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Do Debt Markets Price *Ṣukūk* and Conventional Bonds Differently?

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Abstract. A new type of debt securities called *ṣukūk* certificates have grown to US$ 840 billion in 11 financial markets as of 2011. These Islamic debt instruments share some features similar to conventional bonds, so market operators treat both as bonds. Whether it is appropriate to treat *ṣukūk* certificates as conventional bonds is empirically tested in this paper. If the yields of *ṣukūk* are the same as those of conventional bonds, Granger causality tests could confirm their equivalence. Practically the tests show otherwise. Also, the yields of *ṣukūk* instruments are significantly higher than yields of conventional bonds even after controlling issuers, rating quality and tenure in matched samples tests. Finally, *ṣukūk* issuance affects the issuing firm's beta risk significantly, which is consistent with capital structure theory. These new findings on the 10-year old Islamic debt market have regulatory and market making policy implications as to whether *ṣukūk* instruments should be classed as a *new class* of financial instruments, and *not* as bonds. Future research and market practices have to reinvestigate a number of issues anew because *ṣukūk* market is for a different class of debt.

Keywords: *Ṣukūk*, Bond, Yield curve, Yield to maturity, Islamic finance, Islamic bond, Fixed income finance, Securitization, Yield spread.

JEL Classification: Z12, G12.

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1. Introduction

This paper reports empirical findings that do not support the market's current practice that the 16-year old *ṣukūk* debt securities, which are Sharī'ah-compliant, are the same as conventional bonds. This market has grown to about US$840 billion since this type of debt funding instruments were first issued for public trading in the mid-1990s. *Ṣukūk* securities are new funding instruments traded in 11 markets across the world as traded instruments as well as in some locations as non-traded contracts issued privately in several more markets including London, Zurich, Singapore, etc., as OTC market private issues.

Ṣukūk and conventional bond securities have some similarities that led market participants, the mass media, public policy makers and some academics to describe *ṣukūk* bond certificates as being equivalent to conventional bond certificates. This is despite the former having a strict ethical filter that must be complied with(1) before issuance is approved as *ṣukūk* certificates and approval is controlled by strict legal/structuring requirements. This research poses this question: since some fundamental differences exist between these two financial instrument types, could these two be classified as equivalent instruments? The market analysts apply the conventional bond valuation theory to price these instruments. We believe they do that without realizing that the two types are different. If these are not similar, then *ṣukūk* should belong to a different class of debt securities.

The differences lie mainly in the very nature or purpose of funding as well as the way *ṣukūk* securities are structured under Sharī'ah guidelines. Both *ṣukūk* (if listed and traded) and public issue of conventional bond securities are traded in secondary markets with the same trading mechanism in the same market, as for example in Malaysia, where this paper's tests are done. Malaysia accounts for two-thirds of the world market in *ṣukūk*. *Ṣukūk* securities are priced in the market, by experts as

(1) There are some six variations in design of this new funding instrument, and these are structured differently from the conventional bonds. Essential features of this type of funding are: returns to investors are based on profit-sharing ratios agreed ahead of contract and *not* as pre-agreed fixed interest; asset backing, meaning assets to the value of lending are transferred to a special purpose company owned by the lenders; funds are to be used for specific purposes with some use of funds forbidden. For more details see **Ariff**, **Iqbal** and **Shamsher** (2012), **Jobst et. al.** (2008), **Rohmatunnisa** (2008), **Sole** (2008), **Tariq** (2004), **Tariq** and **Dar** (2007), and **Wilson** (2008).

well as investors in the market, in ways similar to the conventional bills and bonds because of the belief that these are similar.

Thus, the main purpose of this paper is to report findings on this central research question as to whether there is *empirical* evidence to support the claim that these two types of debt instruments are the same. By using the market pricing behavior of these two types of securities (while controlling the issuer, rating and tenure) it is possible to find evidence of their similarity or difference using causality modeling. This would give us support for answering the public policy question as how to treat or classify the two types of securities: are *ṣukūk* a bonds or they are a new class of funding instruments? Another test is to see if similar rated *ṣukūk* and bonds for equal term by same issuers yield same return.

