USING THE ARDL APPROACH TO INVESTIGATE THE NEXUS BETWEEN FINANCIAL RISK AND SUKUK MARKET DEVELOPMENT

Siti Nurhidayah Mohd Roslen (iD)**, Azlul Kalilah Zaghlol** (iD)**, Muhammad Ridzuan Abdul Aziz** (iD)

Faculty of Business and Management, Universiti Teknologi MARA (UiTM), 42300 Bandar Puncak Alam, Selangor, Malaysia
E-mail: sitihidayah@uitm.edu.my

Abstract

The purpose of this paper is to examine the effect of financial risk factors on Sukuk market development in Malaysia during the period 2015 to year 2021. To capture the effect of financial risk factors on Sukuk market development, the authors estimated the long-run linkage by using ARDL bounds testing approach to cointegration. This study confirmed the existence of both long-run and short-run relationships between the financial risk factors and Sukuk market development. The authors also found that the coefficient for international liquidity stability is positive and statistically significant in the long-run, but negative and statistically significant in the short-run. Findings obtained in this research can further justify the premium price to be paid in purchasing Sukuk as compared to conventional bond which may be beneficial to Sukuk market players in understanding these securities better in capitalizing its benefit to portfolio diversification. The use of ARDL approach that examines the long-run and short-run effects of financial risk factors on Sukuk market development in Malaysia makes the current study value added to the literature since there is scant research conducted in the same area using samples from emerging Asian market.

Research paper

Reference to this paper should be made as follows: Roslen, S. N. M, Zaghlol, A. K., & Abdul Aziz, M. R. (2022). Using the ARDL Approach to Investigate the Nexus Between Financial Risk and Sukuk Market Development. *Journal of Entrepreneurship, Business and Economics*, *10*(2S1), 95–123.

Introduction

Global *Sukuk* issuance increased by approximately USD40 billion from January to February 2022, which is equivalent to an increase of more than 7% over the same period in 2021. Moreover, Malaysia has the largest *Sukuk* market globally, resulting from the strong demand from domestic and foreign investors. Hence, it is expected that Malaysia's *Sukuk* market development will be highly impacted by various domestic and international financial risk factors. A vast amount of research has been conducted on the determinants of equity and conventional bond market development given their considerable importance in stimulating economic growth (Kowalewski and Pisany, 2019; Teplova and Sokolova, 2018; Bhattacharyay, 2013). Today, the growing importance of *Sukuk* around the globe has attracted increasing interest among academics in conducting more research on the *Sukuk* market to have a better understanding of the risk and return potential of *Sukuk* investment.

Sukuk can be defined as certificates of investment that entitle the holder to a proportionate share of ownership in the underlying asset of the *Sukuk*, or ownership in a business venture along with pro-rate profits or losses associated with the assets, business ventures, and investments (Sairally and Abdullah, 2017). It presents proportionate ownership rights over the assets in which funds are being invested. *Sukuk* are usually structured as asset-based securities rather than asset-backed securities, and the underlying assets used must be Shari'ah compliant and may include tangible assets, usufructs, services generating income, intangible assets, commodities, assets of particular projects, and investment activities.

Sukuk issuance has a dominant role in the economy of Malaysia and it directly supports the funding of various projects conducted by government

and corporate entities. Malaysia's total *Sukuk* issuance has reached USD286.8 billion as of March 2021, accounting for 39.6 percent of global *Sukuk* outstanding. The leading position of Malaysia as among the global leaders in the world's *Sukuk* market has been strengthened with the overwhelming success of its first sovereign dollar sustainability *Sukuk*, which has been oversubscribed by 6.4 times, according to Malaysia's Finance Ministry (New Straits Times, 2021). Despite the growing importance of the *Sukuk* market in Malaysia, the academic literature focusing on the determinants is still under-researched. The academic literature on the long-term capital market topic mainly focuses on the bond market, ignoring largely the determinants of the *Sukuk* market (Aman et al., 2019). Many of the past research on determinants of *Sukuk* market development focused on firm specific factors besides the country's macroeconomic stability and institutional quality factors (Aman et al., 2021; Basyariah et al., 2021; Al-Raeai et al., 2018; Said and Grassa, 2013). Studies on the impact of financial risk stability were not evident except in Boukhatem (2022), who studied the impact of financial risk indices on *Sukuk* market development in Saudi Arabia. To date, no study has been conducted in the same area using an emerging Asian market sample. Using the ARDL approach, this study attempts to investigate the impact of financial risk factors on the development of the Malaysian *Sukuk* market from 2015 to 2021.

The significance of financial risk factors in the developing *Sukuk* market has become more apparent in late-January 2020 as the COVID-19 outbreak has dampened global economic growth, which resulted in large non-resident outflows (approximately from RM30 billion in January 2020 to RM20 billion in March 2020) from the bond and equity markets in Malaysia,

as reported by Bank Negara Malaysia and Bloomberg. Investors have become more cautious in investing their money in order to minimize their investment risk from continued volatility in domestic and global financial markets. Among the factors that may help to strengthen the domestic capital market, as highlighted in the Financial Stability Review report published by Bank Negara Malaysia in 2019, were market risk, liquidity risk, and funding risk. This highlights to what extent the *Sukuk* market performance is also affected by specific financial risk factors, even though it is considered a diversification tool that can create a lower risk-higher return portfolio for investors (Pirgaip et al., 2021) and performed well during the global financial crisis period of 2008 (Smaoui et al., 2017). Given *Sukuk*'s safer side compared to conventional bonds, this evidence caused some investors to be perplexed in understanding the reasons behind the higher premium required in buying *Sukuk* (Cakir and Raei, 2007). Due to the mixed results on *Sukuk*'s diversification effect, this study will revisit this issue under the impact of financial risk factors.

Findings obtained in this study indicate the significance of financial risk factors in determining the *Sukuk* market development in Malaysia in the short-run and long-run. This study also uses the international country risk guide (ICRG) database in determining the financial risk factors to be studied in this research, given the wide usage of the ICRG database in determining the indices of various types of risks, which include political risk, economic risk, financial risk, and composite risk. The remainder of this study is organised as follows. Section 2 presents a brief literature review. Section 3 provides the methodology and data used in this research. Section 4 discusses empirical results, while Section 5 concludes.

Literature Review

The Effect of Macroeconomic Factors on Sukuk Market Development

The rapid development of Islamic finance over the past decade has led to the birth of numerous innovative financial products and services that are in compliance with Shari'ah, the Islamic fundamental law. The three components identified in Islamic finance theories include Islamic banking, Islamic insurance or Islamic takaful, and Islamic capital markets. In the Islamic financial system, *Sukuk* is the most important financial instrument, as it represents 90% of the whole Islamic capital market (Al Sayed, 2013). *Sukuk* is thus considered to be the icon of Islamic finance (Muhammad and Junaid, 2012). In recent years, the growing popularity of *Sukuk* for investment among Islamic banks and Islamic financial providers around the world has allowed it to be recognized as a viable alternative to traditional financial products. As a result, *Sukuk* became one of the most important mechanisms for raising capital through large Islamic structures (Hasan et al., 2019). *Sukuk*'s popularity was also acknowledged by Latham and Watkins (2015), who opined that *Sukuk* issuers are at an advantage in terms of their capability to achieve favorable pricing in the *Sukuk* market when compared with the conventional bond market.

