Yield Spread Determinants of *Sukuk* and Conventional Bonds

Abstract

Despite increased economic turmoil over the past few years, the Islamic financial sector including sukuk has shown tremendous growth and stability. This study examines the yield spread determinants of sukuk and conventional bonds. We comparatively assess the effects of firm- and industry-specific variables, bond characteristics, and macroeconomic conditions on the yield. Our sample data features bonds and sukuk of different maturities issued by 58 publicly traded (listed) firms in Malaysia. For sukuk, primary determinants are the firm-specific indicators which indicate lower yield spreads. Moreover, sukuk spreads do not widen with equity volatility, making them less risky than conventional bonds. For conventional bonds, both firm-level and bond-specific characteristics significantly affect yield spreads. Higher financial leverage with shorter maturity is associated with low yields and low spreads. Findings in this study present new insights and important policy implications for investors trading in and regulators governing sukuk and conventional bonds.

Keywords: s*ukuk*; Islamic bonds; conventional bonds; yield spreads.

Classification Codes: E44, G15, N20, F30

1. Introduction

For private companies, the relative cost of finance is a key driver of economic growth, while corporate bond yield spreads (i.e., the difference between corporate *sukuk*/bond yields and the risk-free rate of each maturity) are associated with the general economic climate (see Cavallo and Valenzuela, 2010). Further, risk premia, which inversely vary with the readiness to incur risk, are reflected in corporate yield spreads (see Gebka et al., 2018; Liu et al., 2009; Collin-Dufresne et al., 2001). For instance, the yield spreads of corporate bonds widen and tighten because of various reasons, such as the changing risk tolerance of market participants, the supply and demand in a corporate bond market, and so forth.

When investors become more reluctant to take risks, the risk premium can increase, and vice versa. Meanwhile, corporate yield spreads tend to change in the same direction, and their variations are highly correlated. Thus, studying which factors affect such spreads is important for a wide range of participants in the financial market. Specifically, it is not only helpful for bond issuers to improve pricing (since it enhances efficiency in the market for corporate bonds) but also for policymakers enacting prudential measures to control credit risk in the bond market. As for the behavior of corporate yield spreads, it has received significant attention from practitioners, financial regulators, and researchers. However, several research questions remain. To what extent are corporate and government yields associated with default risk and bond-specific characteristics? Which macroeconomic factors are associated with variations in corporate yield spreads?

Adding to the general interest is the rapid growth of Islamic banking and finance. Islamic finance assets have shown a compound annual growth rate (CAGR) of 4% since 2012, with capital market assets as the fastest-growing assets. Regarding *sukuk*, it is the second fastest-growing asset class, with a CAGR of 7% since 2012 (Abdelsalam et al., 2020). Many salient features of *sukuk* (e.g., time to maturity, the coupon rate, trades on the normal yield price relationships, etc.) are identical to those of conventional bonds (see Wilson, 2008). Yet, there are controversies and myths regarding the differences between conventional bonds and *sukuk*. Although empirical studies have indicated the differences between their respective yields, the relevant factors have been neglected (Safari and Ariff, 2014). Moreover, these studies not only failed to provide a wider range of determinants of yield movement (causing the issuer to default on payment), but they also failed to compare the underlying factors affecting *sukuk* yields with that of conventional bonds. It is

important to note that *sukuk* have an innovative and flexible structure compliant to the Sharia principles while avoiding the *riba*, *gharar*, *maisir*, and other prohibited elements. Consequently, *sukuk* have a different pattern of yield spreads as opposed to conventional bonds (Saad et al., 2020).

By analyzing the yield spreads of securities, the following research questions are addressed: (1) Are there any significant variations in the yield spreads of securities relevant to understanding the determinants of relative credit risk?; and (2) Are *sukuk* merely a camouflaged version of conventional bonds? Overall, the focus is upon firm-specific variables, industry-specific variables, bond characteristics, and macroeconomic conditions. The sample in this study consists of 206 Malaysian bonds (62 *sukuk* and 144 conventional bonds) issued by 58 publicly traded (listed) firms from 2002 to 2013.[1] For the purpose of this study, the Malaysian market offers an interesting setting for several reasons. First, the Malaysian market is the most active in terms of *sukuk* issuances. Second, Malaysian *sukuk* accounts for 49% of the total outstanding *sukuk* (see ICD Thomson Reuters, 2015). Finally, it represents approximately half of the total stock of Malay corporate bonds (see Jobst et al., 2008).[2]

[Insert Figures 1a and 1b here]

According to our findings, when comparing the variances in the spread of conventional bonds and *sukuk*, the explanatory power of different determinants is evident. The analysis of the entire sample also indicates that for *sukuk*, firm-level characteristics, such as size, profitability, and interest coverage ratios, are closely associated with lower *sukuk* spreads. Meanwhile, for conventional bonds, both leverage and volatility are associated with yield spreads. Unlike conventional bonds, *sukuk* spreads do not widen with equity volatility. In short, *sukuk* appear to be less risky than conventional bonds. Additionally, one bond-related characteristic (e.g., the remaining time to

[1] Our preliminary analysis showed that for a long period of time, *sukuk* issues in the Middle East and other Muslim populated regions were minimal, which could have led to data anomalies in our analysis. Thus, we focused on the Malaysian bond market. Additionally, we were unable to obtain a similar data frequency for 3-, 5-, 7-, and 10-year maturity *sukuk* and bonds in the same time period for other countries.

[2] The issuance of bonds in Malaysia has faced strong demand from all investors. The adoption of a special provision for non-profit trusts, similar to the English law that facilitates the establishment of special purpose vehicles (SPVs) (which are required to hold the title of underlying securitized assets and administering payments to investors), are among the steps taken by the Malaysian authorities to stimulate this growth.

maturity) shows a significant negative relationship for both securities. However, the interaction between debt and the remaining time to maturity is only significant for conventional bonds. The positive coefficient of the interaction term for both securities also indicates that firms with high leverage do not benefit from long-maturity bonds. Furthermore, although the interaction between debt and the remaining time to maturity is significant for conventional bond spreads, no similar pattern exists for *sukuk*.

These results contribute to the literature in the following ways. First, it uniquely implements an empirical methodology that utilizes panel data techniques to reveal the determinants of corporate risk while mitigating cross-sector heterogeneity in the sample. Second, there have been relatively few comparisons of the yield spreads of bonds and *sukuk*. Hence, with its focus on the different maturities and bonds issued by the 58 Malaysian companies, comparisons can be drawn from the behaviors in the United States (U.S.) and European bond markets. Third, this study extends the work of Hassan et al. (2018) and Maghyereh and Awartani (2016). While Hassan et al. (2018) highlighted the relevance of market-wide factors, Maghyereh and Awartani (2016) examined the returns and volatility spillovers of *sukuk* and global corporate bonds. Fourth, in showing that *sukuk* yield spreads are less associated with macroeconomic factors than conventional bonds, we extend the research of Ramasamy et al. (2011). Finally, our findings suggest that Islamic equities and *sukuk* provide a "cushion" against risk and instability, thus confirming the findings of Kenourgios et al. (2016).

The remainder of this study is as follows. The next section includes a literature review, a description of both *sukuk* specifications, and a discussion on the theory underpinning our methodology and econometric framework. Section 3 outlines the hypothesis development, while Section 4 presents the data sample. Section 5 discusses the empirical design and framework, while Section 6 summarizes the results of the panel econometric model, the sensitivity analysis, and the variance decomposition analysis. Finally, Section 7 provides the conclusion.

2. Background

2.1 Related Literature

The growing literature on *sukuk* over the past two decades (e.g., Paltrinieri et al., 2019; Amrani et al., 2017; Zulkhibri, 2015) highlights the increasing importance of investigating the structure of these bonds. Specifically, these studies mainly focused on the growth of *sukuk*, conducted analyses

on the theoretical aspects of *sukuk*, and made comparisons of *sukuk* vis-à-vis conventional bonds. These studies also examined *sukuk* and stock market behaviors. Overall, such literature can be classified into three aspects: (1) Comparing the business models of *sukuk* and bonds; (2) Examining the determinants of the issuance of *sukuk*; and (3) Exploring the stock market perspective of *sukuk* and bonds as well as the linkages between their respective markets. Jobst (2007) was among the first analysts to discuss the legal and economic implications of Sharia compliance for the configuration of *sukuk*. He even predicted a strong demand from both Islamic countries and conventional financial institutions for Sharia-compliant securities.

The finding that *sukuk* brings diversification advantages is consistent with the finding that measured value-at-risk is lower for a portfolio that includes sovereign *sukuk* and Eurobonds, compared to a portfolio containing only the latter (Cakir and Raei, 2007). For a similar comparison of riskiness, the duration and convexity of *sukuk* and conventional bonds was assumed to approximate the value lost or gained in a portfolio (Ramasamy et al., 2011).[3] Their findings also showed that both convexity and duration measures perform better for *sukuk*, as their risk is relatively lower.

Another strand of literature focused on the determinants of *sukuk* issuance. Thus, the choice of this financing tool is accordingly subordinate to normal debt finance but prior to equity issuance. Godlewski et al. (2013) examined the relative risk-reduction advantages of issuing *sukuk* over conventional bonds in the Malaysian market. They found that the stock market is neutral to announcements of bond issues, but it negatively reacts to announcements of *sukuk* issues. They attributed this to excess demand for *sukuk*, while lower-quality debtor companies explained the difference in the stock market reactions as an adverse selection mechanism that favors *sukuk* issuance. Hanifa et al. (2014) compared the use of *sukuk* with that of conventional bonds by firms targeting debt optimization. Based on the issuance of 120 conventional bonds and 80 *sukuk* from 2000 to 2011, they utilized partial adjustment models to reveal the determinants of the firms' debt target ratios as well as the dynamic adjustment behaviors for the *sukuk* issuance and its sub-categories. First, their results showed that the trade-off benefits for *sukuk* issuers differ from those of bond issuers. Second, the issuers of partnership-based *sukuk* and convertible bonds closely follow the pecking-order theory, in which the former is chosen if firms face higher information

[3] Convexity estimates reflect the change in duration when the yield rate changes.

asymmetry costs. Finally, while both exchange-based *sukuk* and straight bond issuers focus on a particular target, firms with higher sales growth tend to prefer the former.

The third strand of literature explored *sukuk* and bonds from the stock market perspective, including the co-movements and linkages between the stock and bond market (Aloui et al., 2015a; Sclip et al., 2016; Maghyereh and Awartani, 2016; Naifar et al., 2016), the co-movement dynamics between *sukuk* and conventional bonds (Hassan et al., 2018), the structural changes in the stock market affecting the bond market (Aloui et al., 2015b), and the interest rate effect on the *sukuk* market (Akhtar et al., 2017). Specifically, Aloui et al. (2015a) investigated the co-movement mechanism between *sukuk* and Islamic stock indices in the Gulf Cooperation Council (GCC) countries. Using time-frequency analysis, they found a strong dependence between the Islamic stock market indices and *sukuk*. They also provided evidence of a strong negative correlation between the Islamic stock market and *sukuk* market. For instance, in the dynamic conditional correlation (DCC), the level of correlation increased because of the contagion effect of a global financial crisis. Additionally, although the degree of co-movement varied across time and frequency, the long-run horizon was dominant. Using the GARCH-DCC model, Sclip et al. (2016) investigated the dynamic linkages between the *sukuk* and conventional markets, providing evidence of a high correlation between the former and the latter. Moreover, they argued that investors can achieve portfolio diversification by investing in *sukuk*, given their lower volatility. However, they also referred to *sukuk* as a "hybrid security" between equity and bonds. Conversely, Maghyereh and Awartani (2016) highlighted the difference between *sukuk* and conventional bonds by investigating the returns and volatility spillovers of *sukuk* and global bonds with equities. They not only identified a different transmission mechanism among both markets but also found that the *sukuk* market has a higher transmission of information from equities. However, the return and volatility diffusion of the *sukuk* market was relatively small and trivial, compared to other financial markets.

Akhtar et al. (2017) investigated the impact of interest rate announcement news on *sukuk*, the conventional bond market, and the Islamic and conventional stock markets. They found that such news has a negligible impact on the *sukuk* market, compared to their conventional counterpart. However, the interest rate news has a greater impact on the Islamic stock market than on the conventional one. In a similar vein to that of Maghyereh and Awartani (2016), Hassan et al. (2018)

investigated the determinants of co-movement dynamics between *sukuk* and conventional bonds. They analyzed the conditional correlations and volatility linkages between the *sukuk* and conventional bond markets and found that *sukuk* and conventional investment-grade bonds have a lower reaction of conditional volatility to market shocks and that *sukuk* returns are much less volatile than U.S. and European investment-grade bonds. However, they found a time-varying, positive, and conditional correlation between *sukuk* returns and leading bond markets, driven by the changing macroeconomic and market conditions. Additionally, they revealed that during recessions, the dynamic correlation between *sukuk* and bond markets tends to increase. Their study is one of the few that not only compares the correlation and volatility of *sukuk* returns with that of U.S. and European bond markets but also highlights the market-wide factors affecting bonds and *sukuk* returns. Moreover, their objectives appear to resonate with the purpose of the present study in that it investigates how the determinants of the returns in both types of securities compare with one another.