In case the yields are the same for identical securities from both types, one may conclude that the existing valuation model for conventional bonds may be applicable also for these new *ṣukūk* instruments and that the two instruments are the same as bonds. If empirical results are otherwise, it raises doubt with respect to classifying them as the same.

Furthermore, since issuance of some types of *ṣukūk* securities, especially in large funding cases, may affect balance-sheet of the issuer (e.g., case of *ijārah ṣukūk, which is a form of lease funding*) the risk structure of the issuer is affected. In other words, by issuing *ṣukūk* particularly with transfer of assets to a special purpose company owned by the fund providers as asset-backed *ṣukūk* such as is the case in *ijārah*, ownership of some parts of the assets of the issuing entity is transferred to the intermediating entity (i.e., Special Purpose Vehicle, or SPV) whose ownership is vested with the fund providers as *ṣukūk*-holders. This is not the case in conventional collateralized bonds and introduces greater risk, unlike in conventional bonds. Moreover, the profit stream of a *ṣukūk*-issuing firm is not entirely dedicated to the equity-holders because parts of the profit streams belong to SPV. Some portion of this profit of the SPV is distributed to the *ṣukūk*-holders as profit shares (or as rent for lease funding in *ijārah*) instead of interest payments, which is strictly prohibited in the structuring of *ṣukūk* funding.

Thus, to capture the impact of issuance of *ṣukūk* on risk structure of the firm, a second objective of this paper is to investigate the impact of the issuance of *ṣukūk* on risk measure of the firm and discuss the possible

underlying reasons, if risk actually changes after *ṣukūk* issuance. Optimal capital structure theory (Miller and Modigliani 1961, Modigliani and Miller 1958) predicts that the impact of the funding change is contingent on whether the funding leads to loss (gain) of *tax shield value*, given the tax-deductibility of interest cost in bonds (therefore the profit share or rent in *ṣukūk*). That means the change could be either positive if the firm's new funding leads in a post-issue capital structure below the optimal level; otherwise it is negative.

The rest of the paper is organized as follows. Section 2 discusses the theoretical aspects of the study by discussing the yield to maturities as well as Granger causality modeling, and beta calculation. Since the literature on *ṣukūk* securities does not cover these issues at all, we choose to cover the relevant literature on conventional bonds and discuss potential relationship of *ṣukūk* to the conventional instruments: there is no valuation theory for this new instrument yet. Section 3 is a description of the methodology, the data set to be used. The findings are presented in Section 4 followed by concluding remarks in Section 5.

2. Theory

Conventional theory suggests that bonds are priced as per the bond valuation theory (Williams 1938). This theory suggests the theoretical value to bondholder of a conventional bond is the present value of the stream of payments – the interest coupons and the redemption value as face value - discounted by the market interest rate:

$$P = \frac{M}{(1+r)^N} + \sum_{t=1}^{N} \frac{C}{(1+r)^t} \quad (1)$$

where, P is the market price of a bond, C is the amount of pre-fixed periodic coupon payments; M is the amount of maturity payment (i.e., the face value of a bond certificate); r is the discount rate (i.e., market required yield at the time of pricing), and N is the issue tenure (i.e., number of payments).

Theory Testing

Yield-To-Maturity (YTM) is the internal rate of return earned by a bondholder who buys a bond certificate today, at market price, and holds it until the maturity, entitling the bondholder to all coupon payments as well as maturity payment (Cox, Ingersoll and Ross, 1985; Bodie, Ariff and Rosa, Marcus and Kane, 2007; Ariff, Cheng and Neoh, 2009).

If the *ṣukūk* funding instruments are the same as the above, then this valuation theory applies squarely also as the valuation theory for the *ṣukūk* instruments. Applying the above theory and deriving the yield for (i) bonds and (ii) *ṣukūk* will provide statistics to confirm if the two are priced identically. If the pricing is identical, the two are the same; otherwise the behavior of one is different from that of the other. Given the complex structuring of the *ṣukūk* with several markedly different features from those of the simple conventional bonds, it appears that the results may not be the same. By observing the difference in the pricing behavior, this issue could be tested.