Previous research has shown that the *Sukuk* market plays an important role in diversifying investment risk. However, to what extent are other risks affecting the *Sukuk* market? This section will thus be reserved for a review of the related studies on the risks that may affect the development of the *Sukuk* market, beginning with macroeconomic factors and progressing to more specific financial factors.

Macroeconomic factors refer to natural, geopolitical, or fiscal events that influence the economy of a nation or a region (Salamzadeh et al., 2022; Salamzadeh & Markovic, 2018). These factors influence the population at large. Macroeconomic factors have been shown as the important determinants of the development of the financial market. Several studies have been conducted on the relationship between macroeconomic factors and *Sukuk*. Among the previous studies are the studies by Basyariah et al. (2021), Ependi and Thamrin (2020), Suciningtias (2019), Al-raeai et al. (2018), Smaoui and Khawaja (2017), and Said and Grassa (2013).

The study by Said and Grassa (2013) on the relationship between macroeconomic, financial, legal, and institutional factors and *Sukuk* market development found that *Sukuk* market development was influenced by gross domestic product per capita, economic size, trade openness, and regulatory quality. This study also assessed the relationship between the financial crisis and *Sukuk*, in which a negative relationship was found between the financial crisis and *Sukuk* market development. An investigation by Smaoui and Khawaja (2017) ion the determinants of *Sukuk* market development, including the structural, financial, developmental, institutional, and macroeconomic factors, found a significant influence of structural, institutional, and financial factors on *Sukuk* market development.

A conceptual model was developed by Al-Raeai et al. (2019) in order to investigate the macroeconomic determinants of *Sukuk* market development by including political risk, and *Sukuk* market development in their study. It was found that exchange rates, trade openness, and the size of the banking sector are the significant determinants of *Sukuk* market development. This study also found a non-significant relationship between the capitalization of

stock market capitalization, saving rates, and *Sukuk* market development, as well as a positive relationship between political risk and *Sukuk* market development.

Suciningtias (2019) investigated the relationship between macroeconomic variables such as the benchmark interest rate, inflation, exchange rate, and changes in global gold and oil prices with *Sukuk* performance. It was found that the long-term performance of *Sukuk* was influenced by changes in exchange rates, inflation, and changes in world gold prices. It was also found that the short-term performance of *Sukuk* was influenced by previous performance, benchmark interest rates, exchange rates, and world gold prices. However, no significant relationship was found between crude oil prices and the long-term and short-term performance of *Sukuk*.

Ependi and Thamrin (2020) investigated the relationship between macroeconomic factors such as inflation, economic growth, money supply, foreign exchange rate, benchmark interest rate, and *Sukuk* market development. The results of this study indicated that inflation, economic growth, money supply, and benchmark interest rates had no influence on *Sukuk* market development. In contrast, a significant relationship was found between the foreign exchange rate and *Sukuk* market development. The most recent study by Basyariah et al. (2021) on the relationship between macroeconomic and institutional stability and *Sukuk* market development found that gross domestic product per capita and the rule of law index relate positively and significantly to *Sukuk* market development. On the contrary, no relationship was found between inflation and exchange rates or *Sukuk* market development.

The aforementioned literature has investigated the macroeconomic determinants related to *Sukuk* market development. Besides these factors, the

specific risk to a financial system needs to be considered too when it comes to *Sukuk* market development as it will be the guideline by which the business determines the level of profit to be estimated from a project. This will be discussed next.

Risks Affecting the Sukuk Market

Risk in the Islamic financial system is essential to making profits (Alswaidan et al., 2017). It forms the basis of a profit where profits and losses are both shared in a joint partnership. While profit is an integral part of an Islamic economic system, the assumption of risk is equally important. Therefore, whenever only profits are shared in any commercial partnership but not the risks, the Islamic transaction becomes invalid simply because it is imperative for both profits and risks to be shared.

Specifically for *Sukuk*, the management of risk has become very crucial for its structure (Al Sayed, 2013). In fact, the performance of the *Sukuk* market is highly dependent on the ability to minimize *Sukuk*-related risks. More recently, Alswaidan et al. (2017) and Hasan et al. (2019) added that risk management is of fundamental importance in Islamic finance, such that prudent precautions must be taken to mitigate risks since they can't be avoided. These risks are uniquely associated with the prohibition of debt-based financial transactions and the profit and loss sharing concept within Islamic finance. Hence, in achieving sustainable *Sukuk* market growth, efficient risk management of *Sukuk* structures becomes crucial.

Literature on *Sukuk* has highlighted numerous risks underlying the *Sukuk* structures. They include Khan and Ahmed (2001), Jobst (2007), Tariq and Dar (2007), Jabeen and Javed (2007), Sundararajan (2007), Wilson

(2009), Nanaeva (2010), Said (2011), Majid et al. (2011), Alsaeed (2012). More recently, El Shazly and Tripathy (2013), Noor and Shahimi (2013), and Al Sayed (2013) have similarly found that there are several different risks that need to be incorporated when profiling for *Sukuk* models. As a result, this emphasizes the importance of understanding the risk management aspect of *Sukuk* investment for both *Sukuk* issuers and investors.

According to the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI), there are 14 types of Shari'ah structures in *Sukuk* securitization. However, out of these 14 recognized *Sukuk* structures, only seven types of *Sukuk* are more commonly issued. They are the Mudaraba *Sukuk*, Musharaka *Sukuk*, Ijara *Sukuk*, Murabaha *Sukuk*, Salam *Sukuk*, Istisna *Sukuk*, and the Hybrid *Sukuk*. Each type follows a different type of sale contract that underlies the *Sukuk* securitization. Alswaidan et al. (2017) therefore highlighted the pressing question of how to identify, evaluate, measure, and manage the risks of *Sukuk*.

The *Sukuk* risks are broadly classified into systematic risks and unsystematic risks. The former includes factors such as interest rate risk, foreign exchange risk, equity price risk, and commodity price risk. Meanwhile, the unsystematic or idiosyncratic risk components include credit risk, Shari'ah compliance risk, operational risk, and institutional risk. The following Table 2.2 summarizes some of the literature on risks related to *Sukuk*.