A thorough review of the empirical and theoretical studies on *sukuk* shows that there is no study to date which has analyzed and identified the risk premia of conventional bonds and *sukuk*, as measured by yield spreads. Furthermore, none of the prior studies have investigated the dynamic behavior of corporate bond credit spreads in the conventional fixed-income and *sukuk* market. According to Loncarski et al. (2012), this area remains unscathed and warrants key attention as it can help investors and policymakers identify the factors that influence the credit spreads of both types of securities and make informed decisions in choosing *sukuk* over conventional bonds, and vice versa. Therefore, the present study extends the previous research by analyzing the determinants affecting the yield spreads of these two types of securities. It also investigates the relevance of firm- and bond-specific variables as well as the macroeconomic factors in such spreads by focusing on the Malaysian *sukuk* and bond market.

2.1. Stylized Facts of Sukuk

In Islamic finance, three requirements are necessary to comply with Sharia law (Godlewski et al., 2013): (1) The instrument must represent ownership in tangible assets, usufruct, or services from revenue-generating firms; (2) Payments to the investor must accrue from after-tax profits; and (3) The value repaid on maturity must follow the current market price of the asset, not the original amount invested. Table 1 indicates the differences between *sukuk* and conventional bonds. Like

conventional asset-backed securities (ABS), *sukuk* are backed by assets. The difference is that the underlying assets for ABS can be financial assets, such as loans or other receivables, while only real assets may serve as collateral for *sukuk*. By implication, the value of *sukuk* is solely determined by the performance of relevant real assets (AAOIFI, 2008). Meanwhile, *sukuk* prices can vary based on the creditworthiness of the issuer and the market value of the underlying assets (Godlewski et al., 2013). Therefore, *sukuk*, (especially partnership *sukuk* such as *musharkah* and *mudarbah sukuk*) are akin to an equity instrument rather than a debt instrument. As for the yield spreads of *sukuk*, they are determined by firm-level characteristics rather than macroeconomic or *sukuk*-specific characteristics.

[Insert Table 1 here]

The ongoing debate in which the extent to which *sukuk* instruments are closer to conventional debt than equity finance often turns into a distinction between asset-based or asset-backed *sukuk* (see Abdelsalam et al., 2020). With asset-based *sukuk*, the principal is supported by the capital value of the asset, but the returns and repayments are not directly financed from the asset. In substance, asset-based *sukuk* are the same as equity. For asset-backed *sukuk*, the principal as well as the returns and repayments are directly financed from the asset. In this case, as it offers investors neither income nor capital guarantees, there can be no default. Overall, the key difference between asset-based and asset-backed *sukuk* is the concept of true sale. In asset-backed *sukuk*, there is a true sale between the originator and the special purpose vehicle (SPV). Moreover, the assets are owned by the SPV, the returns are derived from the assets, and the asset prices vary over time. It is important to note that the majority of *sukuk* are not asset-backed. (Hayat, 2010).

3. The Determinants of Credit Spreads and Hypothesis Development

The extensive literature on yield spreads falls into three strands. The first strand analyzes the default component, which is assumed to be endogenously determined by the issuer's balance sheet (Longstaff and Schwartz, 1995). The second strand applies a reduced-form model (Jarrow and Turnbull, 1995), in which yield spreads are assumed to be exogenously determined by the default probability and expected recovery rate. The third strand regresses the spreads according to variables, mainly derived from the structural and reduced-form models. These range from macroeconomic conditions and bond-level variables to firm-specific information. Previous

research on these theoretical models (Cavallo and Valenzuela, 2010; Peter and Grandes, 2005) have also indicated that they have difficulties explaining the observed credit spreads for different maturity issuances, especially those with similar firm performance behavior and the observed term structure of credit spreads. However, they do highlight some potential determinants of such spreads.

Thus, we consider the major factors driving credit spreads, from both theoretical and empirical viewpoints, to distinguish between the bond-specific and common factors that affect all corporate bonds and *sukuk*. As these theoretical implications can be empirically tested, we analyzed the effects of the variables in the three different categories on the change in yield spreads.

3.1. Firm Characteristics and Credit Spreads

Firm-level characteristics, such as the size, capitalization ratio, leverage ratio, profitability, and stock volatility, may be more relevant to yield spreads for the quasi-equity nature of *sukuk* than to corporate bonds. For example, if small firms exhibit longer earnings depressions than large firms, then relative size might indicate a negative relationship between size and returns. Conversely, small firms may require larger coverage ratios to achieve the same credit rating as larger firms. In addition, as large firms are better situated to accommodate risk than small firms, the yield spreads may be lower for the former. From their investigation on the impact of investors' expectations of future debt, Flannery et al. (2012) found that expected increases in future leverage can result in higher credit spreads. However, as leverage is limited for Islamic securities, this factor is less likely to affect *sukuk* yield spreads.

Accordingly, we conjecture a positive association between the volatility of a firm's value and credit spreads (see Collin-Dufresne et al., 2001). Moreover, relatively higher asset-value volatility carries a higher probability of a subsequent drop. Thus, the first hypothesis is as follows:

H_{01}: Firm-level characteristics (i.e., the high-interest coverage ratio, the high returns on assets (ROA), and large size) significantly decrease sukuk and bond spreads, while other firm characteristics (capitalization, volatility, and leverage) significantly widen such spreads.

3.2. Bond Characteristics and Credit Spreads

A bond's time-to-maturity, indicating a firm's debt maturity structure, can also explain an important proportion of corporate bond spreads (Valenzuela, 2016). In principle, this most likely holds true for *sukuk*. According to Longstaff et al. (2005), the rationale for using this variable is that there might be maturity-sensitive clientele for conventional corporate bonds.

The economic intuition is that, if both value-volatility and firm-value are high, then as the time to maturity shortens, the leverage or the risk of default (hence, the spread) rises (see Peter et al., 2005). Accordingly, the longer the time to maturity, the more opportunities a firm has to increase earnings and reduce leverage. Moreover, there is relevance with regard to time to maturity, and the interaction between time to maturity and leverage in the yield spreads for both bonds and *sukuk*. Hence, the second hypothesis is as follows:

H_{02}: Conventional corporate bonds and sukuk with longer maturities exhibit higher spreads for firms that are highly leveraged and have high-equity volatility.

3.3. Macroeconomic Conditions and Credit Spreads

Previous research has found that conventional corporate bond yield spreads tend to fluctuate with business cycles. For example, Fama and French (1993) showed that credit spreads widen as economic conditions weaken, while Duffie et al. (2007) indicated that macroeconomic variables tend to be correlated with default rates and yield spread changes. Further, Elton et al. (2001) argued that corporate bond credit spreads may be explained by factors commonly used to model risk premia for common stocks. In related studies, Tang and Yan (2006), David (2008), and Chen et al. (2007) showed how default probability and credit spreads decline as economic growth rises. Calculated as the difference between 10- and 2-year bonds, the slope of the yield curve has also been cited as a predictor of credit spreads (Krishnan et al., 2010). Furthermore, as the future probability of default decreases when the expectation of the future interest rate increases, the credit spread narrows (Collin-Dufresne et al., 2001). Accordingly, our third hypothesis is as follows:

H_{03}: Macroeconomic factors have significant effects with similar magnitudes on the change in yield spreads for both types of bonds.

4. Data and Variable Description

4.1. Data Coverage and Sources

From the Bloomberg Professional database, we drew a sample of 206 bonds (62 *sukuk* and 144 conventional bonds) with different maturities (3-, 5-, 7-, and 10-year), issued by 58 companies across six Malaysian sectors from 2002 to 2013 (see Tables 2(a) and 2(b)). As firm-specific variables are typically reported on a quarterly basis, bond and *sukuk* prices are reported daily. Thus, the latter were transformed into quarterly frequency by computing the corresponding period average.[4] As for the sample selection, it was constrained by data availability and the necessary screening to meet the filter criteria.[5] Finally, balance-sheet level information was extracted from Bursa Malaysia's website, while the Refinitiv Datastream and the International Financial Statistics database of the International Monetary Fund (IMF) were used for the macro data.

[Insert Tables 2(a) and 2(b) here]

4.2. Dependent Variable

The dependent variable was the short form of the yield spread over the benchmark curve. The yield spread on a corporate bond/*sukuk* is defined as the difference between the yield to maturity (YTM) of the corporate bond, minus the YTM of a comparable-maturity, default-free instrument. The default-free instrument used in this study was the Malaysian Government Security (MGSY) benchmark index for 3-, 5-, 7-, and 10-year maturities.

The YTM or gross redemption yield is the most commonly used measure of the return from holding a bond. It is also used as a proxy for measuring the cost of capital (Benzie, 1992; Ariff and Safari,

[4] To minimize the potential impact of outliers, the dependent variables and regressors were winsorized at the 1st and 99th percentiles.
[5] We first excluded Malaysian denominated bonds and *sukuk*, which are exchange-listed and issued in Malaysian ringgit. The motivation was that publicly available financial data (e.g., income statement and balance sheet data) is accessible through Bloomberg or annual company statements. Although some data had limited availability on Bloomberg, we extracted the data from the websites of the companies whose data was not updated on Bloomberg. Next, we limited the sample to fixed-coupon or zero-coupon bonds that are not callable, convertible, putable, or have sinking fund provisions. Likewise, guaranteed bonds and subordinated bonds/*sukuk* were excluded. It should be noted that the prices of guaranteed bonds reflect the credibility of the assurers rather than that of the company itself. Meanwhile, the prices of subordinated bonds vary by the priority precedence of the debt. As the yield spreads of bonds with less than one year to maturity are extremely sensitive, even to minor price changes (see Ericsson and Renault, 2006), these bonds were excluded. The final filter removed bond and *sukuk* issues of less than one year. Unlike sovereign bonds, which have greater liquidity, corporate bonds are traded less frequently. More reliable empirical results are likely from issues of longer duration (Shin and Kim, 2015). For example, a bond/*sukuk* issued at the beginning of 2005 and expiring at the end of 2008 was included in the sample, whereas a bond/*sukuk* issued in the middle of 2013 (and is still outstanding) was excluded. This filter helped us include bonds with more observation points, thus improving the reliability and statistical power of our data set.

2012). It also considers the pattern of coupon payments, the bond's term to maturity, and the capital gain (or loss) over the remaining life of the bond. If we set the internal rate of return (IRR) for a set of cash flows to be the rate that applies from a start-date to an end-date, then we can assume the IRR to be the YTM for these cash flows. Hence, the YTM is equivalent to the IRR of the bond, i.e., the rate that equates the value of the discounted cash flows on the bond to its current price. This calculation assumes that the bond is held until maturity, and consequently, the cash flows to maturity are discounted in the calculation. Liu and Skully (2005) used yield spreads (rather than interest rates) as the risk measurement, as they help overcome the inflation that fluctuates and dynamically changes across industries. According to Saad et al. (2020), as the inflation rate is unpredictable and uncertain, it is prohibited by Muslim investors (Saad et al., 2020). Thus, the following equation is presented:

$$YTM = \frac{C + \frac{F - P}{n}}{\frac{F + P}{2}}$$

where C is the coupon/interest payment, F is the face value, P is the price, and n is the years to maturity. Meanwhile, the spread is given as follows:

$$Spread_{i,t} = YTM_{i,t} - YTMMGS_{i,t}$$

where *i* is the corporate bond/sukuk issued at time *t*, $YTM_{i,t}$ is the yield to maturity of the corporate bond/*sukuk*, and $YTMMGS_{i,t}$ is the yield to maturity of the MGSY of the comparable maturity.

4.3. Explanatory Variables

We divided the determinants (i.e., the independent variables) of the credit spreads into three groups: (1) firm-specific variables; (2) bond characteristics; and (3) macroeconomic variables. Table 3 provides a list of the variables with brief descriptions and the predicted signs.

In this study, the firm-specific variables included: return on assets (ROA), the capitalization ratio, the leverage ratio, the interest coverage ratio, size, and equity volatility. The profitability (ROA) of a firm was captured by the ratio of earnings before interest and taxes (EBIT) to assets. Balasubramanian and Cyree (2012) conjectured that higher ROA is only possible with higher risk-taking, resulting in a higher cost of debt. Hence, the yield spread increases with ROA. Based on

this finding, the variable shows a positive association, indicating that changes in the debt market signal variations in a firm's risk. Meanwhile, a firm's equity-to-total capitalization $(Equity/Capital)$ indicates the portion of its capital structure funded by equity. As for equity holders' risk, it inversely varies with equity-to-total capitalization.