Another means of testing the similarity or difference is to apply causality modeling. To test the yield of the conventional bonds traded in the same market as the *ṣukūk* certificates are causally related, we apply Granger Causality test as most appropriate. Granger causality (1969) theory implies that:

$$\begin{cases} Y_{S_t} = a_0 + a_1.Y_{S_{t-1}} + a_2.Y_{S_{t-2}} + b_1.Y_{C_{t-1}} + b_2.Y_{C_{t-2}} + \varepsilon_t \\ Y_{C_t} = a_0 + a_1.Y_{C_{t-1}} + a_2.Y_{C_{t-2}} + b_1.Y_{S_{t-1}} + b_2.Y_{S_{t-2}} + \varepsilon_t \end{cases} \quad (2)$$

where Y_{St} is yield of *ṣukūk* securities at time t; Y_{Ct} is yield of conventional bonds at time t; a_i, b_i are coefficients of regressions, and ε_t is residual term at time t.

The conventional bond market developed rapidly after the pre-World War II years in Malaysia(2).The *ṣukūk* market evolved faster since the 1990s reforms, and has rapidly grown because of its many attractions to the users. In terms of size, the *ṣukūk* market value accounted for 40 per cent of both *ṣukūk* and conventional funding markets in 2012. Total value of *ṣukūk* securities outstanding in 2012 was RM405 billion (US$135 billion) in Malaysia. Therefore, it is reasonable to predict that causality may run from conventional bond market to the *ṣukūk* market, given the larger size of the former, if the two are the same. Thus, if the causality tests establish causality, then the two markets may be characterized as

(2) The bond and share markets developed over a 70-year period in this country during the British rule of this country with Singapore as one of its cities. The conventional bond market has an outstanding value of RM521 billion (US$173 billion): the share market is capitalized at US$ 200 billion or 75% of the GDP of Malaysia. Studies have shown that market institutions such as securities commission, stock exchange, accounting institutions, regulatory oversight are sufficiently well-developed in this market. (**Ariff, Cheng** and **Neoh, 2009,** and **Ariff et al.,** 2008). Hence, the pricing behavior of this market is confirmed to be efficient.

being similar; if not these two are two different types of debt funding markets. Both common bonds and *ṣukūk* are traded in the same market under similar trading arrangements. The test statistics is the F-ratio in the Granger equation.

The second objective of the paper is to examine the impact of *ṣukūk* issuance on the market's perceived risk of the firm (i.e., firm's beta). In order to capture this effect, firm's beta is calculated as:

$$\beta_i = \frac{\mathrm{cov}\,(r_i, r_m)}{\mathrm{var}(r_m)} \qquad (3)$$

where r_i is the return on the equity and r_m is the return of the market and the denominator is the variance of market returns. Beta is calculated for pre- and post-issuance periods using one year daily observations on either side with corrections for thin-trading(3).

In order to test this objective, only *ijārah ṣukūk* issues have been included in the sample. The rational for this filtering is based on the legal principle that *ijārah ṣukūk* contracts require the issuer to transfer the ownership of an asset to the SPV. In other words, by issuing *ijārah ṣukūk*, the balance-sheet of the issuer will be affected, introducing more risk.

The third objective of the paper is to test the applicability of conventional pricing models for *ṣukūk* securities. *Ṣukūk* securities, if they possess identical characteristics to conventional bonds, should be valued by models that have been developed since long for conventional bond securities. The market analysts actually use the conventional models. Thus, in any test, conventional models should generate values of *ṣukūk* securities based on their respective cash flows. Such generated values should be in line with the market price, assuming that market is correctly pricing the *ṣukūk*. This hypothesis is tested in this section. It is unacceptable to have two different values for a particular security at a point in time under the condition (i) market is pricing the bonds correctly and (ii) *ṣukūk* securities are the same as conventional securities. Hence, if *ṣukūk* securities are merely conventional bonds converted to be Sharī'ah-compliant, the prices in the market and the prices applying the theory must be the same for *ṣukūk*. The only reason the prices may differ in the case of *ṣukūk* from theory prices is due to either that the market is unable

(3) The beta is computed using Sharpe (1964) Market Model.

to price it correctly or (ii) the conventional theories are not applicable to *ṣukūk* valuation. This has important implication, so doing these tests by assuming the market belief that the conventional models could be used for *ṣukūk* is a necessary step to demonstrate if this belief is well founded(4).