Table 1. Summary of Literature on Sukuk Risks

Author(s) and Year	Type of *Sukuk* Risks	Main Findings
Zakaria et al. (2012)	Default Risk	*Sukuk* may also promote default risk as it needs to undergo a credit rating assessment of their future payment prospects.
De Lorenzo (2007)	Sharīʿah Non-Compliance Risk	There is a possibility that *Sukuk* are not or will not be in compliance with the established Shari'ah principles and standards.
Al-Sayed (2013)	Systematic and Unsystematic Risk	Systematic risk relates to regulatory, Shari'ah non-compliance, liquidity, the rate of return, and foreign exchange risk, while unsystematic risk relates to default, asset-related, and staff-related risks of *Sukuk*.
Rauf & Ibrahim (2014)	Market Risk, Operational Risk, Credit Risk, and Liquidity Risk	*Sukuk* returns are affected by interest rate risk, inflation risk, dollar (currency) rate risk, maturity risk, credit risk and default risk, legal and Sharīʿah non-compliance risk, liquidity risk, and re-investment risk.
El Shazly & Tripathy (2013)	Credit Risk, Operational Risk, and Sharīʿah Compliance Risk	Failure to capture all the specific risks in their valuation can make *Sukuk* a new name in the lexicon of toxic assets.
Majid et al. (2011)	Default risk	The issue of *Sukuk* default is very crucial since it affects the welfare of its stakeholders.
Noor & Shahimi (2013)	Credit risk	Findings show that credit risk management applications used for debt-based *Sukuk* are about the same as in conventional bonds.
Tariq (2004)	Market risk, interest rate risk, foreign exchange rate risks, credit risk, Sharīʿah compliance risk and operational risk	Adequate risk management techniques will foster this growth and enable issuers to satisfy a greater variety of investment appetites.

Source: Adopted from Hasan et al. (2019).

All this literature reveals that the factors that determine the *Sukuk* market are not very much different from the factors that determine conventional bond market performance (Rahman et al., 2022; Hosseini et al., 2022; Ebrahimi et al., 2022; Hameed et al., 2021; Yakubu et al., 2022). This study follows the International Country Risk Guide (ICRG) rating on financial risk determinants by focusing on five measurements of financial risk called exchange rate stability, foreign debt stability, debt service stability, current account stability, and international liquidity stability. By definition, all these

variables were found to be linked with some of the macroeconomic and financial risk factors identified earlier.

Methodology

The objective of this study consists of examining the short and long-run relationships of financial risk components on Malaysia's Sukuk market development using the autoregressive distributed lag (ARDL) model. The ARDL model is an ordinary least square based model which is applicable for both non-stationary time series as well as for time series with a mixed order of integration (Pesaran & Shin, 1995; Pesaran et al., 1999; Dana et al., 2021, 2022. This model uses a sufficient number of lags to capture the data generating process in a general-to-specific modelling framework. In addition, this approach is also suitable to be used for conducting studies with a small sample size and allows a combination of different stationary variables (at level and at first difference) (Boukhatem, 2022).

The baseline model to study the relationship between the financial risk components and *Sukuk* market development is presented in Equation (1):

$$SUK_t = A + B_1ERS_t + B_2FDS_t + B_3DSS_t + B_4CAS_t + B_5ILS_t + \varepsilon_t \qquad (1)$$

The definition of each variable used in this study is provided in Table 2.

Table 2. Variables Definition and Data Sources

Factors	Variable	Acronym	Descriptions	Source
***Sukuk* market development**	*Sukuk* market size	SUK	Total amount of *Sukuk* issued in Malaysia market, quarterly data (natural log of *Sukuk* size)	EIKON database
Financial risk measures	Exchange rate stability	ERS	Appreciation or depreciation of Ringgit against US dollar, quarterly data, computed as percentage change.	EIKON database
	Foreign debt stability	FDS	Gross foreign debt in a given quarter, in US dollars as a percent of GDP in US dollars, quarterly data.	Bank Negara Malaysia Monthly Statistical Bulletin, EIKON database, and Department of Statistics Malaysia
	Debt service stability	DSS	Total external debt in US dollars as a percent of total exports of goods and services in US dollars, quarterly data.	Bank Negara Malaysia Monthly Statistical Bulletin, EIKON database, and Department of Statistics Malaysia
	Current account stability	CAS	Total current account of the balance of payment in US dollars as a percent of total exports of goods and services in US dollars, quarterly data.	EIKON database, and Department of Statistics Malaysia
	International liquidity stability	ILS	Official foreign currency reserves in US dollars as a percent of total imports in US dollars, quarterly data	Bank Negara Malaysia Monthly Statistical Bulletin, EIKON database, and Department of Statistics Malaysia

Note: The definition of each component of financial risk were sourced from SAMA and ICRG as found in https://www.prsgroup.com/wp-content/uploads/2014/08/icrgmethodology.pdf

Following the model used by Boukhatem (2022), in investigating the long-run relationships between the financial risk variables and the *Sukuk* market development, the ARDL bound co-integration test is applied and can be specified as follows:

$$\Delta SUK_t = \alpha_0 + \alpha_1 SUK_{t-1} + \beta_1 ERS_{t-1} + \beta_2 FDS_{t-1} + \beta_3 DSS_{t-1} + \beta_4 CAS_{t-1} + \beta_5 ILS_{t-1} +$$

$$\sum_i^p \gamma_t \Delta SUK_{t-i} + \sum_j^{q1} \varphi_t \Delta ERS_{t-j} + \sum_k^{q2} \varphi_t \Delta FDS_{t-k} +$$

$$\sum_l^{q3} \lambda_t \Delta DSS_{t-l} + \sum_m^{q4} \pi_t \Delta CAS_{t-m} + \sum_n^{q5} \lambda_t \Delta ILS_{t-n} + \varepsilon_t$$

(2)

Where; ε_t is the error term that is white noise, and Δ represents the first difference operator. If the results from bound test shows the value of F-statistic higher than the upper critical bound I(1), it means there exist a long-run cointegration relationship between the independent and dependent variables. If the F-statistic value is below the lower bound I(0), no cointegration is presumed. If the value F-statistic is between the lower and upper bound values, the relationship is said to be inconclusive.

Once the cointegrating relationship has been identified, the long-run coefficients of the ARDL model were then determined based on the following Equation (3).

$$SUK_t = \alpha_0 + \sum_i^p \gamma_t SUK_{t-i} + \sum_j^{q1} \varphi_t ERS_{t-j} + \sum_k^{q2} \varphi_t FDS_{t-k} +$$

$$\sum_l^{q3} \lambda_t DSS_{t-l} + \sum_m^{q4} \pi_t CAS_{t-m} + \sum_n^{q5} \lambda_t ILS_{t-n} + \varepsilon_t$$

(3)

The orders of the ARDL (p,q1,q2,q3,q4,q5) model are selected based on AIC criterion.