As a firm's leverage ratio is a common distress proxy for explaining the leverage position of a firm, we employed a book value-based classification of firm leverage, defined as long-term debt divided by total assets $(Debt/Assets)$. Additionally, interest coverage was defined by the EBIT to interest expense. This ratio measures a firm's capability to cover its interest payment on its outstanding debt. In this case, the lower the ratio, more the firm is burdened by the interest expense. Thus, as the credit spread increases, the coefficient of this ratio reports a negative association.

Next, we employed *SIZE* as a firm-specific variable to explain the bond spreads. In the present study, *SIZE* was the natural logarithm of the book value of a firm's total assets. Meanwhile, empirical findings elsewhere showed that variables, such as equity market risk factors, affect the credit spread (e.g., Collin-Dufresne et al., 2001; Campbell and Taksler, 2003). Hence, we incorporated the equity volatility of the issuing firm in our model to account for any changes in stock market dynamics that may affect the yield spread. In this regard, any increase in the volatility of a firm's value increases the probability of default, which, in turn, increases the credit spread (Collin-Dufresne et al., 2001). Additionally, equity volatility is the standard deviation of day-to-day logarithmic price changes. As our data included quarterly observations, the quarterly change in the most recent quarter's closing prices was expressed as a percentage.[6]

The bond characteristics variables in this study included time to maturity and the interaction term *time-to-maturity * leverage.* The rationale for including this variable is the presence of maturity-sensitive clientele for corporate bonds (see Longstaff et al., 2005). Meanwhile, the risk of the default varies and depends on the bond's time to maturity and a firm's leverage, while the structure of the credit spreads vary with the leverage of the firm, indicating a strong dependence of the change in time to maturity on leverage. In order to control for this dependence in the simplest way, we included the interaction term *time-to-maturity * leverage* in the linearized estimating equation,

[6] Based on the daily equity price data, quarterly annualized equity volatility was calculated as [Quarterly std. dev {ln (Pt/ Pt-1)}]*[sqrt(4)].

along with time to maturity. In this case, if there are two bonds with the same maturities but different leverage levels, then the bonds with the low leverage levels will result in lower spreads, whereas the bonds with high leverage levels will result in higher spreads.

As for the macroeconomic variables in this study included: the industrial production index (IPI), the consumer price index (CPI), the gross domestic product (GDP) growth rate, and slope (10- and 2-year). The IPI captures the effects of economic conditions on yield spreads, and it is an indicator of the actual production output of businesses integrated into the industrial sector of the economy. For instance, the rate of change in the IPI is negatively related to yield spreads if a rise in economic activity boosts investors' confidence, thus leading to a reduction in the risk premia. Meanwhile, the CPI (as a proxy for inflation) is relevant because of its influence on the risk-free rate and the discount rate agents use to price assets (Amato and Luisi, 2006). According to David (2008), inflation risk compromises the purchasing power of future cash flows. Hence, the higher the inflation rate, higher the yield spread.

Moreover, the GDP is a proxy for economic growth. In an economic downturn, a firm's capacity to meet payment obligations significantly weakens. Based on previous research (e.g., Stock and Watson, 1989; Estrella and Mishkin, 1998), a steepening term structure (i.e., lower short-term interest rates and/or higher long-term rates) portents future growth. Therefore, to measure the slope of the yield curve, we calculated the difference between 10- and 2-year Malaysian government yields.

[Insert Table 3 here]

Finally, Tables 4 and 5 present the pairwise correlation among the independent variables for conventional bonds and *sukuk*, respectively. Based on the findings, there was no indication of multicollinearity (see the correlation matrix in these tables).

[Insert Tables 4 and 5 here]

5. Methodology

5.1. Model

In this study, the data enabled us to observe both time-series and cross-sectional variations in the credit spread determinants.[7] Our analysis also referred to the yield spreads of conventional corporate bonds and *sukuk* in 3-, 5-, 7-, and 10-year maturities issued by Malaysian firms from 2002 to 2013. Based on the variable descriptions in the previous section, the baseline specification of our model is as follows:

$$\ln(Sukuk/Bond\ Spread_{ift}) = \beta_0 + \beta_1 Firm_{it} + \beta_2 Sukuk_{it}/Bond_{it} + \beta_3 Macro_t + \beta_4 Sector_{it} + \mathbf{A_f} + \mathbf{B_t} + \mu_{ift} \quad (1)$$

where $\ln(Sukuk/Bond\ Spread_{ift})$ is the natural logarithm of the difference between the yield at the issuance of $Sukuk_i$ /$Bond_i$ of firm f at issuance date t and the yield of a government bond with comparable maturity. Meanwhile, $Firm_{it}$ is the vector of the firm-level determinants of the corporate yield spreads; $Sukuk_{it}/Bond_{it}$ represents the bond-structure characteristics; $Macro_t$ refers to the macroeconomic time-varying variables; and $Sector_{it}$ represents the sector dummies. Moreover, $\mathbf{A_f}$ and $\mathbf{B_t}$ are the vectors of the firm- and quarterly-time dummy variables that account for firm- and time-fixed effects, while μ_{ift} is the error term.

5.2. Model Selection and Specification

In the present study, a likelihood-ratio test between the ordinary least squares (OLS) regression and the fixed effect model (FEM) was conducted to determine if it is inappropriate to run a simple OLS model.[8] Further, the Breusch–Pagan Lagrange multiplier test for random effects was used to determine whether the OLS regression is a better fit than the random effects (REM) model.[9]

[7] Murray (2006) referred to data that contains a time series of cross-sections as "panel data." In the presence of firm- and time-fixed effects, the pooled OLS estimation can produce biased results. Thus, we applied a panel data regression framework.

[8] We also conducted a poolability test, in which we compared the OLS model (with restricted parameters) and the FEM (with unrestricted parameters) to determine whether adding fixed and time effects to the model significantly improves the model fit. The likelihood ratio test statistics were significant and failed to reject the FEM as the best-fit model.

[9] Murray (2006) pointed out that panel data with unobserved heterogeneity comes in two varieties. The unobserved heterogeneity may be the *same* from one sample to the next or it may *randomly vary* from one sample to the next. FEMs are suitable when the unobserved differences among groups are the same from one sample to the next. Error component models (random error models) are those, in which the unobserved differences among groups randomly vary from one sample to the next.

Meanwhile, the Hausman test suggested that the FEM is a better fit.[10] Thus, we used the FEM with Driscoll and Kraay's (1998) standard errors (FEM-DR) to control for heteroscedasticity, autocorrelation, and possible correlation among the groups in the panel data. It should be noted that Driscoll and Kraay (1998) adapted the Newey–West estimator in the panel time-series context, in which not only the serial correlation between residuals from the same individual observations in different times was considered but the cross-serial correlation between the different individual observations in different times was also considered (see also Arellano, 2003).

In this study, the FEM estimator was implemented in two steps.[11] In the first step, the model variables $z_{it} \in \{y_{it}, \boldsymbol{x}_{it}\}$ were within-transformed as follows:

$$\tilde{z}_{it} = z_{it} - \bar{z}_i + \bar{\bar{z}}, \text{ where} \qquad \bar{z}_i = T_i^{-1} \sum_{t=t_{i1}}^{T_i} z_{it} \quad \text{and} \quad \bar{\bar{z}} = (\sum T_i)^{-1} \sum_i \sum_t z_{it}$$

We also recognized that the within-estimator corresponds to the OLS estimator as follows:

$$\tilde{y}_{it} = \tilde{x}_{it}'\theta + \tilde{\varepsilon}_{it} \qquad (2)$$

In the second step, we estimated the transformed regression model in the aforementioned equation by pooled OLS estimation, with Driscoll and Kraay's (1998) standard errors.

5.3. Variance Decomposition

In order to examine the bond/*sukuk* spreads, we quantified the relative contributions of the three groups of determinants: (1) firm-specific variables, (2) bond characteristics, and (3) macroeconomic variables. Then, we performed a variance decomposition[12] exercise, based on the regressions in Columns (1) and (5) of Table 7 for the bonds and *sukuk*, respectively. Finally, we

[10] The model was also estimated by assuming the homoscedasticity of the residuals. Within the series of additional tests, the Woolridge test of cross-sectional dependence showed that the residuals across entities were correlated, while the modified Wald test for heteroscedasticity rejected the null of constant variance in the residuals. Although these tables were omitted to maintain brevity, they can be presented upon request.

[11] In Stata, the *xtscc* program's option *fe* estimates FEM (within) regression, with Driscoll and Kraay's (1998) standard errors.

[12] We employed a user-developed Stata module named *rego*, which decomposes the R2 (i.e., the share of explained variance) of linear regression into contributions of (or groups of) regressor variables, with the help of Shapley or Owen values. As for the "groups" of variables that belong to the same category (such as the variables that belong to a polynomial in age), the computational effort is lower than in the "classical" Shapley decomposition without groupings. Meanwhile, *rego* includes an implemented option to bootstrap the decomposition results in order to obtain percentile confidence.

performed a variance decomposition analysis to quantify the importance of each set of determinants to explain the variations in the bond/*sukuk* spreads.

6. Results and Discussion

6.1. Descriptive Statistics

Table 6a presents the summary statistics of the dependent variable yield spreads of the conventional bonds and *sukuk* in the Malaysian government securities. On average, the *sukuk* yields spread across the four segments (3-, 5-, 7-, and 10-year maturity) varied between 1.7 basis points (bp) and 3.5 bp, whereas the conventional bonds' yield spreads mostly varied between 1.4 bp and 1.9 bp.

Table 6b includes the summary statistics of the variables used in the analysis. The determinant variables used in the conventional bonds' sample and that of *sukuk* did not significantly differ. With the exception of the capitalization ratio (e.g., .55 for conventional bonds and .60 for *sukuk*) and size (e.g., 35,214.67 million MYR for conventional bonds and 20,925.1 million MYR for *sukuk*), there was a minimal difference in the average values of the variables used to analyze the credit spread determinants for conventional bonds and *sukuk*.[13]

It should be noted that unlike developed market firms, which include average leverage ratios ranging from 40% to 90% (Arellano, 2008), Malaysian market firms display low leverage ratios (e.g., 29% and 27% for firms issuing conventional bonds and *sukuk,* respectively). This may be attributed to the generalized constraints faced by the firms in emerging and developing financial markets.

[Insert Tables 6(a) and 6(b) here]

6.2. Empirical Results

We estimated Equation (1) for the full sample of Malaysian corporate bonds (2,298 observations) and *sukuk* (929 observations) from 2002 to 2013 by using four alternative estimators: (1) OLS, (2)

[13] Based on a thorough comparison of the descriptive statistics of both *sukuk* and conventional bonds, we found that the spreads of the overall sample and for the different maturities were comparable, with the exception of the conventional bonds with 10-year maturity. A further inspection showed that the frequency of the conventional bonds with 10-year maturity was 45 out the 2,238 observations, which is equivalent to 2% of the total conventional bond sample. Meanwhile, the frequency of 10-year *sukuk* was 116 out of 972, which is equivalent to 12% of the total *sukuk* sample. We attributed the difference in the spreads between the two types of bonds to the lack of sample/frequency of the conventional bonds.

REM, (3) FEM, and (4) FEM-DR. The results of these equations for both conventional bonds and *sukuk* are presented in Table 7. Next, we created various sub-samples based on the maturities of the conventional bonds and *sukuk* (see Tables 8 to 11). The motivation was to determine if the empirical results continued to hold within the sub-samples.

6.2.1. The Determinants of Credit Spreads (Full Sample)

According to Table 7, which presents the results of the full sample of bonds and *sukuk*, many coefficients refute our prior expectations. For example, whereas the coefficient related to firm profitability *(EBIT/Assets)* for *sukuk* was significant and negative but for conventional bonds was positive and insignificant.

Contrary to the theoretical predictions and conventional wisdom, and in line with Balasubramanian and Cyree (2012), the positive associations for conventional bonds highlight that higher ROA for conventional bonds is the outcome of high risk-taking and is consistent with expectation that a trade-off between risk and return exists. Thus, yield spread increases with ROA and results in a higher cost of debt. With reference to the statistical insignificance of this variable, it is evident from the variance decomposition analysis (discussed later) that ROA explains just under 5% of the variation in the credit spreads of both *sukuk* and conventional bonds.

Regarding the coefficient of the capitalization ratio (*Equity/Capital*), it was only significant for conventional bonds, as the coefficient for bonds was positive and that for *sukuk* was negative.[14] For the sub-samples (varying maturities), we observed positive associations, with the exception of *sukuk* with 5-year maturity, indicating the overall *sukuk* benefit from higher capitalization ratios. This also implies that firms in Malaysia that issue 5-year maturity *sukuk* could benefit from debt financing, which can subsequently provide them with a tax shield and lower spreads.

