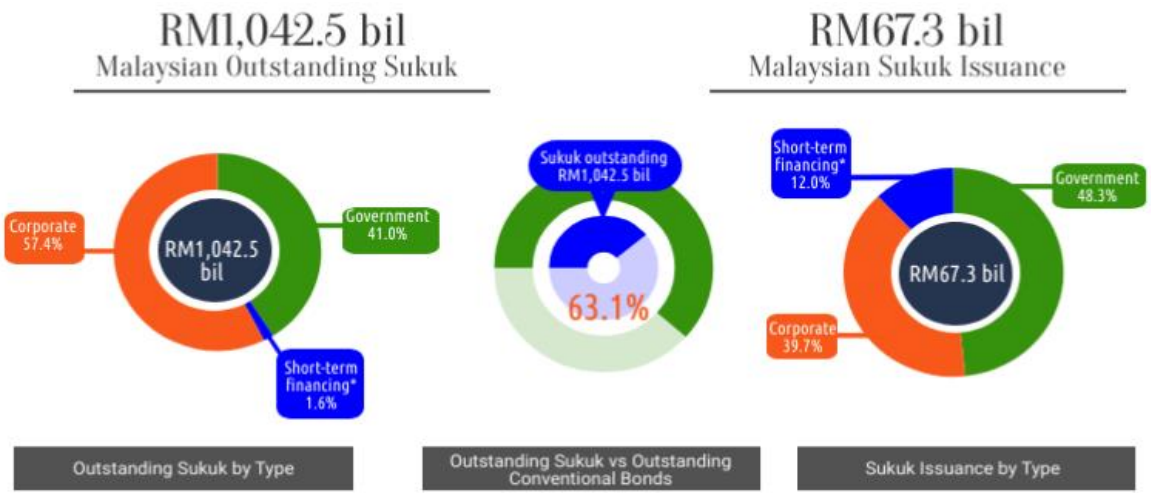


Figure 2. Global Sukuk Outstanding (2011-2020) MIFC (2020).



*Short term financing includes short term corporate debt securities and quasi-government short term securities

Figure 3. Malaysian Sukuk Market (as at end-March 2021) BPAM, RAM.

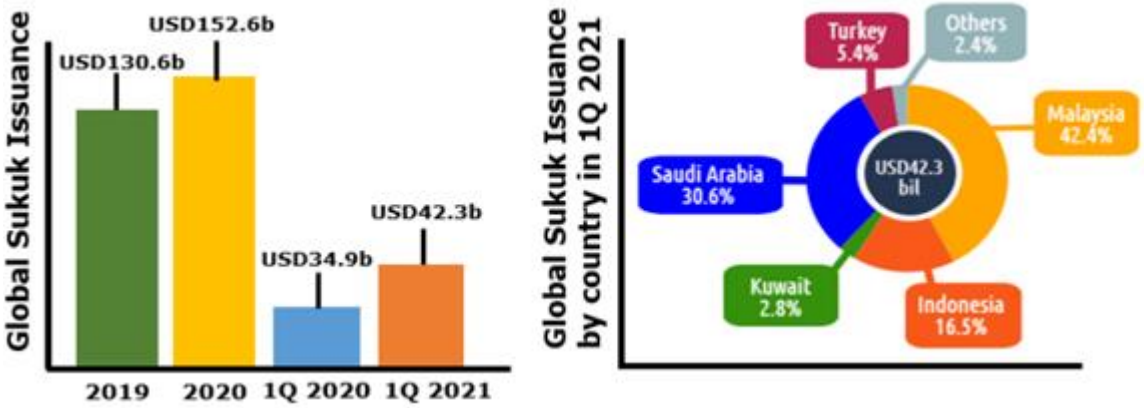


Figure 4. Global Sukuk Issuance by Country in 1Q 2021. RAM, Eikon-Thomson Reuters.