Finally, the short-run dynamics are estimated using error correction model (ECM) as shown in equation (4):

$$\Delta SUK_t = \alpha_0 + \sum_i^p \gamma_t \Delta SUK_{t-i} + \sum_j^{q1} \varphi_t \Delta ERS_{t-j} + \sum_k^{q2} \varphi_t \Delta FDS_{t-k} +$$

$$\sum_l^{q3} \lambda_t \Delta DSS_{t-l} + \sum_m^{q4} \pi_t \Delta CAS_{t-m} + \sum_n^{q5} \lambda_t \Delta ILS_{t-n} + \psi ECT_{t-1} + \varepsilon_t$$

(4)

ECT variable is an indicator of the speed of adjustment of the variables in case the long-term equilibrium state is disturbed because of some shock in the short run and hence strengthens the evidence of the co-integrating relationship stability.

To check the goodness of fit of the model, diagnostic tests such as functional form, serial correlation, non-normality and heteroscedasticity are conducted. In addition, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) stability tests are also applied to test the stability of the co-integration relationship equation.

Findings and Discussions

Unit Root Tests

The analysis begins with the unit root tests using augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) methods to determine the stationarity of series and their order of integration. Table 3 illustrates the findings of these tests that consistently showed that three out of six series (FDS, DSS, and ILS) were stationary at first difference and consequently integrated at order one (I(1)), while the rest are stationary at level. Given these results, the series characteristics fulfil the conditions set before applying the ARDL model in order to examine the relationship between financial risk factors and the domestic *Sukuk* market development in Malaysia.

Table 3. ADF and PP Unit Root Test Results

Variables	ADF test statistic		PP test statistic		Order of integration
	Level	First difference	Level	First difference	
SUK	-4.264405 (0.007)	-5.905308 (0.000)	-4.251422 (0.007)	-19.23747 (0.000)	I(0)
ERS	-6.077793 (0.000)	-8.718581 (0.000)	-6.055471 (0.000)	-23.61335 (0.000)	I(0)
FDS	-1.657700 (0.759)	-8.522376 (0.000)	-1.552468 (0.801)	-8.570572 (0.000)	I(1)
DSS	-0.703299 (0.968)	-8.770685 (0.000)	-2.894040 (0.171)	-21.66175 (0.000)	I(1)
CAS	-3.930123 (0.016)	-9.167960 (0.000)	-3.930123 (0.016)	-25.17092 (0.000)	I(0)
ILS	-3.428403 (0.056)	-7.678555 (0.000)	-3.428403 (0.056)	-9.728718 (0.000)	I(1)

Note: The Schwarz Information Criterion was used to determine the lag length for ADF test, while in PP unit root test; Newey-West Barlett Kernel was utilized to determine the bandwidths.

Bounds Testing for Cointegration

Before continuing with the cointegration test, this study conducted the VAR Model to select the optimum lag order. According to the Akaike Information Criterion (AIC), the optimal lag suggested is 4, as shown in Table 4.

Table 4. VAR Model for Optimal Lag Selection (SUK, ERS, FDS, DSS, CAS and ILS)

Lag	LR	FPE	AIC	SC	HQ
0	NA	63.4245	21.17707	21.41559*	21.26642*
1	56.42128	72.43009	21.29559	22.96522	21.92104
2	50.11019	82.26361	21.34232	24.44306	22.50387
3	44.06236	95.88147	21.27559	25.80744	22.97325
4	64.07458*	34.79885*	19.78964*	25.7526	22.0234

Table 5 presents the results of the bound test of the ARDL specification. The results indicate that the calculated F-statistic is greater than the upper bound, I(1) bound of the 5% level of significance. This suggests that there is an existence of cointegration between the identified series. Subsequently, this study estimated the long-run relationship between the *Sukuk* outstanding and the financial risk measures based on the AIC criterion in determining the optimal lag value.

Table 5. Results of the Bound Test for Cointegration Relationship

Estimated Model	F_{SUK} (SUK / ERS, FDS, DSS, CAS, ILS)		
Optimal Lag Length (AIC)	(1,4,4,4,4)		
F-stat (Bound Test)	6.0223		
Critical Values	1%	5%	10%
Lower Bounds I(0)	3.41	2.62	2.26
Upper Bounds I(1)	4.68	3.79	3.35
R-squared	0.7931		
Adj. R-squared	0.5939		
DW	2.214		
F-stat	3.9820 (0.000)		

Note: The ARDL model with 1 lag of dependent variable and 4 lags of each independent variable results in a conclusive model that show the existence of long-run relationship between the *Sukuk* market development and financial risk factors at 5% significance level.

The short- and long-run estimations on the relationship between financial risks factors with *Sukuk* market development variable are presented in Table 6. The first factor that has a significant relationship with the size of *Sukuk* issuance is the exchange rate changes (ERS). The exchange rate has been identified in Mishkin (1995) as one of the channels that is used as the monetary policy transmission mechanisms. Theoretically, exchange rates are considered as one of the key factors affecting *Sukuk* market as it can cause

changes to aggregate supply and demand, which consequently determine the national output and price level. A decrease in domestic currency value against dollar (USD) will cause the domestic goods relatively cheaper compared to products in the foreign markets. Results obtained in this study provide clearer evidence about significant negative impacts of ERS increase towards the domestic *Sukuk* issuance in Malaysia. Lower ERS value indicates appreciating Ringgit, while higher ERS value indicates depreciating Ringgit against USD. The results from this study suggest that higher ERS value (depreciating value of Ringgit) encourages greater global *Sukuk* issuance (denominated in USD) which is in line with the findings obtained by Ahmad (2016). Besides that, the changes in domestic currency values (as represented by ERS variable), is seen as a proxy for risk and may affect the value of assets attached to the *Sukuk* issued. When Ringgit value becomes unattractive relative to USD it then caused the Malaysia global *Sukuk* denominated in USD to become more attractive, the global *Sukuk* portfolio increases and finally caused an increase in aggregate output. Increase in aggregate output will give positive impact on firm value and attracts more firms to issue more *Sukuk* due to its favorable firm valuation. The positive relationship running from the exchange rate changes to the *Sukuk* market development is found in the previous year's second and third quarter. This finding implies that Malaysia's global *Sukuk* also was also supported by strengthening Ringgit exchange rate stability. This finding is in line with previous research conducted by Suriani et al. (2021). They found a significant unidirectional causality moving from exchange rate to Indonesia's *Sukuk* market.