As for the coefficients of the proxy for firm leverage (*Debt/Assets*), they were negative for both *sukuk* and conventional bonds. However, these results were not in line with our expectations. Meanwhile, the interest coverage ratio was used as a proxy for estimating a firm's debt-servicing

[14] Intuitively, higher ratios of equity over capital make the bond-/*sukuk*-issuing firm less risky, resulting in a negative point estimate for the capitalization ratio. This intuition holds true for conventional bond spreads, as the coefficient is negative. However, for *sukuk* spreads, the coefficient of the capitalization ratio was positive and significant, implying that higher capitalization firms issuing *sukuk* may have higher yields, which result in a larger credit spread.

ability. In this regard, a higher value indicates better financial health, which, in turn, implies a lower spread. Additionally, the coefficients for *sukuk* showed a negative association, while there was a positive association for conventional bonds. However, none of them were significant, implying that this debt-servicing determinant does not explain the credit spread. These findings were also confirmed through the variance decomposition results (see Figure 2).

The coefficient estimates of asset size were negative for the spread of both the *sukuk* and conventional bonds. This result was in line with our expectation as discussed in Section 4.3. In addition, the *equity volatility* (a proxy for idiosyncratic risk) coefficient was positive for both *sukuk* and conventional bonds. However, it was only statistically significant in the case of conventional bonds. This positive estimate also confirmed that higher levels of volatility lead to higher yields, thus resulting in higher spreads. As for *sukuk*, the effects of all firm-specific variables, except for the capitalization ratio, were in line with our prior assumption that leads to lower spreads. Thus, we failed to reject H_{01}, rendering *sukuk* less risky.

Concerning the signs of the coefficients for both *years to maturity* and *years to maturity * debt to assets*, they were not in line with our expectation. However, both bond-specific variables were significant for *sukuk* as well as for conventional bonds. The negative coefficient of *years to maturity* for the two types of securities was also counterintuitive. Yet, this effect could be somewhat mitigated at higher levels of debt, in which more time reduces the risk and the spreads. Consequently, a negative association was observed for these two security types.

Moreover, the interaction term for both *sukuk* and conventional bonds indicated a positive coefficient, which was contrary to the predicted direction of the association and the economic insights. In this regard, higher financially leveraged firms with less time remaining to maturity show low yields and spreads. As for the validity of H_{02}, it was important to analyze both securities according to their maturity. Consequently, we observed that firms with high leverage do not benefit from issuing either long-term bonds or *sukuk.* This finding is similar with that of Chen et al. (2020), in which the long-term maturity effect on credit spreads is positive for firms with high leverage or high systematic risk.

Furthermore, the effect of the macro factors on the spreads for both types of securities differed, while the coefficients of several macro variables were mainly in line with our prior expectation.

Meanwhile, the signs of the coefficients for IPI, for both conventional bonds and *sukuk*, were not in line with our prior expectation and not statistically significant, as evident from the variance decomposition graph (discussed later). For *sukuk*, an interesting observation was the positive effect of the slope on the credit spreads, which was in contrast to previous studies such as Duffie et al. (1999). However, these positive relationships were similar to the findings of Yap and Gannon (2007), who analyzed the factors affecting the credit spread behavior of USD Malaysian bonds. They also cited that liquidity shortage was associated with the positive coefficients of slope. Thus, $\boldsymbol{H_{03}}$ does not entirely hold true when considering the full sample.

Finally, we observed that for *sukuk*, firm-specific variables, such as size, profitability, and the interest coverage ratio, showed negative associations, indicating lower spreads for *sukuk*. As opposed to the spreads of the conventional bonds, *sukuk* spreads do not widen due to equity volatility. This implies that *sukuk* are less risky than conventional bonds. Our sample also had lesser long-term maturity *sukuk*, suggesting that short- and medium-term *sukuk* have lower spreads. This finding was confirmed when the coefficient of time to maturity was positive, indicating that *sukuk* spreads widen (see Section 6.2.2.d).

6.2.2. Determinants of the Credit Spreads by Maturities

a. 3-year Maturity

Table 8 presents the estimates for conventional bonds and *sukuk* with a 3-year maturity. For firm-specific variables, the majority of the regression results were not that different from the baseline results (see Table 7) of the full sample.

The profitability coefficient (*EBIT/Assets*) for *sukuk* and bonds followed those of the baseline results. The coefficient of ROA for *sukuk* was also in line with our prior expectation (i.e., higher returns are associated with higher profitability). For the bonds, ROA again showed increased spreads. Next, the capitalization coefficients for conventional bonds and *sukuk* were in line with our theoretical expected results. However, the sign for the coefficient of the capitalization under *sukuk* differed from the baseline results (i.e., higher capitalization of the firms issuing short-term *sukuk* is associated with reduced risk premia).

Additionally, the interaction term *years to maturity * debt to assets* for both *sukuk* and bonds was significant and was in line with the baseline results, indicating that the shorter the time to maturity, higher the risk. The interaction term also suggested that with a higher leverage, the probability of curtailing risks lowers, thus increasing the spreads and raising the yields.

The behavior of the macroeconomic factors for securities with a 3-year maturity also closely followed the baseline results. For example, for conventional bonds, the slope coefficient was positive and similar to that of the full *sukuk* sample (see Table 7). This implies that the issue of liquidity shortage might be evident for both short-term *sukuk* and conventional bonds in the Malaysian bond market, resulting in higher credit spreads when the slope is steep. Moreover, when we compared both types of securities with a 3-year maturity, except for $\triangle CPI$ and *GDP growth*, the coefficients for conventional bonds and *sukuk* included the same direction of the predicted association. These findings primarily support $\boldsymbol{H_{03}}$ and are consistent with our predictions.

b. 5-year Maturity

Table 9 presents the estimates for conventional bonds and *sukuk* with a 5-year maturity. For firm-specific and bond-/*sukuk*-specific variables, all the results were in line with the baseline results of the full sample, except for *sukuk's* ROA coefficient.

However, the regression results for the macroeconomic factors of *sukuk* differed from those of conventional bonds. Thus, we failed to accept $\boldsymbol{H_{03}}$. We also observed that the coefficient of growth change (CPI and GDP) did not follow our prior expectations. This can be attributed to the fact that investors' expectations regarding inflation and GDP growth can differ, depending on the state in which the economy is operating. For instance, an unexpected hike in the interest rate increases market participants' inflation expectations during good times but not during bad times. This indicates that the *sukuk* market participants (i.e., the holders of medium-term maturity *sukuk*) perceive inflation expectations to be positive during good times and negative during bad times. Hence, credit spreads narrow (widen) following an unexpected increase (decrease) in the *CPI,* which might be perceived by the market participants as positive (negative) news about the future of the economy during good times.

c. 7-year Maturity

Table 10 identifies the effects of firm-specific, bond-/*sukuk*-specific, and macroeconomic factors on the credit spreads of bonds/*sukuk* with a 7-year maturity. With the exception of the capitalization and interest coverage ratios, the coefficients of *sukuk* across all the categories were in line with the baseline results. In the case of conventional bonds, with the exception of the capitalization and size coefficients, all the firm-specific coefficients were in line with the baseline results. These findings do not support $\boldsymbol{H_{01}}$. In the case of bonds/*sukuk* with a 7-year maturity, the regression results for all the macroeconomic variables of both types of securities differed. Thus, we failed to accept $\boldsymbol{H_{03}}$.

d. 10-year Maturity

Table 11 presents the regression results for bonds/*sukuk* with a 10-year maturity. The direction of the associations for the coefficients of the variables under the conventional bonds was in line with our expectations, except for leverage and GDP growth. However, in the case of *sukuk*, there were a few deviations. Specifically, deviations were found in the interest coverage ratio, the interaction term, and two macro factors, namely, $\triangle IPI$ and $\triangle CPI$. It should be noted that this was the only table that closely matched our prior expectations regarding firm-specific and bond-specific variables, indicating that longer securities behave in a similar manner to bonds issued globally. Thus, our findings support $\boldsymbol{H_{01}}$ to $\boldsymbol{H_{03}}$.

6.2.3. Variance Decomposition

Overall, firm-specific, security-specific characteristics, and macroeconomic conditions were relevant to bond/*sukuk* spreads in Malaysia. Based on the regression results in Table 7, a variance decomposition exercise, represented in a comparative chart (see Figure 2), illustrates the idiosyncratic impact of the factors on *sukuk* and conventional bonds. For *sukuk*, firm-specific factors accounted for approximately 54% of the total variance, compared with roughly 48% for conventional bonds. Next, as indicators, size, leverage, and capitalization were respectively associated with 34%, 8%, and 7.8% of the total variance for *sukuk* spreads, while for conventional bonds, volatility, leverage, and size were respectively associated with 14.2%, 14%, and 8.9% of the total variance of bond spreads. We also observed that bond-/*sukuk*-specific factors (*time to maturity* and *time to maturity * debt/assets*) were associated with approximately 40% of the total

variance for both *sukuk* and bonds. Whereas the interaction term *time to maturity * debt/assets* was associated with less than 1% of the variance in the case of *sukuk* spreads, the corresponding value for bonds was 26%. Further, we found that macroeconomic conditions were associated with less than 7% of the variance in *sukuk* spreads, while the corresponding value for bonds was 12%.

6.3. Sensitivity Analysis and Robustness Checks

In order to determine whether our results were adversely affected by any endogeneity of the firm-specific variables, we considered the two-step generalized method of moments (GMM) estimator of Cavallo and Valenzuela (2010).[15] Using this estimator, we tested firm-specific variables with 1- and 2-year lags.[16] The unreported results derived from these estimations were robust and consistent across the alternative specifications.[17] Hence, the baseline results did not appear to be driven by endogeneity bias.[18]

We also examined the impact of the ownership of the issuing company on yield spreads (see Table 12). For instance, we assessed if a domestic or a foreign company issued a bond/*sukuk* and if it helped explain the yield spread for both types of securities. In this case, we considered conventional bonds and *sukuk* with a 5-year maturity, as this maturity class included the highest number of observations. We found that for domestic firms that issued corporate bonds, they had a negative impact on bond spreads. This finding is in line with that of Campbell and Taksler (2003). Meanwhile, bonds and *sukuk* issued by foreign companies had little to no effect on bond spreads.

We further identified the differences in the yield spread determinants, if we were only to include non-financial companies in the full sample (see Table 13). The overall results were in line with our predictions for both *sukuk* and conventional bonds. Moreover, we noted the following. First, an increase in interest coverage lowered the spread. Second, taking into consideration all the sectors, a decrease in slope lead to an increased spread. However, the opposite was observed if we

[15] We implemented a two-step GMM approach (using the Stata command *ivreg2*), which is in line with Cavallo and Valenzuela (2010). More information on GMM can be found in Arellano and Bover (1995).
[16] As we used quarterly data, this implies that we tested each variable t with lags $t-4$ and $t-8$. The GMM estimations also included the results from the Sargan test of over-identifying restrictions. The joint null hypothesis of this test is that the instruments are uncorrelated with the error term and that the excluded instruments are correctly excluded from the estimated equation.
[17] The unreported results derived from these estimations were largely unchanged from the baseline regressions. The tables can be presented upon request.
[18] We also considered the effect of financial crises by observing the period from 2007 to 2010 (as the crisis period) and assigning dummy variables. We found no significant change or deviations from our baseline results.

excluded the financial companies (i.e., an increase in slope lead to a decrease in spread). Third, for *sukuk*, after excluding the financial institutions, both the firm-level and bond-/*sukuk*-specific variables were affected. We also found that after excluding the financial firms, the ROA and CAP (the two firm-level determinants) showed an increase in spread. This was an opposite result to the main findings (i.e., when these variables reported a decrease in the credit spread). Additionally, an increase in spread due to an increase in ROA for non-financial firms issuing *sukuk* suggested that these firms conducted high risk-taking activities, resulting in a higher spread. The positive coefficient on the capitalization ratio for non-financial firms issuing *sukuk* also showed that as opposed to the *sukuk* data with financial firms, the non-financial firms followed a different capital structure, such that the higher ratios of equity over capital made the bond-/*sukuk*-issuing firms riskier, resulting in a positive point estimate for the capitalization ratio. Fourth, after excluding the financial institutions, the *sukuk*-specific factors also affected the spread differently than the pooled sample. In other words, as the leverage level was low for a non-financial company, the longer the maturity of *sukuk*, the lower the spread.

Finally, another sensitivity analysis was conducted (see Table 14) by running the model on the full sample. In this case, the objective was to compare the results of the firms issuing both corporate bonds and *sukuk* with those only issuing corporate bonds. Among the total sample of 58 companies, 33 companies issued both *sukuk* and conventional/corporate bonds, while 25 companies only issued corporate bonds. A negligible difference was found between this model and the baseline model in Table 7.