Despite the economic challenges that have been posed by the coronavirus pandemic, global sukuk issuance has increased by 21.2 percent year over year to USD42.3 billion in the first quarter of 2021 (1Q 2020: USD34.9 bil). Both sovereign, corporate, and quasi-government sectors contributed to the overall increase in global sukuk issuance. The total sovereign issuance increased by 31.8 percent to USD25.7 billion (1Q 2020: USD19.5 billion), while corporate and quasi-government sukuks increased by 8.5 percent to USD16.6 billion (1Q 2020: USD15.3 billion).

In the first quarter of 2021, Malaysia has led global sukuk issuance with a 42.4 percent market share (USD17.9 billion), followed by Saudi Arabia (30.6 percent or USD12.9 billion), Indonesia (16.5 percent or USD7.0 billion), Turkey (5.4 percent or USD2.2 billion), and Kuwait (5.4 percent or USD2.2 billion) (2.8 percent or USD1.2 bil). As a result, sukuk issuance from these five countries has accounted for 97.7% of global issuance in total.

Sovereign sukuk issues have continued to drive market performance in the first quarter of 2021, accounting for 60.7 percent (USD25.7 billion) of total global sukuk issuance; the remaining 39.3 percent was made up of corporate and quasi-government debt (USD16.6 bil). Overall, sukuk issuances increased significantly in key markets such as in Malaysia (+39.8% y-o-y) and Indonesia (+89.2% y-o-y). On the other hand, the GCC region saw a 12.7 percent y-o-

y drop to USD14.4 billion for the quarter (1Q 2020: USD16.5 bil). The corporate and quasi-government sectors, which fell 37.3 percent to USD5.2 billion, were the main contributors to the decline (1Q 2020: USD8.3 bil). The shift to conventional bond issuance, which has a faster time to market and lower documentation costs, explains the overall decline in GCC sukuk issuance. As a result, conventional bond issuance has increased 176.4 percent to USD47.8 billion in the same quarter (RAM Ratings, 2021).

Market Efficiency

Black and McMillan (2006) examine whether the returns exhibit a positive (negative) risk premium as a result of a negative (positive) shock and the size of any premium using an asymmetric GARCH-M model. They claim that after a shock, volatility and expected future volatility increase, resulting in a rise in the required rates of return and a drop in the current prices. Squalli (2006) examines market efficiency in the Dubai Financial Market (DFM) and the Abu Dhabi Securities Market (ADSM) (ADSM). He uses run tests and variance ratio tests. The Random walk hypothesis is rejected in all sectors by the variance ratio tests, and the run tests indicate that ADSM is the only weakly efficient sector. The efficiency of India, Sri Lanka, Pakistan, and Bangladesh is then examined by Cooray and Wickremasinghe (2007), who use a unit root test to conclude that these markets have weak-form efficiency.

Then, for three years, Verma and Rao (2007) look at the weak-form efficiency of Bombay Stock Exchange (BSE100) Index companies. For the first two years, the serial correlation and run test exhibit have indicated that the market is not weak-form efficient, but the third-year results indicate that it is. Mishra and Paul (2008) investigate the Indian stock and foreign exchange markets' integration and efficiency. They conclude that the Indian stock and foreign exchange markets are inefficient in the long run. Then, from 1990 to 2000, Asiri (2008) examines the behaviour of stock prices on the BSE and the weak-form efficiency of 40 publicly traded companies. The above authors conclude that the stock markets and stock exchanges in India, Sri Lanka, Pakistan, and Bangladesh are inefficient.

For the Indian scenario, Chander, Mehta, and Sharma (2008) have looked at empirical evidence on weak-form stock market efficiency. Both parametric and nonparametric tests show that the stock market is inefficient in its current form. Their findings suggest that trading strategies based on historical prices cannot consistently rely on abnormal gains unless they coincide with the underlying stock price drifts. Lazar (2009) investigates the Indian capital market's weak-form efficiency. The Indian capital market is weak-form efficient, according to ADF and Phillips-Perron (PP) tests. Finally, according to their research, Mittal and Jain (2009) test a weak-form of efficiency, and the EMH on the Indian stock market is a random walk. They investigate whether the Indian stock market has seasonal anomalies. The results show that there were no anomalies in the market and that it was informationally efficient. As a result, these researchers believe that India is an inefficient market country.