This study also discovered a significant negative impact of debt service stability (DSS) on Malaysia *Sukuk* market development. Unlike the evidence found in Boukhatem (2022) who studied on *Sukuk* market development in Saudi Arabia, *Sukuk* issuance in Malaysia market is not found to increases in size as the debt service ratio increases. Evidence found in this research is aligned with past findings that show no evidence to support the Pecking Order Theory in relation to *Sukuk* issuance (Asmat et al., 2014; Nagano, 2016; Imene, 2020). According to Pecking Order Theory, firms will issue additional debt to raise fund only when they have insufficient internal financing resources. In the context of this research, it is expected that firms with to issue *Sukuk* when they have strong financial health (i.e. higher ability to service debt). The negative sign of DSS coefficients in Table 6 imply that *Sukuk* issuance in Malaysia is not positively influenced by the issuers' ability to pay back the outstanding debt. The increasing size of *Sukuk* issuance despite of lower debt service stability could be explained by the unique benefits of religiosity and Islamic CSR development offered in *Sukuk* investment.

The results for foreign debt stability (FDS), current account stability (CAS), and international liquidity stability (ILS) are found to be significant for lagged variables. One variable that shows a positive and significant relationship between its lagged variable with Malaysia *Sukuk* market development is ILS. The ILS variable was measured using number of months of imports that can be covered with foreign exchange reserves. Result shows that greater international liquidity stability in previous year's second and third quarter will result in higher Malaysia global *Sukuk* issuance. However, in the long-run, the sign of the coefficients of the ILS variable is negative implying that higher international liquidity stability does not always lead to higher

Sukuk issuance. Countries with higher foreign reserves may be able to issue *Sukuk* with lower yield spread (Min, 1998) and therefore may have issue to attract more foreign investors to invest. Thus, lesser *Sukuk* are being issued when this condition arise in the long-run. On the other hand, FDS and CAS indexes negatively affect the Malaysia *Sukuk* market development. Finding on CAS is aligned with the relationship obtained for DSS variable that shows the increase issuers' earnings does not necessarily results in higher *Sukuk* issuance. In addition, findings for FDS variable show that the higher the foreign debt level outstanding in the previous year's second and fourth quarter, the lower the *Sukuk* issuance level. The possible reason for this result is the scopes for promoting default risk in *Sukuk* (Othman and Kamarudzaman, 2012). Not all *Sukuk* are asset-backed in their real nature (Al-Sayed, 2013). Even though *Sukuk* have been well-marketed as an interest free investment instruments, but it does not mean that there is no possibility of default risk. This could be explained by the need for Sukuk to undergo a credit rating assessment of its future payment prospects (Zakaria et al., 2012).

The coefficient of the error correction term, ECT(-1), is highly significant at 1% level and carries a negative sign. This result highlighted the existence of a cointegrating relationship among the underlying variables. The -0.8978 coefficient of the ECT (-1) variable suggests that, on average, 89.78% of the deviation from the equilibrium level will be corrected in the next quarter. In other words, it takes approximately 3 months (i.e. one quarter) to restore the long-run equilibrium.

Table 6. Short- and Long-Run Estimates

Variable	Coeff.	t-stat	Prob.
Short-Run Coefficients (Dependent Variable: ΔSUK)			
ΔSUK(-1)	-0.0274	-0.1629	0.8720
ΔERS	-0.0576**	-2.4314	0.0229
ΔERS(-1)	-0.0402*	-1.7221	0.0979
ΔERS(-2)	0.0416**	2.0823	0.0481
ΔERS(-3)	0.0608***	3.0723	0.0052
ΔERS(-4)	0.0173	0.7441	0.4640
ΔFDS	0.0135	1.3395	0.1929
ΔFDS(-1)	0.0012	0.1125	0.9113
ΔFDS(-2)	-0.0309***	-2.9473	0.0070
ΔFDS(-3)	-0.0107	-0.9464	0.3534
ΔFDS(-4)	-0.0425**	-2.4775	0.0207
ΔDSS	-0.0324**	-2.6545	0.0139
ΔDSS(-1)	-0.0324**	-2.1417	0.0426
ΔDSS(-2)	0.0013	0.0792	0.9375
ΔDSS(-3)	-0.0114	-0.6806	0.5027
ΔDSS(-4)	-0.0228	-1.4860	0.1503
ΔCAS	-0.2469	-1.4623	0.1566
ΔCAS(-1)	0.4056**	2.1686	0.0403
ΔCAS(-2)	-0.1954	-0.9350	0.3591
ΔCAS(-3)	-0.3316*	-1.7460	0.0936
ΔCAS(-4)	-0.1845	-1.0860	0.2883
ΔILS	-0.1332	-1.1686	0.2540
ΔILS(-1)	-0.0006	-0.0063	0.9950
ΔILS(-2)	0.4317***	3.9853	0.0005
ΔILS(-3)	0.4134***	2.9581	0.0069
ΔILS(-4)	0.2325	1.3410	0.1925
Constant	0.1712***	3.0966	0.0049
ECT(-1)	-0.8978***	-4.4303	0.0002
F-statistic	7.9398		
R-squared	0.6426		
DW	2.0368		
Long-Run Coefficients (Dependent Variable: SUK)			
ERS	0.0248	0.4202	0.6777
FDS	0.0104	1.0518	0.3022
DSS	-0.0189	-0.7558	0.4563
CAS	-0.6652	-1.5404	0.1351
ILS	-0.2502**	-2.1064	0.0446
Constant	11.108***	12.3857	0.0000

Note: *,**, and *** represent significance at 1%, 5% and 10% level, respectively
The optimal of lag used for SUK variable was selected based on the model which passes the four diagnostic checks used in this study.

Since all the series are stationary at first difference and the error term is stationary at level, it means that there is a cointegration or long run relationship between the variables. From the short-run coefficients findings, it

can be seen that the short-run performance of Malaysia's *Sukuk* market is significantly affected by the previous quarter's *Sukuk* market performance. On the other hand, the results of long-run estimates appear to indicate that foreign debt stability has a long-run relationship with Malaysia *Sukuk* market development. The coefficient of error correction term, ECT (-1), is highly significant at 1% level, indicating the existence of a cointegrating relationship among the underlying variables. The error correction term coefficient of -0.469 implies that, on average, 46.9% of the deviation from the equilibrium level will be corrected in the next quarter. In other words, it takes approximately two-quarters to restore the long-term equilibrium.

Diagnostic Tests

Multiple diagnostic tests results of selected model are presented in Table 7, which is comprised of the results from the Breusch-Pagan test for heteroscedasticity, Breusch-Godfrey (serial autocorrelation LM test), Jarque-Bera normality test, and Ramsey RESET test for functional form specification. The results show that the model passes the diagnostic checks, indicating that the residuals are independent, homoscedastic, normally distributed, and non-functionally mis-specified.

Table 7. Diagnostic Tests

Specification	F-statistics	Prob.
Breusch-Pagan (Heteroscedasticity)	0.6796	0.8360
Breusch-Godfrey (Serial Correlation LM test)	1.5872	0.2114
Jarque-Bera (Normality)	0.4906	0.7824
Ramsey Reset Test	2.2882	0.1424

In addition, both CUSUM and CUSUM squared plots are also presented to confirm the stability of the ARDL estimated model at a 5% significance level since the CUSUM and CUSUMSQ lines are within the boundaries (as shown in Figure 1 and Figure 2).