7. Conclusion

This study identified the relevant factors for determining the yield spreads of *sukuk* and conventional bonds. In this regard, understanding the causes of different risk premiums is important to investors, issuers, and regulators. Although still in their nascent stage, *sukuk* markets are a growing impetus in emerging economies, where *sukuk* is conducive to raising capital for infrastructure projects and where investors tend to hold assets to maturity. Thus, we utilized a comprehensive set of measures representing firm-specific and industry-specific variables, bond characteristics, and macroeconomic conditions for a sample of listed firms in Malaysia.

Based on the findings, *sukuk* are generally less risky than conventional bonds (Abdelsalam et al., 2020) and that firm-specific indicators are the primary determinants. According to the variance decomposition analysis, size, capitalization, and leverage were significantly and negatively associated, indicating lower spreads for *sukuk*. In contrast to the spreads of conventional bonds, *sukuk* spreads did not widen due to equity volatility. This suggests that *sukuk* are less risky than conventional bonds. Meanwhile, the cross-sectional regression of firm-specific determinants explained 51% of the variance in *sukuk* spreads. For conventional bonds, the variance decomposition analysis showed that only leverage and volatility are significant, as the firm-level indicators and cross-sectional regression of the firm-specific determinants explained 41% of variance in *sukuk* spreads. Regarding the bond-specific characteristics, time to maturity and the interaction of the debt with the remaining time to maturity was significant. This implies that *sukuk* investors tend to hold *sukuk* until maturity and that Malaysian firms with high leverage do not benefit from long-maturity bonds and *sukuk*.

For both *sukuk* and conventional bonds, our sub-sample results indicated that spreads can vary with maturity, while the significant macroeconomic factor was the difference between 10- and 2-year Malaysian government yields. This difference was most likely due to the weak integration between Association of Southeast Asian Nations (ASEAN) bond markets, as previously observed (see Plummer and Click, 2005; Tsukuda et al., 2017).

Overall, this study offers important insights and policy implications to investors, regulators, and other stakeholders engaging with different bond markets. As for policymakers, they must be aware of the systematic risks, which can be a deterrent to investment. Various factors, such as time to maturity and the interaction terms *leverage* and *time to maturity*, are equally important to *sukuk* and corporate bonds investors in that they do not benefit from long-term maturity bonds and *sukuk*. Our study also includes wide implications for conventional bond markets, where the emergence of a new asset class can boost investments across various market segments. In terms of high volatility and low interest rates, the availability of *sukuk* as an alternative asset option can facilitate economic growth.

Moreover, a number of possibilities exist for future research. In particular, future studies should examine the differences between *sukuk* and bond markets for different regions. They should also conduct a duration and convexity analysis to identify additional factors related to risk premiums.

In these cases, the overall objective should be to facilitate the development of Islamic capital markets in order to attract investors to hold *sukuk*, while moving beyond faith-based motives.

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	Sukuk	Conventional Debt
Asset ownership	*Sukuk* give the investor partial ownership in the asset on which the *sukuk* are based.	Bonds do not give the investor a share of ownership in the asset, project, business, or joint venture they support. They are a debt obligation from the issuer to the bond holder.
Investment criteria	The asset on which *sukuk* are based must be Sharia-compliant.	Generally, bonds can be used to finance any asset, project, business, or joint venture that complies with local legislation.
Issue unit	Each *sukuk* represents a share of the underlying asset.	Each bond represents a share of debt.
Issue price	The face value of *sukuk* is based on the market value of the underlying asset.	The face value of a bond price is based on the issuer's credit worthiness (including its rating).
Investment rewards and risks	*Sukuk* holders receive a share of profits from the underlying asset (and accept a share of any loss incurred).	Bond holders receive regularly scheduled (and often fixed rate) interest payments for the life of the bond, and their principal is guaranteed to be returned at the bond's maturity date.
Effects of costs	*Sukuk* holders are affected by costs related to the underlying asset. Higher costs may translate to lower investor profits, and vice versa.	Bond holders generally are not affected by costs related to the asset, project, business, or joint venture they support. The performance of the underlying asset does not affect investor rewards.

Source: Jamaldeen (2012: 211)

Table 1: The Differences between *Sukuk* and Conventional Debt

Maturity	*Sukuk*	Conventional Bonds	Total
3-year	19	34	53
5-year	31	78	109
7-year	6	17	23
10-year	6	15	21
Total	**62**	**143**	**205**

Table 2(a): Number of Bonds/*Sukuk* in the Sample According to Maturity

Sector	Companies
Basic materials	1
Communications	3
Consumer	17
Diversified	2
Financial	19
Industrial	15
Utilities	1
Total	58

Table 2(b): Companies According to Sectors

Variable	Definition	Unit of Measurement	Data Source	Expected Sign
Bond/*sukuk* spread	YTM of *sukuk*- YTM of bond	Percent (in natural logarithms)	Bloomberg/Data Stream/ Author's calculation	
Return on Assets	EBIT to assets	Percent	Bursa Malaysia/Company's Annual Accounts	-
Capitalization Ratio	Equity/Capital	Percent	Bursa Malaysia/Company's Annual Accounts	-
Leverage Ratio	Debt to assets	Percent	Bursa Malaysia/Company's Annual Accounts	+
Interest Coverage Ratio	EBIT to interest expense	Percent	Bursa Malaysia/Company's Annual Accounts	-
Size	Assets	Millions of (Malaysian ringgit in natural logarithms)	Bursa Malaysia/Company's Annual Accounts	-
Equity Volatility	Standard deviation of day-to-day logarithmic price changes. A previous 360-day price volatility equals the annualized standard deviation of the relative price change of the 360 most recent trading days' closing price.	percent	Data Stream	-
Years to Maturity	Years to Maturity	Years (in natural logarithms)	Bloomberg	+
Interaction	Time to maturity * leverage	Author's Calculation	Author	-
Industrial Production Index (IPI)	Quarterly growth rate in Industrial Production	Percent (in natural logarithms)	Data Stream	-
Consumer Price Index/Inflation	Annual percentage change in the Consumer Price Index	Percent (in natural logarithms)	Data Stream	+
GDP Growth	Annual real GDP growth	Percent	Data Stream	-
Slope	Difference between 10- and 2-year Malaysian Treasury Rate	Percent	Data Stream	-

Table 3: Description of Variables and Expected Signs

	ROA	CAPT	Leverage	Interest Coverage	Volatility	Ln (Size)	Ln (YrtoMat)	Ln (△IPI)	Ln (△CPI)	GDP Growth	Slope
ROA	**1**										
CAPT	0.0575*	**1**									
Leverage	0.152*	−0.482*	**1**								
Interest Coverage	0.458*	0.214*	−0.164*	**1**							
Volatility	−0.138*	0.161*	−0.00443	−0.106*	**1**						
Ln(Size)	−0.217*	−0.539*	−0.189*	−0.0912*	−0.378*	**1**					
LnYrtoMat	−0.0392	−0.139*	−0.0682*	−0.0192	−0.153*	0.172*	**1**				
Ln (△IPI)	−0.00282	0.0002	−0.0181	−0.00904	0.129*	0.0153	0.0114	**1**			
Ln (△CPI)	−0.0306	0.0369	0.0193	−0.0683*	0.191*	−0.119*	−0.00774	0.0679*	**1**		
GDP Growth	0.0337	−0.0116	−0.0023	0.0256	−0.0916*	0.02	−0.0148	0.102*	0.0964*	**1**	
Slope	−0.00331	0.0284	0.0403	0.0822*	−0.0392	−0.0473*	0.00132	−0.0748*	0.027	0.0700*	**1**

Notes: Table 4 reports pairwise correlation coefficients for the firm-specific, bond-specific, and macroeconomic variables included in our estimations. No multicollinearity problems are evidenced. **, *significance at 5%; 1% respectively. Table reports significance levels for the hypothesis test H0: rho = 0 against the two-sided alternative. Here CAPT: Capitalization ratio (Equity/Capital), Int Covg.: Interest Coverage (EBIT/Interest Expense), LnYrtoMat: Years to Maturity in natural logarithm, Ln (△IPI): Change in Industrial Production Index in natural logarithm, Ln (△CPI): Change in Consumer Price Index in natural logarithm.

Table 4: Correlation Matrix (Conventional Bonds)

	ROA	CAPT	Leverage	Int Covg.	Ln size	Volatility	LnYrtoMat	ln IPI	ln CPI	Slope	GDP Growth
ROA	**1**										
CAPT	0.2242*	**1**									
Leverage	−0.0108	−0.4982*	**1**								
Interest Coverage	0.5038*	0.3124*	−0.1861*	**1**							
Volatility	−0.0879*	−0.3178*	−0.2623*	−0.0257	**1**						
Ln(Size)	−0.2638*	−0.0937*	0.1526*	−0.1742*	−0.3611*	**1**					
LnYrtoMat	0.1205*	0.0055	−0.1688*	0.11*	0.2616*	−0.1442*	**1**				
Ln (△IPI)	0.0507	−0.1090*	−0.0274	−0.0105	0.3186*	−0.1711*	0.2317*	**1**			
Ln (△CPI)	0.0111	−0.1519*	−0.0212	−0.027	0.4*	−0.0481	0.3095*	0.7230*	**1**		
GDP Growth	0.0680*	0.0123	−0.0009	0.026	0.0084	−0.1252	0.0232	0.1683*	−0.0201	**1**	
Slope	−0.0195	0.0961*	−0.0491	0.1473	−0.0503	−0.0043	−0.0099	−0.4912*	−0.1678*	0.079*	**1**

Notes: Table 5 reports the pairwise correlation coefficients for the firm-specific, bond-specific, and macroeconomic variables included in our estimations. No multicollinearity problems were evidenced. ** and * represent significance at the 5% and 1% levels, respectively. The table reports significance levels for the hypothesis test H0: rho = 0 against the two-sided alternative. Here, CAPT: Capitalization ratio (Equity/Capital); .: Interest Coverage (EBIT/Interest Expense), LnYrtoMat: Years to Maturity in natural logarithm, Ln (△IPI): Change in Industrial Production Index in natural logarithm, Ln (△CPI): Change in Consumer Price Index in natural logarithm.

Table 5: Correlation Matrix (*Sukuk*)

	Conventional Bonds								*Sukuk*							
	3-year		*5-year*		*7-year*		*10-year*		*3-year*		*5-year*		*7-year*		*10-year*	
Year	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**
2002		--	−0.019	.0	--	--	--	--	0.025	0.006	0.035	0.001	--	--	--	--
2003	0.021	0.020	0.002	0.020	--	--	--	--	0.013	0.006	0.033	0.006	--	--	--	--
2004	0.018	0.015	0.008	0.014	--	--	--	--	0.008	0.006	0.018	0.014	0.013	0.000	--	--
2005	0.017	0.02	0.016	0.019	0.031	0.016	--	--	0.011	0.008	0.020	0.017	0.018	0.006	0.036	0.015
2006	0.026	0.03	0.020	0.023	0.024	0.015	--	--	0.020	0.020	0.024	0.021	0.032	0.023	0.025	0.019
2007	0.016	0.012	0.025	0.034	0.022	0.016	--	--	0.015	0.014	0.027	0.036	0.040	0.040	0.028	0.021
2008	0.017	0.011	0.026	0.034	0.019	0.015	--	--	0.022	0.032	0.018	0.008	0.054	0.064	0.025	0.020
2009	0.019	0.028	0.026	0.038	0.021	0.016	--	--	0.018	0.010	0.019	0.010	0.047	0.061	0.046	0.050
2010	0.010	0.001	0.024	0.042	0.020	0.016	--	--	0.011	0.008	0.016	0.010	0.034	0.044	0.062	0.058
2011	0.008	0.006	0.015	0.023	0.019	0.015	0.012	0.0025	0.008	0.006	0.016	0.021	0.028	0.048	0.045	0.051
2012	0.006	0.003	0.010	0.020	0.021	0.025	0.009	0.0018	0.005	0.004	0.013	0.027	0.016	0.006	0.032	0.041
2013	0.005	0.003	0.006	0.009	0.015	0.016	0.006	0.002	0.005	0.005	0.005	0.004	0.011	0.003	0.026	0.036
Overall	0.014	0.018	0.020	0.031	0.020	0.018	0.0082	0.0029	0.014	0.013	0.018	0.020	0.035	0.044	0.036	0.041

Table 6a: Descriptive Statistics of dependent variable (bond/*sukuk* spread)

Variable	Conventional Bonds			*Sukuk*		
	Mean	St. Dev.	Obs.: n x T	Mean	St. Dev.	Obs.: n x T
Bond/*Sukuk*-specific						
Year To Maturity	3.225752	2.902176	2,238	2.84	2.22	979
Firm-specific						
ROA	.0182289	.0268677	2,238	.0145138	.012496	979
Capitalization	.5482608	.1732111	2,238	.606712	.1214616	979
Leverage	.2930784	.1477036	2,238	.2761216	.1033539	979
Interest Coverage	8.717283	15.6879	2,238	6.197747	10.27514	979
Volatility	.3190235	.239902	2,238	.3460204	.2436026	979
Size	35214.64	77540.38	2,238	20925.1	63632.07	979
Macro Factors						
Ln (△IPI)	−4.1332	1.0616	2,238	−4.166	6.597387	979
Ln (△CPI)	−4.7217	1.3525	2,238	−4.7729	.0730073	979
GDP Growth	.0130902	.0290443	2,238	.013163	.0289325	979
Slope	.0079436	.0047963	2,238	.0080153	.0046743	979

Notes: Here, ROA: return on Assets; Ln (△IPI): log of change in the Industrial Production Index; CPI: log of change in the Consumer Price Index in natural logarithms; and Size is total assets in millions of Malaysian ringgit.