Furthermore, Awad and Daraghma (2009) look at the Palestine Security Exchange's (PSE) weak-form market efficiency for 35 stocks in the PSE market indices. Because the returns of the 35 sample stocks do not follow a normal distribution, the researchers have used parametric and nonparametric tests to ensure that they are random. The PSE is inefficient in its weak form, according to the run tests. The unit root tests have also suggested the weak-form inefficiency in the return series. Abedini (2009), on the other hand, investigated the

stock market's weak-form efficiency in the Gulf Cooperation Council countries of Bahrain, Kuwait, and Dubai. The GCC stock market was efficient according to the autocorrelation function test and the Augmented Dickey-Fuller (ADF) test; even though these studies had suggested the weak-form, their efficiency was different.

From 2004 to 2009, Hamid and colleagues researched Pakistan, India, Sri Lanka, China, Korea, Hong Kong, Indonesia, and Malaysia. All of these markets were in poor form efficiency during the test timeframe, according to the autocorrelation, runs test, unit root test, and variance ratio in the study. According to Abdmoulah (2010), for periods ending in March 2009, all 11 Arab stock markets had high sensitivity to the past collapsed and were deemed weak-form inefficient. After the global financial crisis of 2007/2008, the results revealed that the Asian market was inefficient in its weak-form, while the Arab stock markets were inefficient in their weak-form. From 1986 to 1989, Ntim et al. (2011) investigate the weak-form efficiency of 24 African stock price indices, and have found that the majority of stock price indices on the African continent have poor form efficiency.

Meanwhile, Haroon (2012) examines the weak-form efficiency of the Karachi Stock Exchange (KSE) from 1991 to 2011 and concludes that it is inefficient. Weak-form efficiency is not found in descriptive statistics or nonparametric tests; using the same method as Haroon shows that the Karachi Stock Market is not weak (Omar et al., 2013). (2012). Tweneboah et al. (2013) investigate the Ghanaian foreign exchange market's efficiency. They discover that the US Dollar's behaviour contradicts the random walk process and the weak-form of efficiency. They have argued that using the Variance Ratio (VR) technique to test for the random walk is a better method.

Mabakeng and Sheefeni (2014) use three bilateral exchange rates to test the weak-form of efficiency in the Namibian foreign exchange market. They discover that past values cannot predict future values, so they are effective in the weak form. According to Hasan (2015), the Dhaka Stock Exchange is inefficient in its current state because historical stock prices are unable to achieve superior gains. Furthermore, if there is a link between the stock prices and economic variables, Bangladesh's stock market will lose its semi-strong informational efficiency and become more volatile. Bhuiyan et al. (2017), on the other hand, look into whether sukuk can help with global diversification. They use wavelet coherence and Multivariate GARCH analyses to look at the volatilities and correlations of bond indices from emerging countries such as South Korea, Singapore, China, India, Indonesia, and Malaysia, using the Thomson Reuters BPA Malaysia Sukuk Index. They conclude that the sukuk market provides effective portfolio diversification opportunities for fixed-income investors in the sample countries.

Because of the scarcity of research in this area, this section does not solely focus on a literature review of the sukuk market efficiency. In countries that do not issue sukuk, the author also looks at other types of markets. These include studies of the foreign exchange market, exchange rates, stock markets, and countries with a non-Muslim investor base but have not expressed interest in Islamic financial instruments.

Methodology

Data Collection

The daily data of historical prices from 2005 to 2015 for all indices are collected from the Bloomberg database (Saturdays and Sundays excluded). This study has used four sukuk indices which are separated by different tenures:

Dow Jones Sukuk 1-3 Year Total Return Index (DJSUK3TR)

The Dow Jones Sukuk 1-3 Year Total Return is designed to track the performance of global Islamic fixed income securities, which is also known as sukuk. The index includes U.S. dollar-denominated, investment-grade sukuk with maturities of 1-3 years that have been screened for Shari'ah compliance (Bloomberg, 2018).