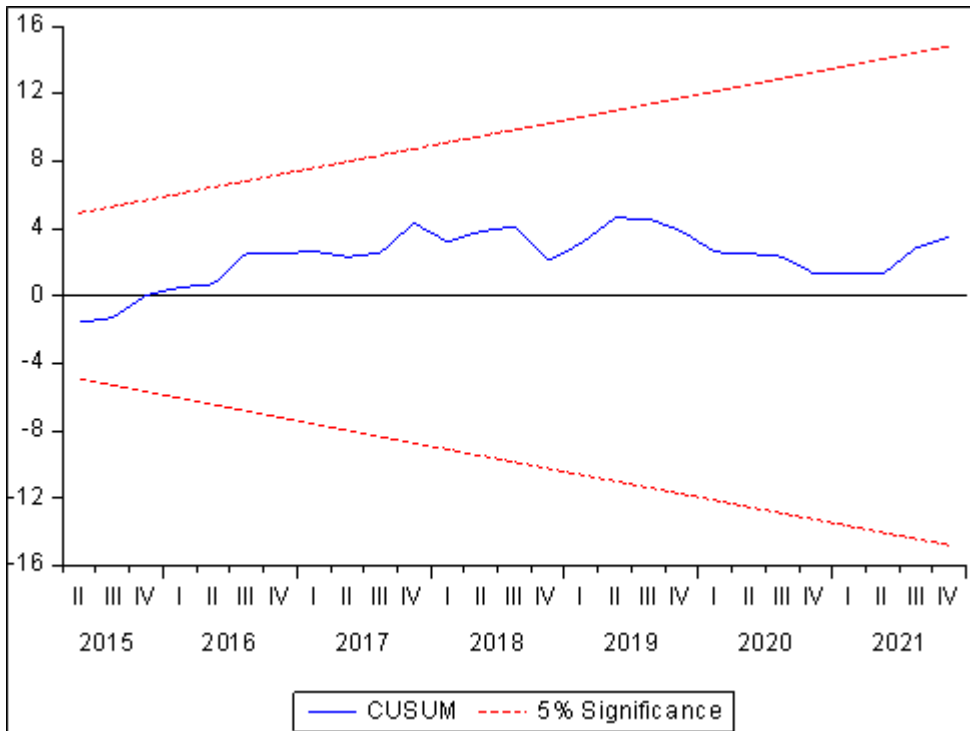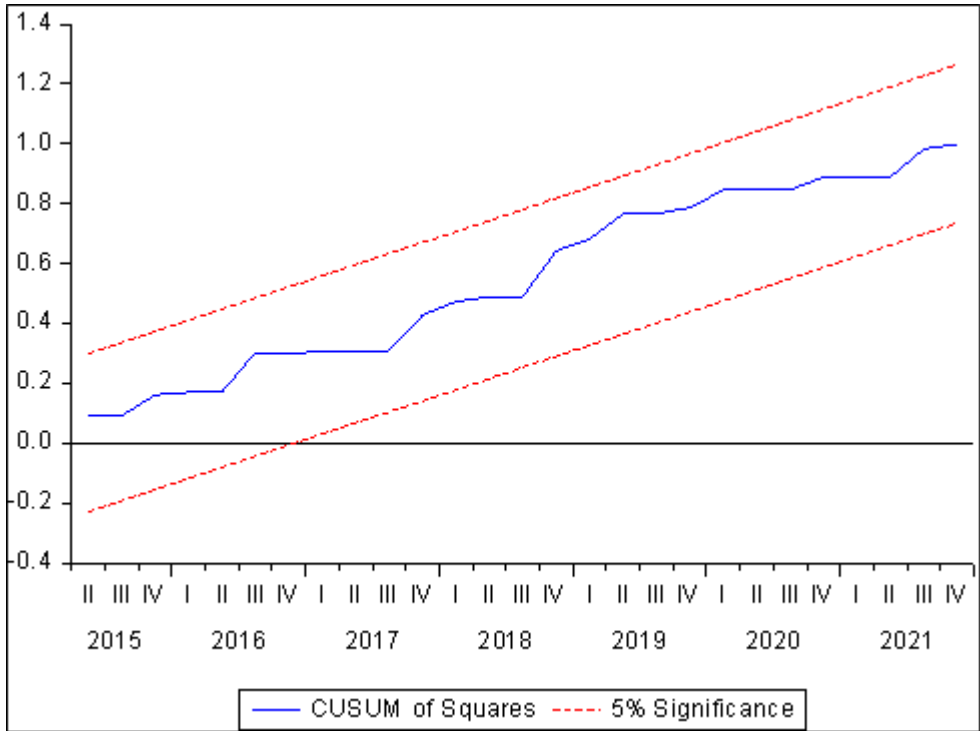**Figure 1.** CUSUM Long Run Analysis Stability Test

Figure 2. CUSUMSQ Long Run Analysis Stability Test

Conclusion

Sukuk constitutes a valuable financial instrument for changing the world for the better. The unique properties of *Sukuk* are enhanced with greater attention given to various social responsibility objectives, such as curbing the harmful effects of climate change. In addition, innovations in *Sukuk* retailing via digital channels could also automate the issuance of *Sukuk* and lead to increased issuance with the emergence of retail transactions as opposed to institutional focus.

Although there has been a growing importance of Malaysia *Sukuk* issuance in global market since year 2005, the academic literature focusing

on the determinants of *Sukuk* market development is still under-researched. This research contributes to the *Sukuk* literature in exploring the impact of financial risk (stability) factors on the country-level *Sukuk* market development. Evidence obtained from this study provides more specific reasoning behind the higher premium required in buying *Sukuk* relative to conventional bonds. From authors' knowledge, this is the first study analyzing the impacts of financial risk components on *Sukuk* market development in Malaysia, one of the leaders in *Sukuk* issuance. Results from this study show two main findings. There are short-run relationships between exchange rate stability, foreign debt stability, debt service stability, current account stability and international liquidity stability with *Sukuk* market development in Malaysia market. Secondly, the long-run *Sukuk* market development was found to be significantly influenced by international liquidity stability factor.

These findings may assist stakeholders in focusing their attention on more specific factors in managing the financial risk aspects of *Sukuk* in order to provide more market stability and attract more investors to hold *Sukuk* securities. Future research on additional financial risk components such as sovereign, political, and corporate risks may provide a better point of view on how to design more well-rounded policies to further stimulate *Sukuk* market development.

References

1. Ab Majid, H., Shahimi, S., & Abdullah, M. H. S. B. (2011, December). Sukuk defaults and its implication: a case study of Malaysian capital market [Paper presentation]. 8th International Conference on Islamic Economics and Finance, Qatar.