Table 6b: Descriptive Statistics

	Conventional Bonds				*Sukuk*			
	[1] OLS	[2] RE	[3] FE	[4] FE-DR	[1] OLS	[2] RE	[3] FE	[4] FE-DR
Firm-specific								
ROA	−12.196***	−0.396	0.333	0.333	−3.116	−1.707	−2.762	−2.762
	(0.98)	(2.30)	(1.93)	(1.92)	(3.02)	(4.10)	(3.72)	(3.73)
Capitalization	−2.127***	−0.667	−0.279	−0.279	−1.075**	3.292*	1.326*	1.326*
	(0.23)	(0.34)	(0.32)	(0.41)	(0.35)	(1.54)	(1.38)	(1.64)
Leverage	−2.527***	−2.402***	−2.237***	−2.237***	−3.002***	−0.305	−2.851*	−2.851*
	(0.36)	(0.44)	(0.44)	(0.47)	(0.43)	(1.74)	(1.32)	(1.58)
Interest Coverage	0.002	0.004	0.003	0.003	−0.010**	−0.002	−0.002	−0.002
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ln (Size)	−0.328***	−0.109*	−0.044	−0.044	−0.321***	−0.008	−0.100	−0.100**
	(0.02)	(0.05)	(0.04)	(0.05)	(0.03)	(0.11)	(0.06)	(0.06)
Volatility	0.596***	0.304*	0.290*	0.290*	0.451*	0.297	0.277	0.277
	(0.16)	(0.12)	(0.11)	(0.12)	(0.17)	(0.17)	(0.14)	(0.15)
Bond-/*Sukuk*-specific								
Ln (Year to Maturity)	−0.060	−0.141***	−0.157***	−0.157***	−0.184***	−0.175***	−0.220***	−0.220***
	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)
Yr to Maturity* Debt/assets	0.077*	0.308***	0.390***	0.390***	0.443***	0.508***	0.728***	0.728***
	(0.04)	(0.03)	(0.05)	(0.07)	(0.08)	(0.10)	(0.10)	(0.10)
Macro Factors								
Ln (△IPI)	0.017	0.024	0.025	0.025	0.033	0.035	0.040	0.040
	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)
Ln (△CPI)	0.008	0.001	−0.002	−0.002	0.037*	0.018	0.011	0.011
	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
GDP Growth	−1.435	−1.767	−1.743*	−1.743*	−0.122	−0.303	−0.193	−0.193
	(1.17)	(0.92)	(0.84)	(0.83)	(0.96)	(0.81)	(0.72)	(0.74)
Slope (10yr- 2yr)	−3.672	−1.740	−2.547	−2.547	34.936***	29.760***	26.628***	26.628***
	(5.73)	(3.79)	(3.71)	(3.45)	(7.09)	(6.21)	(5.27)	(5.80)
_cons	0.436	−3.832***	−3.439***	−3.439***	−0.446	−8.143***	−3.933**	−3.933**
	(0.35)	(0.67)	(0.59)	(0.71)	(0.64)	(2.32)	(1.40)	(1.44)
N	2238	2238	2238	2238	979	979	979	979
Adj. R^2	.345		.090		.278		.093	
Firm Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Sector Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Cluster (Time)	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*No*

Notes: The dependent variable is the corporate bond/*sukuk* spread. Standard errors are in parentheses. * p < 0.05, ** p < 0.01, and *** p < 0.001. The dependent variable is ln (CB spread) and ln (*sukuk* spread) for conventional bonds and *sukuk*, respectively. (OLS)[1] Ordinary least squares, (REM) [2] random effects model, (FEM) [3] fixed effects model, (FE-DR), and [4] fixed effects with Driscoll and Kraay's (1998) standard errors.

Table 7: Determinants of Corporate Bonds/*Sukuk*–Full Sample

	Conventional Bonds				*Sukuk*			
	[1] OLS	[2] RE	[3] FE	[4] FE-DR	[1] OLS	[2] RE	[3] FE	[4] FE-DR
Firm-specific								
ROA	−10.480**	−0.853	0.287	0.287	−2.954	−11.204	−12.616	−12.616
	(3.12)	(3.59)	(2.59)	(2.05)	(9.46)	(11.31)	(11.59)	(9.93)
Capitalization	−2.357***	−1.821**	−1.691*	−1.691*	−2.399***	1.006	−0.492	−0.492
	(0.51)	(0.70)	(0.69)	(0.62)	(0.58)	(3.81)	(4.27)	(4.24)
Leverage	−3.162***	−4.369**	−3.874*	−3.874**	−5.482***	−8.275*	−9.751*	−9.751*
	(0.55)	(1.40)	(1.46)	(1.29)	(1.18)	(3.58)	(4.21)	(3.90)
Interest Coverage	0.000	−0.001	0.001	0.001	−0.012***	−0.003	−0.002	−0.002
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ln (Size)	−0.348***	−0.282*	−0.255*	−0.255*	−0.422***	0.622	0.458**	0.458**
	(0.04)	(0.11)	(0.11)	(0.11)	(0.05)	(1.20)	(1.20)	(1.33)
Volatility	0.358	0.178	0.139	0.139	0.199	0.064	0.064	0.064
	(0.22)	(0.15)	(0.13)	(0.14)	(0.30)	(0.33)	(0.32)	(0.30)
Bond-/*Sukuk*-specific								
Ln (Year to Maturity)	−0.210**	−0.208***	−0.212***	−0.212***	−0.625***	−0.583***	−0.592***	−0.592***
	(0.07)	(0.06)	(0.06)	(0.05)	(0.16)	(0.14)	(0.13)	(0.11)
Yr to Maturity* Debt/assets	0.979***	1.114***	1.082***	1.082***	1.881***	2.064***	2.053***	2.053***
	(0.18)	(0.12)	(0.13)	(0.10)	(0.41)	(0.37)	(0.38)	(0.32)
Macro Factors								
Ln (△IPI)	0.101*	0.116***	0.111***	0.111***	0.155*	0.139*	0.140*	0.140*
	(0.04)	(0.03)	(0.03)	(0.03)	(0.07)	(0.06)	(0.06)	(0.06)
Ln (△CPI)	0.012	−0.006	−0.015	−0.015	0.071	0.065	0.073	0.073
	(0.03)	(0.03)	(0.03)	(0.02)	(0.04)	(0.05)	(0.05)	(0.05)
GDP Growth	−2.357	−1.738	−1.795	−1.795	0.262	1.053	0.945	0.945
	(1.31)	(1.01)	(1.02)	(1.18)	(1.74)	(1.68)	(1.58)	(1.89)
Slope (10- and 2-year)	22.590**	11.320	18.230*	18.230	62.851***	34.685*	37.494**	37.494*
	(7.49)	(9.09)	(8.64)	(10.12)	(12.92)	(13.52)	(13.74)	(14.02)
_cons	0.509	0.367	−0.582	−0.582	1.588	−10.709	−4.896	−4.896
	(0.79)	(1.96)	(1.75)	(1.63)	(1.12)	(14.28)	(11.80)	(12.84)
N	377	377	377	377	228	228	228	228
Adj. R^2	.4487		.2853		.469		.291	
Firm Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Sector Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Cluster (Time)	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*No*

Notes: The dependent variable is the corporate bond/*sukuk* spread. Standard errors are in parentheses. * p < 0.05, ** p < 0.01, and *** p < 0.001. The dependent variable is ln (CB spread) and ln (*sukuk* spread) for conventional bonds and *sukuk*, respectively. (OLS)[1] Ordinary least squares, (REM) [2] random effects model, (FEM) [3] fixed effects model, (FE-DR), and [4] fixed effects with Driscoll and Kraay's (1998) standard errors.

Table 8: Determinants of Corporate Bonds/*Sukuk*–3-year Maturity

	Conventional Bonds				*Sukuk*			
	[1] OLS	[2] RE	[3] FE	[4] FE-DR	[1] OLS	[2] RE	[3] FE	[4] FE-DR
Firm-specific								
ROA	−12.993***	−2.763	−2.009	−2.009	−0.029	0.872	0.761	0.761
	(0.88)	(1.85)	(1.43)	(1.77)	(3.46)	(5.60)	(5.50)	(5.85)
Capitalization	−1.724***	−0.484	−0.220	−0.220	0.778	0.836	1.079	1.079
	(0.25)	(0.45)	(0.43)	(0.54)	(0.51)	(2.40)	(2.35)	(2.13)
Leverage	−1.876***	−2.139***	−2.073***	−2.073**	−0.593	−3.025	−2.721	−2.721
	(0.32)	(0.58)	(0.58)	(0.68)	(0.83)	(2.36)	(2.26)	(1.75)
Interest Coverage	0.0004	0.0004	0.0001	0.00001	−0.022***	−0.008**	−0.008**	−0.008**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ln (Size)	−0.337***	−0.171*	−0.122	−0.122	−0.190***	−0.261**	−0.184**	−0.184**
	(0.02)	(0.08)	(0.06)	(0.06)	(0.05)	(0.09)	(0.11)	(0.13)
Volatility	0.707***	0.279**	0.258*	0.258*	0.373	0.377*	0.376*	0.376
	(0.18)	(0.10)	(0.10)	(0.10)	(0.20)	(0.19)	(0.19)	(0.20)
Bond-/*Sukuk*-specific								
Ln (Year to Maturity)	−0.151**	−0.181***	−0.200***	−0.200**	−0.172*	−0.138	−0.138	−0.138
	(0.05)	(0.05)	(0.05)	(0.06)	(0.08)	(0.08)	(0.08)	(0.08)
Yr to Maturity* Debt/assets	0.070	0.311***	0.403***	0.403***	0.333*	0.630***	0.648***	0.648***
	(0.04)	(0.05)	(0.06)	(0.08)	(0.16)	(0.16)	(0.16)	(0.15)
Macro Factors								
Ln (△IPI)	−0.011	0.002	0.004	0.004	−0.021	−0.000	0.001	0.001
	(0.03)	(0.03)	(0.02)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)
Ln (△CPI)	0.022	0.012	0.010	0.010	0.026	−0.003	−0.004	−0.004
	(0.02)	(0.01)	(0.01)	(0.01)	(0.04)	(0.02)	(0.02)	(0.02)
GDP Growth	−1.474	−1.823	−1.836	−1.836	0.247	0.251	0.239	0.239
	(1.48)	(1.07)	(0.99)	(0.94)	(2.11)	(1.54)	(1.51)	(1.83)
Slope (10- and 2-year)	−6.433	−3.800	−5.402	−5.402	45.249***	29.229***	29.288***	29.288*
	(5.41)	(4.03)	(4.07)	(2.91)	(12.75)	(7.93)	(8.13)	(10.90)
_cons	0.117	−3.238***	−2.771**	−2.771**	−3.574**	−3.349	−3.521	−3.521
	(0.34)	(0.88)	(0.80)	(0.86)	(1.05)	(2.31)	(2.17)	(2.14)
N	1455	1455	1455	1455	516	516	516	516
Adj. R^2	.390		.094		.224		.065	
Firm Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Sector Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Cluster (Time)	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*No*

Notes: The dependent variable is the corporate bond/*sukuk* spread. Standard errors are in parentheses. * p < 0.05, ** p < 0.01, and *** p < 0.001. The dependent variable is ln (CB spread) and ln (*sukuk* spread) for conventional bonds and *sukuk*, respectively. (OLS) [1] Ordinary least squares, (REM) [2] random effects model, (FEM) [3] fixed effects model, (FE-DR), and [4] fixed effects with Driscoll and Kraay's (1998) standard errors.