Dow Jones Sukuk 7-10 Year Total Return Index (DJSUK10TR)

The Dow Jones Sukuk 7-10 Year Total Return is designed to track the performance of global Islamic fixed income securities, which is also known as sukuk. The index includes U.S. dollar-denominated, investment-grade sukuk with maturities of 7-10 years that have been screened for Shari'ah compliance (Bloomberg, 2018).

Table 1: Sukuk Indices

	List of Sukuk Indices	Launch Date	N
1	Dow Jones Sukuk 1-3 Year Total Return Index	28th April 2006	2,424
2	Dow Jones Sukuk 7-10 Year Total Return Index	31st July 2007	2,126

Source: Bloomberg Database (2015)

Method: Measuring Sukuk Market Efficiency

The study's objective is to investigate the types of sukuk market efficiency- pre, during and post 2008 global financial crisis, based on the selected sukuk indices. For that purpose, the GARCH-in-Mean (GARCH-M) model is implemented to identify the types of sukuk market efficiency, as listed in Table 1. The Generalised Autoregressive Conditionally Heteroscedasticity in Mean model (GARCH-M (1,1) model) allows the variance of the error term to vary over time, in contrast with the classical regressions that assume constant variance. Also, the GARCH-M model enables the testing for the presence of risk premium in the markets. The GARCH-M (1,1) model is stated as follows:

$$r_t = \beta_0 + \beta_1 r_{t-1} + \delta h_t + e_t$$
$$e_t \sim N(0, h_t)$$
$$h_t = \alpha_0 + \alpha_1 h_{t-1} + \alpha_2 e_{t-1}^2$$

The β_0 is the intercept and the β_1 is the slope. Both β_0 and β_1 represent an AR (1) model. The δ represents the risk premium parameter in the conditional model when the trade-off between volatility and return prevails. Returns volatility is measured by conditional variance h_t, which is described as a function of a squared value of past residuals (e_{t-1}^2), presenting the ARCH factor, and an autoregressive term (h_{t-1}) reflecting the GARCH character of the model. The sum of $\alpha_0 + \alpha_1$ represents the degree of volatility persistence in the model. If the sum of $\alpha_0 + \alpha_1$ is very close to 1, it indicates a volatility cluster and the effect of volatility clustering will become more important (Eagle, Ito, and Lin, 1990).

Bollerslev, Chou, and Kroner (1992) have stated that volatility clustering indicates that the market is volatile for a week or two before calming gradually for several subsequent weeks. In the case of overshooting, this can be seen as the presence of an outrageous level of volatility. Therefore, the estimation process is to identify the selected sukuk indices as the proxy to analyse the types of efficiency of the sukuk market. Table 2 shows the classification of sukuk market efficiency. Instability here is indicated by summing up the root of the autoregressive model of $\alpha + \beta$; the rule of the thumb, in this sense if:

Table 2. Classification of Sukuk Market Efficiency

	ARCH term (α) + GARCH term (β)	Types of Sukuk Market Efficiency
1.	$\alpha + \beta < 0.5$	Strong form efficiency
2.	$0.5 \leq \alpha + \beta < 0.75$	Semi-strong form efficiency
3.	$0.75 \geq \alpha + \beta < 1$	Weak form efficiency
4.	$\alpha + \beta > 1$	No efficiency or inefficient market

Sources: Ojo and Azeez (2012) and Sheefeni (2015)

Hypothesis:

The Efficient Market Hypotheses (EMH) categorise market efficiency into three types: weak-form, semi-strong form, or strong-form efficiency. Sukuk data are analysed in pre, during, and post-2007/2008 global financial crisis period in order to test the second hypothesis as follows:

i. Null Hypothesis (H_0):
Sukuk market is inefficient based on EMH classification, and it does not follow a random walk theory for pre, during, and after the 2007/2008 global financial crisis.

ii. Alternative Hypothesis (H_1):
There is a different type of sukuk market efficiency (inefficient, weak-form, semi-strong form, and strong form) which is categorised by the efficient market hypothesis (EMH). The market follows the Random walk theory for pre, during, and after the 2007/2008 global financial crisis.

H_{1a}: Sukuk indices show a weak-form efficient market before the crisis.
H_{1b}: Sukuk indices show an inefficient market during the crisis.
H_{1c}: Sukuk indices show a weak-form efficient market after the crisis.