2. Ahmad, W. (2016). Sukuk and conventional bond issuance [Paper presentation]. Regional Conference on Science, Technology and Social Sciences (RCSTSS 2014). Springer, Singapore.

3. Al Sayed, O. (2013). Sukuk risk: analysis and management. European Journal of Applied Social Sciences Research, 1(3), 67–76.

4. Al-raeai, A. M., Zainol, Z., & Abdul Rahim, A. K. (2018). The role of macroeconomic factors on Sukuk market development of gulf cooperation council (GCC) countries. International Journal of Economics and Financial Issues, 8(3), 333-339.

5. Al-raeai, A. M., Zainol, Z., & Abdul Rahim, A. K. (2019). The influence of macroeconomic factors and political risk on the sukuk market development in selected GCC countries: A panel data analysis. Jurnal Ekonomi Malaysia, 53(2), 199-211.

6. Alsaeed, K. (2012). Sukuk issuance in Saudi Arabia: Recent trends and positive expectations, Doctoral Thesis, Durham University.

7. Al-Sayed, O. (2013). Sukuk risk: Analysis and management. European Journal of Applied Social Sciences Research, 1(3), 67-76.

8. Alswaidan, M. W., Daynes, A., & Pasgas, P. (2017). Understanding and evaluation of risk in Sukuk structures. Journal of Islamic Accounting and Business Research, 8(4), 389–405.

9. Aman, A. U., Naim, A. M., & Isa, M. Y. (2019). What determines Sukuk market development? New theoretical insights. Global Review of Islamic Economics and Business, 7(1), 021-027.

10. Aman, A., Naim, A. M., Isa, M. Y., & Ali, S. E. A. (2021). Factors affecting Sukuk market development: empirical evidence from Sukuk issuing economies. International Journal of Islamic and Middle Eastern Finance and Management.

11. Azmat, S., Skully, M., & Brown, K. (2014). Issuer's choice of Islamic bond type. Pacific-Basin Finance Journal, 28, 122-135.

12. Basyariah, N., Kusuma, H., & Qizam, I. (2021). Determinants of Sukuk market development: macroeconomic stability and institutional approach. The Journal of Asian Finance, Economics, and Business, 8(2), 201-211.

13. Bhattacharyay, B. N. (2013). Determinants of bond market development in Asia. Journal of Asian Economics, 24, 124-137.

14. Boukhatem, J. (2022). How does financial risk affect Sukuk market development? Empirical evidence from ARDL approach. Heliyon, 8(5), 1-7.

15. Cakir, S., & Raei, F. (2007). Sukuk vs. Eurobonds: Is there a difference in value-at-risk?. Eurobonds: Is There a Difference in Value-at-Risk.

16. Dana, L. P., Salamzadeh, A., Hadizadeh, M., Heydari, G., & Shamsoddin, S. (2022). Urban Entrepreneurship and Sustainable Businesses in Smart Cities: Exploring the Role of Digital Technologies. Sustainable Technology and Entrepreneurship, 100016.

17. Dana, L. P., Salamzadeh, A., Mortazavi, S., & Hadizadeh, M. (2022). Investigating the impact of international markets and new digital technologies on business innovation in emerging markets. Sustainability, 14(2), 983.

18. Dana, L. P., Salamzadeh, A., Mortazavi, S., Hadizadeh, M., & Zolfaghari, M. (2022). Strategic futures studies and entrepreneurial resiliency: a focus on digital technology trends and emerging markets. Tec Empresarial, 16(1), 87-100.

19. Dana, L. P., Tajpour, M., Salamzadeh, A., Hosseini, E., & Zolfaghari, M. (2021). The impact of entrepreneurial education on technology-based enterprises development: The mediating role of motivation. Administrative Sciences, 11(4), 105.

20. De Lorenzo, S.Y.T. (2007). Sharīʿah compliance risk. HeinOnline, Vol. 7, pp. 397-408.

21. Ebrahimi, P., Salamzadeh, A., Soleimani, M., Khansari, S. M., Zarea, H., & Fekete-Farkas, M. (2022). Startups and Consumer Purchase Behavior: Application of Support Vector Machine Algorithm. Big Data and Cognitive Computing, 6(2), 34.

22. El Shazly, M. R., & Tripathy, P. (2013). Sukuk structures, profiles and risks. Paper of Columbia College, 1–18.

23. Ependi, H., & Thamrin, H. (2020). The effect of macroeconomic factors on the number of corporate Sukuk offers in Indonesia. Dinasti International Journal of economics, Finance & Accounting, 1(4), 2721-1518.

24. Hameed, N. S. S., Salamzadeh, Y., Rahim, N. F. A., & Salamzadeh, A. (2021). The impact of business process reengineering on organizational performance during the coronavirus pandemic: moderating role of strategic thinking. foresight.

25. Hasan, R., Ahmad, A. U. F., & Parveen, T. (2019). Sukuk risks: A structured review of theoretical research. Journal of Islamic Accounting and Business Research, 10(1), 35–49.

26. Hosseini, E., Ardekani, S. S., Sabokro, M., & Salamzadeh, A. (2022). The study of knowledge employee voice among the knowledge-based companies: the case of an emerging economy. Revista de Gestão.

27. Imene, I. G. (2020). The determinants of Sukuk issuance in GCC countries. Islamic Economic Studies, 28(1).

28. Jabeen, Z. & Javed, M. (2007). sukuk structures: an Analysis of Risk Reward Sharing and Wealth Circulation. The Pakistan Development Review, Vol. 46 No. 4, pp. 405-419.

29. Jobst, A.A. (2007). The economics of Islamic finance and securitization. International Monetary Fund, Vol. 07 No. 1, pp. 1-12.

30. Khan, T. & Ahmed, H. (2001). Risk management: An Analysis of Issues in the Islamic financial industry. Occasional Paper No. 5, Islamic Research and Training Institute, Islamic Development Bank, Jeddah.

31. Kowalewski, O., & Pisany, P. (2019). What drove the growth of the corporate bond markets in Asia?. Research in International Business and Finance, 48, 365-380.

32. Latham, & Watkins. (2015). The Sukuk handbook: A guide to structuring Sukuk (2nd ed.). www.lw.com/thoughtLeadership/

33. Min, H. G. (1998). Determinants of emerging market bond spread: do economic fundamentals matter? (Vol. 1899). World Bank Publications.

34. Mishkin, F. S. (1995). Symposium on the monetary transmission mechanism. Journal of Economic perspectives, 9(4), 3-10.

35. Muhammad, A., & Junaid, H. (2012). Islamic capital market: Sukuk and its risk management. LAP LAMBERT Academic Publishing.

36. Nagano, M. (2016). Who issues Sukuk and when?: An analysis of the determinants of Islamic bond issuance. Review of Financial Economics, 31, 45-55.

37. Nanaeva, Z. K. (2010). How risky sukuk are: comparative analysis of risks associated with sukuk and conventional bonds [Doctoral dissertation, The British University in Dubai (BUiD)].