Table 9: Determinants of Corporate Bonds/*Sukuk*–5-year Maturity

	Conventional Bonds				*Sukuk*			
	[1] OLS	[2] RE	[3] FE	[4] FE-DR	[1] OLS	[2] RE	[3] FE	[4] FE-DR
Firm-specific								
ROA	−0.659	0.588	0.442	0.442	−23.412*	−4.938	−4.938	−4.938
	(4.21)	(3.68)	(3.63)	(2.88)	(9.97)	(5.02)	(4.90)	(5.65)
Capitalization	−2.461***	0.376	0.207	0.207	2.889	−5.234*	−5.234*	−5.234*
	(0.67)	(0.57)	(0.53)	(0.52)	(2.14)	(2.32)	(2.26)	(2.94)
Leverage	−3.378***	−0.917	−0.955	−0.955	4.587	−8.577**	−8.577*	−8.577
	(0.75)	(0.85)	(0.87)	(0.85)	(2.73)	(3.27)	(3.19)	(3.79)
Interest Coverage	0.003	0.026**	0.026**	0.026**	0.042***	0.017*	0.017*	0.017
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Ln (Size)	−0.347***	0.036	0.018	0.018	−0.196	−0.438	−0.438	−0.438**
	(0.06)	(0.08)	(0.07)	(0.08)	(0.17)	(0.26)	(0.26)	(0.30)
Volatility	0.773***	0.479*	0.460	0.460	−0.142	0.302	0.302	0.302
	(0.20)	(0.24)	(0.23)	(0.23)	(0.38)	(0.20)	(0.20)	(0.20)
Bond-/*Sukuk*-specific								
Ln (Year to Maturity)	−0.003	0.100	0.085	0.085	0.186	−0.045	−0.045	−0.045
	(0.10)	(0.09)	(0.09)	(0.07)	(0.15)	(0.13)	(0.13)	(0.11)
Yr to Maturity* Debt/assets	0.073	0.116	0.118	0.118	−0.276	0.142	0.142	0.142
	(0.11)	(0.10)	(0.10)	(0.08)	(0.21)	(0.14)	(0.13)	(0.11)
Macro Factors								
Ln (△IPI)	−0.008	−0.015	−0.016	−0.016	0.187***	0.079*	0.079*	0.079
	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)
Ln (△CPI)	−0.072**	−0.052*	−0.053*	−0.053	0.067	0.037	0.037	0.037
	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)
GDP Growth	−0.013	−0.609	−0.627	−0.627	0.183	−0.642	−0.642	−0.642
	(0.95)	(0.92)	(0.88)	(0.89)	(1.93)	(1.41)	(1.38)	(1.19)
Slope (10- and 2-year)	−6.954	−5.035	−6.751	−6.751	−32.955**	6.481	6.481	6.481
	(7.83)	(6.76)	(6.56)	(7.46)	(10.04)	(7.40)	(7.22)	(5.93)
_cons	0.441	−5.905***	−5.233***	−5.233***	−3.852	4.826	5.391	5.391
	(1.07)	(1.33)	(1.14)	(1.32)	(3.21)	(3.70)	(3.58)	(4.63)
N	361	361	361	361	119	119	119	119
Adj. R^2	.291		.321		.230		.182	
Firm Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Sector Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Cluster (Time)	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*No*

Notes: The dependent variable is the corporate bond/*sukuk* spread. Standard errors are in parentheses. * p < 0.05, ** p < 0.01, and *** p < 0.001. The dependent variable is ln (CB spread) and ln (*sukuk* spread) for conventional bonds and *sukuk*, respectively. (OLS) [1] Ordinary least squares, (REM) [2] random effects model, (FEM) [3] fixed effects model, (FE-DR), and [4] fixed effects with Driscoll and Kraay's (1998) standard errors.

Table 10: Determinants of Corporate Bonds/*Sukuk*–7-year Maturity

	Conventional Bonds				*Sukuk*			
	[1] OLS	[2] RE	[3] FE	[4] FE-DR	[1] OLS	[2] RE	[3] FE	[4] FE-DR
Firm-specific								
ROA	−12.651	−13.362	−31.392**	−31.392*	−24.144***	−1.740	−1.734	−1.734
	(12.69)	(12.01)	(8.84)	(9.54)	(4.35)	(4.12)	(4.05)	(3.59)
Capitalization	−7.557	−8.381	−13.253*	−13.253*	−6.414***	−0.789	−0.763	−0.763**
	(5.52)	(5.91)	(5.23)	(4.75)	(0.65)	(2.34)	(2.31)	(2.01)
Leverage	−16.908	−17.000	−17.646*	−17.646	−6.515***	−1.379	−1.371	−1.371
	(8.94)	(9.14)	(7.72)	(8.00)	(1.15)	(1.90)	(1.88)	(1.63)
Interest Coverage	−0.021	−0.022	−0.080*	−0.080**	0.073***	0.011	0.011	0.011
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Ln (Size)	−0.874	−0.404	−0.206	−0.206	−0.760***	−0.103	−0.103	−0.103***
	(0.75)	(1.12)	(0.69)	(0.30)	(0.04)	(0.09)	(0.09)	(0.06)
Volatility	−1.120	−1.109	−3.428*	−3.428*	1.000***	−0.280	−0.280	−0.280
	(1.65)	(1.71)	(1.49)	(1.03)	(0.19)	(0.36)	(0.35)	(0.27)
Bond-/*Sukuk*-specific								
Ln (Year to Maturity)	2.552	2.915	6.358*	6.358**	−0.371	0.031	0.029	0.029
	(1.56)	(1.79)	(2.01)	(0.89)	(0.26)	(0.15)	(0.15)	(0.12)
Yr to Maturity* Debt/assets	0.632	0.479	−0.246	−0.246	0.242	0.209	0.213	0.213
	(0.52)	(0.61)	(0.65)	(0.31)	(0.16)	(0.14)	(0.14)	(0.12)
Macro Factors								
Ln (△IPI)	−0.044	−0.057	−0.037	−0.037	−0.053	0.004	0.004	0.004
	(0.09)	(0.09)	(0.04)	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)
Ln (△CPI)	0.211	0.249	0.516**	0.516**	−0.061	−0.049	−0.049	−0.049
	(0.19)	(0.17)	(0.15)	(0.11)	(0.05)	(0.05)	(0.05)	(0.05)
GDP Growth	0.765	1.048	4.182*	4.182*	−0.639	−1.773	−1.778	−1.778
	(1.87)	(1.92)	(1.80)	(1.26)	(1.51)	(1.25)	(1.23)	(1.15)
Slope (10- and 2-year)	−152.330	−160.411*	−192.160**	−192.160**	2.526	−28.711**	−28.673**	−28.673*
	(74.88)	(70.52)	(43.28)	(39.56)	(10.05)	(9.25)	(9.11)	(9.11)
_cons	7.725	1.584	−0.486	−0.486	7.419***	−1.871	−2.659	−2.659
	(14.01)	(18.45)	(10.83)	(7.12)	(0.91)	(2.55)	(2.34)	(1.97)
N	45	45	45	45	116	116	116	116
Adj. R^2	.900		.956		.874		.142	
Firm Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Sector Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Cluster (Time)	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*No*

Notes: The dependent variable is the corporate bond/*sukuk* spread. Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$. The dependent variable is ln (CB spread) and ln (*sukuk* spread) for conventional bonds and *sukuk*, respectively. (OLS) [1] Ordinary least squares, (REM) [2] random effects model, (FEM) [3] fixed effects model, (FE-DR), and [4] fixed effects with Driscoll and Kraay's (1998) standard errors.

Table 11: Determinants of Corporate Bonds/*Sukuk*–10-year Maturity

	Conventional Bonds				*Sukuk*			
	[1] OLS	[2] RE	[3] FE	[4] FE-DR	[1] OLS	[2] RE	[3] FE	[4] FE-DR
Firm-specific								
ROA	−13.065***	−2.356	−2.009	−2.009	−1.722	1.849	1.751	1.751
	(0.85)	(−1.42)	(1.43)	(1.80)	(−0.66)	(0.67)	(0.65)	(0.53)
Capitalization	−1.507***	−0.503	−0.220	−0.220	−0.781	−3.018**	−2.968**	−2.968**
	(0.24)	(−1.12)	(0.43)	(0.55)	(−1.96)	(−2.62)	(−2.83)	(−2.77)
Leverage	−1.900***	−2.172***	−2.073***	−2.073**	−1.252**	−3.962***	−4.157***	−4.157***
	(0.32)	(−3.70)	(0.58)	(0.69)	(−2.78)	(−3.97)	(−3.65)	(−4.24)
Interest Coverage	−0.000	0.000409	0.000	0.000	−0.0149***	−0.00311	−0.00281	−0.00281
	(0.00)	(0.20)	(0.00)	(0.00)	(−3.84)	(−1.50)	(−1.47)	(−1.17)
Ln (Size)	−0.330***	−0.175*	−0.122	−0.122	−0.314***	−0.638***	−0.648***	−0.648***
	(0.02)	(−2.29)	(0.06)	(0.06)	(−10.95)	(−7.11)	(−6.78)	(−6.32)
Volatility	0.757***	0.274**	0.258*	0.258*	0.291	0.145	0.141	0.141
	(0.17)	(2.71)	(0.10)	(0.10)	(1.61)	(1.06)	(1.12)	(1.66)
Bond-/*Sukuk*-specific								
Ln (Year to Maturity)	−0.149**	−0.182***	−0.200***	−0.200**	−0.0130	0.0474	0.0466	0.0466
	(0.05)	(−3.63)	(0.05)	(0.06)	(−0.38)	(1.77)	(1.79)	(1.96)
Yr to Maturity* Debt/assets	0.087	0.311***	0.403***	0.403***	0.00160	−0.00248	0.00350	0.00350
	(0.05)	(6.57)	(0.06)	(0.08)	(0.71)	(−0.80)	(0.47)	(0.48)
Macro Factors								
Ln (△IPI)	−0.013	0.00213	0.004	0.004	−0.0132	−0.00521	−0.00538	−0.00538
	(0.03)	(0.08)	(0.02)	(0.03)	(−0.31)	(−0.17)	(−0.18)	(−0.14)
Ln (△CPI)	0.017	0.0122	0.010	0.010	0.0572**	0.0306**	0.0319**	0.0319**
	(0.02)	(1.03)	(0.01)	(0.01)	(3.26)	(3.11)	(3.07)	(2.77)
GDP Growth	−1.412	−1.859	−1.836	−1.836	−1.215	−0.983	−0.973	−0.973
	(1.46)	(−1.72)	(0.99)	(0.95)	(−0.53)	(−0.61)	(−0.62)	(−0.62)
Slope (10- and 2-year)	−7.116	−3.792	−5.402	−5.402	6.701	0.102	0.330	0.330
	(5.68)	(−0.93)	(4.07)	(2.96)	(0.92)	(0.02)	(0.07)	(0.07)
Domestic dummy	−0.224***	−0.807***	0.000	0.000	−0.237*	0	0.000	0.000
	(0.04)	(−3.55)	(.)	(.)	(−2.67)	(.)	(.)	(.)
_cons	−0.030	−1.018	−2.771**	−2.771**	−0.719	4.388**	3.688**	3.688**
	(0.34)	(0.73)	(0.80)	(0.88)	(−1.07)	(2.86)	(2.84)	(3.39)
N	1455	1455	1455	1455	516	516	516	516
Adj. R^2	0.397		.094		0.399		0.131	
Firm Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Sector Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Cluster (Time)	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*No*

Notes: The dependent variable is the corporate bond/*sukuk* spread. Standard errors are in parentheses. * p < 0.05, ** p < 0.01, and *** p < 0.001. The dependent variable is ln (CB spread) and ln (*sukuk* spread) for conventional bonds and *sukuk*, respectively. (OLS) [1] Ordinary least squares, (REM) [2] random effects model, (FEM) [3] fixed effects model, (FE-DR), and [4] fixed effects with Driscoll and Kraay's (1998) standard errors.