Results

The study's second objective is to investigate the state of sukuk market efficiency pre, during and post-2008 crisis on sukuk indices utilising the GARCH-M (1,1) model. The market efficiency is categorised based on the value of the ARCH term (α) and GARCH term (β). The market categorisation follows the EMH's viz. strong form, semi-strong form, weak form, and inefficient market.

The difference between the GARCH-M model from the other GARCH-family is the risk premium parameter, λ, which is the coefficient of standard deviation. A positive risk premium indicates that the return is positively related to its volatility. In other words, a rise in mean return or performance is caused by an increase in the conditional variance as a proxy for more significant risk. Furthermore, the higher conditional variance of returns requires larger compensation to convince the agent to hold the long-term asset. Based on this theoretical premise, identifying two undiversifiable common risks that determine the risk premium for sukuk, market risk and information asymmetry risk, is very important. In addition, identifying

sukuk risk premium, will provide an opportunity for further development in the Islamic sukuk pricing criteria.

Establishing the relationship between risk and return for the GARCH-M model, λ was employed as the coefficient for estimating this relationship. The risk-return coefficient of the GARCH-M (1,1) model had most of the models showcasing a positive and significant relationship (positive risk premium). If λ is positive or negative and statistically significant, an increased risk that is given by an increase in the conditional variance will lead to a rise or fall in the mean return. In this sense, λ can be said to be a time-varying risk premium. A statistically positive relationship indicates that investors are compensated for consuming greater risk. However, a negative relationship signifies the investors' reaction to factors other than the standard deviation of equities from their historical mean. The DJSUK7TR index was launched after the 2008 global financial crisis, and the DJSUK10TR index was launched during the 2008 global crisis. These four sukuk indices also show the same trend, with higher volatility during and after the crisis. The DJSUK7TR index indicates the recovery effect of the crisis, which has started in 2010.

Table 3. Summary of Results for GARCH-M (1,1) Model (During the Crisis)

GARCH-M(1,1) Model for the During-Crisis (2007-2008)							
Parameter	$\emptyset$ (Constant)	λ (Risk premium)	ω (Constant)	α (ARCH effect)	β (GARCH effect)	$\alpha + \beta$	Types of Sukuk Market Efficiency
DJSUK3TR	0.0010	-337.1769	-0.0000	0.1497	0.6877	0.8374	Weak-form
DJSUK10TR	0.0004 (0.9264)	1.7166 (0.3137)	-0.0000 (-1.0690)	**-0.0088 (-26.1713)*** **	**1.0195 (1.0195)*** **	1.0108	**Inefficient market**

Note: ***, **, and * respectively represents significant at the 1%, 5% and 10%
*α and β are significant for only DJSUK10TR.
Source: Authors' calculation
Note: DJSUK7TR have yet to be launched during the crisis.
Note: The z-statistics for DJSUK3TR is not available during the crisis.

There is no significant result of the risk premium, which means that there is no positive and significant relationship between risk and return during the crisis (higher risk does not promise a higher return). There are only one sukuk index with the significance α and β, β,which is DJSUK10TR. This sukuk index shows inefficient markets during the crisis that follows α+β>1, DJSUK10TR with α+β = 1.0108. Efficient Market Hypothesis (EMH) asserts that inefficient market means a market in which prices do not always adequately reflect the available information (Fama, 1965, 1970). This index shows no efficiency during the crisis, even though it has been launched during the situation and does not adequately reflect the bad news of the global crisis.

Hence, the DJSUK3TR shows weak-form efficiency during the crisis. It records the positive value of α and β, but are insignificant results. These results indicate that these sukuk indices were affected by the 2008 global financial crisis because the market efficiency changed when the crisis occurred. DJSUK3TR changed from semi-strong efficient before the crisis to the

weak- form efficient during the crisis. The Efficient Market Hypothesis (EMH) shows no stable relationship between the current and previous rates based on the new information. DJSUK5TR remained stable with semi-strong form efficiency and did not change during the crisis. However, only DJSUK10TR is recorded as the significant results during the crisis.