38. New Straits Times. (2021, April 22). Overwhelming response for Malaysia's world first sovereign dollar sustainability Sukuk

39. Noor, N. M., Shahimi, S., & dan Pengurusan, F. E. (2013). Credit risk management for Sukuk: A case study of debt based Sukuk. Prosiding PERKEM viii, jilid, 3, 1259-1271.

40. Othman, Z., & Kamarudzaman, A. S. (2012). The great Syariah debate. RAM Bulletin: Sukuk Focus.

41. Pesaran, H. M., & Shin, Y. (1995). Long-run structural modelling (No. 9419). Faculty of Economics, University of Cambridge.

42. Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. Journal of the American statistical Association, 94(446), 621-634.

43. Pirgaip, B., Arslan-Ayaydin, Ö., & Karan, M. B. (2021). Do Sukuk provide diversification benefits to conventional bond investors? Evidence from Turkey. Global Finance Journal, 50, 100533.

44. Rahman, M. M., Tabash, M. I., Salamzadeh, A., Abduli, S., & Rahaman, M. S. (2022). Sampling techniques (probability) for quantitative social science researchers: a conceptual guidelines with examples. Seeu Review, 17(1), 42-51.

45. Rauf, A. L. A., & bt Ibrahim, Y. (2014). A sectorial analysis of Sukuk market based on determinants of risk and return performances. European Journal of Accounting Auditing and Finance Research, 2(2), 139-155.

46. Said, A. (2011). Does the Use of Sukuk (Islamic bonds) impact Islamic banks performance? A case study of relative performance during 2007-2009. Middle Eastern Finance and Economics, Vol. 12.

47. Said, A., & Grassa, R. (2013). The determinants of Sukuk market development: Does macroeconomic factors influence the construction of certain structure of Sukuk?. Journal of Applied Finance & Banking, 3(5), 251-267.

48. Sairally, B. S. and Abdullah, M. (2017). Sukuk Principles and Practices. ISRA

49. Salamzadeh, A., & Markovic, M. R. (2018). Shortening the learning curve of media start-ups in accelerators: Case of a developing country. In Evaluating media richness in organizational learning (pp. 36-48). IGI Global.

50. Salamzadeh, A., Ebrahimi, P., Soleimani, M., & Fekete-Farkas, M. (2022). Grocery Apps and Consumer Purchase Behavior: Application of Gaussian Mixture Model and Multi-Layer Perceptron Algorithm. Journal of Risk and Financial Management, 15(10), 424.

51. Smaoui, H. & Khawaja, M. (2017). The determinants of Sukuk market development. Emerging Markets Finance and Trade, 53(7), 1501-1518.

52. Smaoui, H., Mimouni, K., & Temimi, A. (2017). Sukuk, banking system, and financial markets: Rivals or complements?. Economics Letters, 161, 62-65.

53. Soleimani, M., Dana, L. P., Salamzadeh, A., Bouzari, P., & Ebrahimi, P. (2022). The effect of internal branding on organisational financial performance and brand loyalty: mediating role of psychological empowerment. Journal of Asian Business and Economic Studies.

54. Suciningtias, S. A. (2019). Macroeconomic impacts on sukuk performance in indonesia: co-integration and Vector Error Correction Model approach. Journal of Islamic Finance (Special Issue), 117-130.

55. Sundararajan, V. (2007). Risk measurement and disclosure in Islamic finance and the implications of profit sharing investment accounts. Islamic Economics and Finance, 121.

56. Suriani, S., Majid, M. S. A., Masbar, R., Wahid, N. A., & Ismail, A. G. (2021). Sukuk and monetary policy transmission in Indonesia: the role of asset price and exchange rate channels. Journal of Islamic Accounting and Business Research.

57. Tariq, A. (2004), Managing financial risks of Sukuk structures, Loughborough University, Loughborough.

58. Tariq, A. A., & Dar, H. (2007). Risks of Sukuk structures: Implications for resource mobilization. Thunderbird International Business Review, 49(2), 203-223.

59. Teplova, T. V., & Sokolova, T. V. (2018). Market development determinants for corporate bonds in national currencies: Emerging markets review. Journal of East-West Business, 24(1), 50-80.

60. Wilson, R. (2009). The development of Islamic finance in the GCC. (Working Paper). Kuwait Programme on Development, Governance and Globalisation in the Gulf States.

61. Yakubu, B. N., Salamzadeh, A., Bouzari, P., Ebrahimi, P., & Fekete-Farkas, M. (2022). Identifying the key factors of sustainable entrepreneurship in the Nigerian food industry: The role of media availability. Entrepreneurial Business and Economics Review, 10(2), 147-162.

62. Zakaria, N. B., Isa, M. A. M., & Abidin, R. A. Z. (2012). The construct of Sukuk, rating and default risk. Procedia-Social and Behavioral Sciences, 65, 662-667.

Siti Nurhidayah Mohd Roslen obtained her PhD in Finance from Putra Business School, Universiti Putra Malaysia. She is a senior lecturer in Finance at the Universiti Teknologi Mara (UiTM). She did her first degree and master studies in Finance at the Faculty of Economics and Management, Universiti Putra Malaysia. She is one of the members of the Malaysian Finance Association (MFA). She has teaching experience of more than 10 years in the areas of finance in both public and private universities in Malaysia. Her research interests include green bonds, Sukuk, corporate finance, and investment and she has become the corresponding author and co-authored a number of research papers in the same areas.

Azlul Kalilah Zaghlol is a Senior Lecturer in Universiti Teknologi MARA. She earned both her Master of Business Administration in Finance (2005), and Doctor of Philosophy in Business Management (2017) from Universiti Teknologi MARA Malaysia. Prior to that, she was working with the Economics Department in the Central Bank of Malaysia. She has a recent article in the Journal of Global Business and Management Research (GBMR, 2021) entitled The Nexus between FinTech and Financial Development in Malaysia.

Muhammad Ridzuan Abdul Aziz, DBA is a Senior Lecturer in Islamic Banking at the Faculty of Business and Management, Universiti Teknologi Mara (UiTM). He obtained a Doctor of Business Administration (a major in Finance and a minor in Marketing) from Universiti Kebangsaan Malaysia, and a Master of Science (Banking) from Universiti Utara Malaysia. He also holds several professional qualifications including the Professional Certificate in Islamic Finance (INCEIF University), the Islamic Financial Planner (IBFIM), the Certified Qualification in Islamic Finance (Banking) (IBFIM), the Intermediate Qualification in Islamic Finance (Banking) (IBFIM), and the Associate Qualification in Islamic Finance (IBFIM). His research interests are in Islamic wealth management, Islamic financial planning, Islamic banking, and Islamic finance. He is a lifetime member of The Malaysian Association of Finance (MFA).