Table 12: Sensitivity Analysis - Determinants of Corporate Bonds/Sukuk–5-year Maturity (Ownership Variables)

	Conventional Bonds				*Sukuk*			
	[1] OLS	[2] RE	[3] FE	[4] FE-DR	[1] OLS	[2] RE	[3] FE	[4] FE-DR
Firm-specific								
ROA	−10.34***	1.008	1.272	1.272	1.052	0.287	0.659	0.659
	(−8.55)	(0.55)	(0.73)	(0.70)	(0.36)	(0.14)	(0.34)	(0.26)
Capitalization	−2.322***	−1.110***	−0.609*	−0.609*	−0.292	−3.460***	−2.692*	−2.692
	(−8.39)	(−3.41)	(−2.26)	(−2.49)	(−1.12)	(−3.95)	(−2.68)	(−1.93)
Leverage	−2.696***	−1.649***	−1.090*	−1.090**	1.011**	−3.608***	−2.774**	−2.774*
	(−8.53)	(−3.62)	(−2.50)	(−2.77)	(2.80)	(−4.67)	(−3.07)	(−2.31)
Interest Coverage	−0.0127***	−0.00200	−0.00185	−0.00185	−0.0122***	−0.000463	−0.000796	−0.000796
	(−3.81)	(−0.68)	(−0.69)	(−0.57)	(−4.96)	(−0.21)	(−0.37)	(−0.30)
Ln (Size)	−0.377***	−0.141**	−0.0487	−0.0487	−0.425***	−0.312**	−0.278**	−0.278*
	(−18.88)	(−3.04)	(−1.54)	(−1.79)	(−22.08)	(−2.83)	(−2.72)	(−2.66)
Volatility	0.275	0.188*	0.170*	0.170*	0.0143	0.128	0.133	0.133
	(1.97)	(2.39)	(2.20)	(2.70)	(0.15)	(1.46)	(1.53)	(1.63)
Bond-/*Sukuk*-specific								
Ln (Year to Maturity)	−0.0465	−0.0424	−0.0390	−0.0390	0.325***	0.148*	0.161*	0.161*
	(−0.75)	(−0.64)	(−0.60)	(−0.53)	(4.22)	(2.15)	(2.31)	(2.31)
Yr to Maturity* Debt/assets	0.103	0.195	0.170	0.170	−0.776**	−0.249	−0.310	−0.310
	(0.65)	(1.32)	(1.14)	(1.01)	(−3.10)	(−1.19)	(−1.45)	(−1.73)
Macro Factors								
Ln (△IPI)	0.0494	0.0475*	0.0440	0.0440	0.0659*	0.0404	0.0403	0.0403
	(1.67)	(2.01)	(1.94)	(1.42)	(2.44)	(1.73)	(1.72)	(1.26)
Ln (△CPI)	0.0381	0.0190	0.0183	0.0183	0.0356*	0.0102	0.0113	0.0113
	(1.83)	(1.35)	(1.36)	(1.31)	(2.04)	(0.83)	(0.95)	(0.84)
GDP Growth	−1.860	−1.956	−1.933	−1.933*	−1.478	−0.944	−0.961	−0.961
	(−1.38)	(−1.89)	(−2.00)	(−2.08)	(−1.13)	(−0.89)	(−0.89)	(−0.91)
Slope (10- and 2- year)	3.394	6.046	6.771	6.771	−0.391	1.704	2.815	2.815
	(0.50)	(1.09)	(1.24)	(1.42)	(−0.06)	(0.38)	(0.66)	(0.52)
_cons	1.435***	−3.245***	−3.168***	−3.168***	−0.729	0.883	0.380	0.380
	(3.78)	(−5.18)	(−6.29)	(−6.95)	(−2.01)	(0.56)	(0.29)	(0.26)
N	361	361	361	361	119	119	119	119
Adj. R^2	.432		.026		.448		.097	
Firm Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Sector Fixed Effects	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*
Cluster (Time)	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*No*

Notes: The dependent variable is the corporate bond/*sukuk* spread. Standard errors are in parentheses. * p < 0.05, ** p < 0.01, and *** p < 0.001. The dependent variable is ln (CB spread) and ln (*sukuk* spread) for conventional bonds and *sukuk*, respectively. (OLS) [1] Ordinary least squares, (REM) [2] random effects model, (FEM) [3] fixed effects model, (FE-DR), and [4] fixed effects with Driscoll and Kraay's (1998) standard errors.

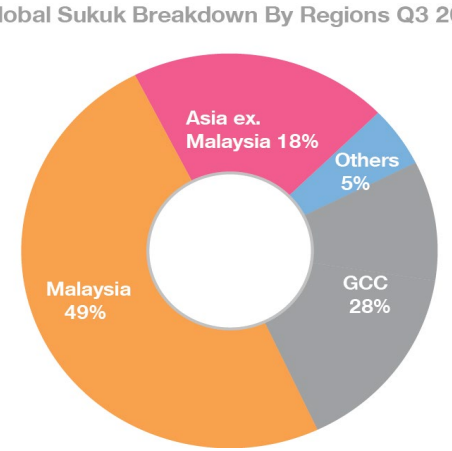
Table 13: Sensitivity Analysis - Determinants of Corporate Bonds/*Sukuk*–Non-Financial Firms

	[1] OLS	[2] RE	[3] FE	[4] FE-DR
Firm-specific				
ROA	−11.82***	0.0555	0.817	0.817
	(−11.80)	(0.03)	(0.46)	(0.44)
Capitalization	−2.003***	−1.427***	−1.183***	−1.183**
	(−9.87)	(−4.26)	(−3.63)	(−3.46)
Leverage	−2.204***	−2.316***	−2.106***	−2.106***
	(−8.51)	(−5.67)	(−4.88)	(−5.11)
Interest Coverage	0.000309	0.00345	0.00306	0.00306
	(0.18)	(1.40)	(1.34)	(1.43)
Ln (Size)	−0.337***	−0.236***	−0.192***	−0.192***
	(−19.56)	(−5.43)	(−4.96)	(−5.69)
Volatility	0.572***	0.275**	0.256*	0.256*
	(4.03)	(2.64)	(2.59)	(2.41)
Bond-/*Sukuk*-specific				
Ln (Year to Maturity)	0.0160	−0.000727	-0.00289	−0.00289
	(0.93)	(−0.03)	(−0.13)	(−0.10)
Yr to Maturity* Debt/assets	-0.00308	0.000119	0.00931	0.00931
	(-1.98)	(0.09)	(1.36)	(1.07)
Macro Factors				
Ln (△IPI)	0.0184	0.0273	0.0274	0.0274
	(0.68)	(1.22)	(1.30)	(0.93)
Ln (△CPI)	0.0121	0.00482	0.00368	0.00368
	(0.74)	(0.39)	(0.30)	(0.25)
GDP Growth	−1.142	−1.545	−1.556	−1.556
	(−0.92)	(−1.55)	(−1.64)	(−1.63)
Slope (10- and 2-year)	−2.819	−0.514	−0.728	−0.728
	(−0.48)	(−0.14)	(−0.20)	(−0.20)
CBONLY Dummy	0.130***			
	(4.34)			
_cons	0.332	-2.432***	−1.508*	−1.508**
	(1.03)	(−3.86)	(−2.53)	(−2.88)
N	3210	3210	3210	3210
Adj. R^2	.432		.026	
Firm Fixed Effects	No	Yes	Yes	Yes
Sector Fixed Effects	No	Yes	Yes	Yes
Cluster (Time)	Yes	Yes	Yes	No

Notes: The dependent variable is the corporate bond/*sukuk* spread. Standard errors are in parentheses. * p < 0.05, ** p < 0.01, and *** p < 0.001. The dependent variable is ln (CB spread) and ln (*sukuk* spread) for conventional bonds and *sukuk*, respectively. (OLS) [1] Ordinary least squares, (REM) [2] random effects model, (FEM) [3] fixed effects model, (FE-DR), and [4] fixed effects with Driscoll and Kraay's (1998) standard errors.

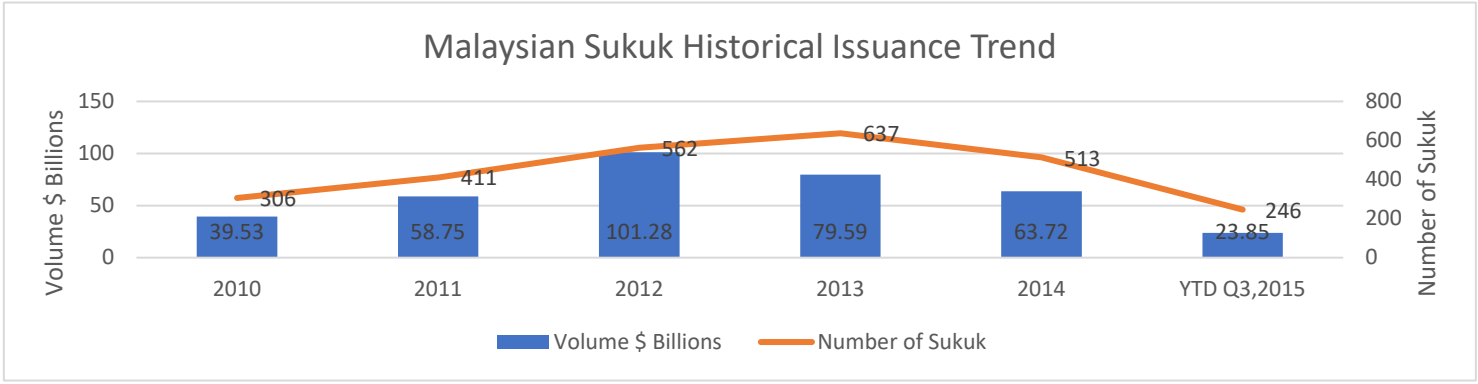
Table 14: Sensitivity Analysis - Determinants of Corporate Bonds/*Sukuk* for the Combined Sample of Corporate Bonds and *Sukuk*

Figure Appendix



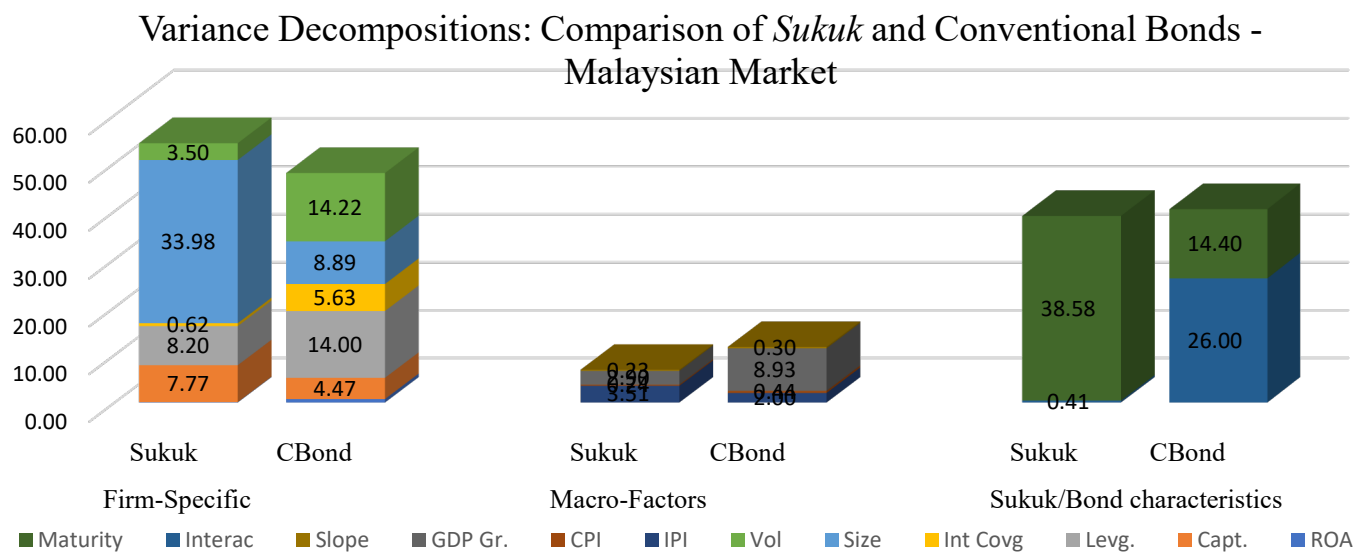
Source: *ICD Thomson Reuters (2015)*

Figure 1a: Regional Breakdown of *Sukuk* Issuance



Source: *ICD Thomson Reuters (2015)*

Figure 1b: Malaysian *Sukuk* Growth Trend



Notes: Here, CBOND: Conventional bond. The variance decomposition of bonds/*sukuk* spreads (when the unobserved individual heterogeneity has been removed) is given by:

$$1 = \frac{Cov(Spread, \beta_1 Firm_{it})}{Var(spread)} + \frac{Cov(Spread, \beta_2 Sukuk_{it}/Bond_{it})}{Var(Spread)} + \frac{Cov(Spread, Macro_t)}{Var(Spread)}$$

Firm-specific factors include: ROA: (Return on Assets); CAPT.: Capitalization ratio (Equity/Capital); Levg.: (Long-Term Debt/Total Assets); Int Covg.: Interest Coverage (EBIT/Interest Expense); Size: Total Assets; and Vol.: Equity Volatility. Macro-factors include: △IPI: Industrial Production Index; △CPI: Consumer Price Index; GDP Gr.: Annual real GDP growth; and Slope:(Difference between 10- and 2-year Malaysian Treasury Rate). *Sukuk*/Bond characteristics include: Maturity: (Years to Maturity in natural logarithms); and Interac: (Time to Maturity * Leverage).

Source: *Authors' Calculation*

Figure 2: Variance Decompositions–Comparison of *Sukuk* and Conventional Bonds- Malaysian Bond Market