Table 4 shows the results of the GARCH-M (1,1) model after the crisis.

Table 4. Summary of Results for GARCH-M (1,1) Model (Post-Crisis)

GARCH-M(1,1) Model for the Post-Crisis (2009-2015)							
Parameter	$\emptyset$ (Constant)	λ (Risk premium)	ω (Constant)	α (ARCH effect)	β (GARCH effect)	$\alpha + \beta$	Types of Sukuk Market Efficiency
DJSUK3TR	0.0002 (0.0224)	3.3768 (0.0094)	-0.0000 (0.9947)	-0.0019 (-6.5797) ***	0.5875 (1.4168)	0.5856	Semi-strong form
DJSUK10TR	0.0000 (-4.1789) ***	**4.6637 (188.7842) *****	-0.0000 (94.6529) ***	**0.3473 (187.5621) *****	**0.8838 (3,0740.90) *****	1.2310	**Inefficient market**

Note: ***, **, and * respectively represents significant at the 1%, 5% and 10%
*α and β are significant for DJSUK5TR and DJSUK10TR.
Source: Authors' calculation

There are two sukuk indices with semi-strong form efficiency after the crisis. They are DJSUK3TR and DJSUK7TR with 0.5≤α+β<0.75, which are α+β= 0.5856, and 0.5528, respectively. These results indicate that the DJSUK3TR showcases early reactions and quickly recovers from the bad news of the crisis. It reacts to semi-strong form efficiency after the crisis, although it has been highly affected as a weak-form efficient market during the crisis.

Table 5. Summary of Results for Objective Two: Market Efficiency

CLASSIFICATION OF SUKUK MARKET EFFICIENCY			
SUKUK INDICES	**$(\alpha \& \beta)$**	**RISK PREMIUM, λ**	**MARKET EFFICIENCY**
DURING CRISIS (2007-2008)			
2 Sukuk Indices [DJSUK3TR, DJSUK10TR]	**DJSUK10TR** (significant results of α & β)	No significant result of the risk premium	**Inefficient market: [DJSUK10TR]**
POST-CRISIS (2009-2015)			
2 Sukuk Indices [DJSUK3TR, DJSUK10TR]	Positive & significant **α & β:** [DJSUK5TR, **DJSUK10TR**]	Positive and significant risk premium [**DJSUK10TR**]	**Inefficient market: [DJSUK10TR]**

*Note: Market efficiency records only the significant results of α, β and λ coefficients.
Source: Authors' calculation

Higher volatility leads to significant variations of return, hence a higher risk. In a positive risk-return relationship, if an investor is a risk lover, an increase in risk will increase return and demand for sukuk. For the summary, only sukuk indices with significant α, β and λ coefficients are considered. Positive and significant results of risk premium (λ coefficient) indicate a positive relationship between risk and returns. In short, the higher the risk, the higher the returns. An inefficient market is when the investors might not have enough information about the securities in that market to make informed decisions about what to buy or the price to pay. Markets in emerging nations may be inefficient since securities laws may not require the issuing companies to disclose relevant information. In addition, few analysts follow the securities that are being traded there. Similarly, there can be inefficient markets for stocks in the new companies, particularly for new companies in new industries that are not widely analysed. An inefficient market is the opposite of an efficient one where enormous amounts of information are available for the investors who choose to use it.

Conclusion

The risk premium is not detected during the crisis period. It could also be deduced that risk premium behaviour is recognised when sukuk are in an inefficient market. The Dow Jones Sukuk Indices are most likely the best leading market indicator based on the market efficiency analysis. A statistically positive risk premium λ suggests that investors are compensated for assuming greater risk and support the positive relationship between risk and returns. From these results, the sukuk index with 10years long-term tenures (DJSUK10TR) records the best leading market indicator, based on the market efficiency analysis.

Based on the results, this research supports the hypothesis that different sukuk market efficiency, which is categorised by the Efficient Market Hypothesis, and markets, follows the Random Walk theory during the sample period. In addition, identifying the sukuk risk premium will provide an opportunity for further development in the Islamic sukuk pricing criteria.

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