3. Methodology and Test Models

In order to investigate the possible existence of a difference(s) between yields to maturity (YTM) of *ṣukūk* securities and YTM of conventional bonds for the same term, rating and same issuer, pair-sampled t-tests are conducted on pairs of data consisting of yields to maturity of *ṣukūk* certificates *and* bonds. The test is the mean difference t-test using the standard error of the two samples. In order to test the first objective, parametric paired sample t-tests are conducted using yields of pairs of *ṣukūk* and the conventional securities with the same characteristics (same issuer, same rating and maturity).

The value of t-statistic for each pair is calculated using Equation 4:

$$t = \frac{\bar{Y}_S - \bar{Y}_C}{\sqrt{\frac{\sigma_S^2}{n} + \frac{\sigma_C^2}{n} - \frac{2\,\sigma_S \sigma_C\, \rho_{S.C}}{n}}} \qquad (4)$$

where,

t : t-statistics,
Y_s : Mean yield to maturity of *ṣukūk* securities,
Y_c : Mean yield to maturity of conventional bonds,
σ_s : standard deviation of yield of *ṣukūk*,
σ_c : standard deviation of yield of conventional bond, and
$\rho_{s.c}$: correlation coefficient between yield of *ṣukūk* and conventional bond.

(4) A recent discussion paper notes that the share prices of *ṣukūk* issuing firms react negatively around the time of *ṣukūk* issuance: Godlewski, et al. (2011). They interpret this as a signal of the unsatisfied demand for this form of debt. It is equally possible that the issuance of *ṣukūk* removes part of the issuers' assets to be held away from the firm in a special purpose company; hence the market considers this as bad news.

This test was performed on various types of issuers including sovereign (Government of Malaysia, and Central Bank of Malaysia)[5] quasi-sovereign (Cagamas Bhd,[6] Khazanah Nasional Bhd)[7] Financial institutions (AAA Rated) and Corporate (Guaranteed AAA, and Corporate AAA) for various maturities ranging from 3 month to 20 years.

YTM data for first working day of each month for the period of August 2001 to April 2012 were collected from *BondStream* database[8]. Data for daily prices and market index (Kuala Lumpur Composite Index, KLCI) were obtained from DataStream. The statistical tests were done using EViews software.

Using MATLAB software, prices are calculated based on the conventional models applied to determine the theoretical prices of *ṣukūk*. Those prices are averaged for each class of *ṣukūk*, and then compared with the average market prices of each class of securities. In order to use conventional models and to avoid the issue of clean price, samples are limited to trades that occurred over few days before payment of promised regular payments: this is because choosing observation far away from coupon dates would distort the valuation prices. Hence, there is a possibility that a particular security is considered more than once, due to availability of trade data for more than one period. Moreover, samples are limited to Malaysia where data for daily yields to maturity of market-traded *ṣukūk* (used as discount rates) are available for each type of issuers with different ratings and maturities.

4. Findings

A. Descriptive Statistics

Summary descriptive statistics for various *ṣukūk* securities and conventional bonds are presented in Table 1 (which is a summary of Table 1A, 1B, 1C, and 1D as presented in Appendices). In market level, as the statistics suggest the mean yield of *ṣukūk* securities for all types of issuers and for all forms of maturities is 3.98 per cent. However, it varies

(5) Bank Negara Malaysia or BNM.
(6) Malaysian national mortgage corporation.
(7) Investment holding arm of the Government of Malaysia.
(8) Product of Bond Pricing Agency of Malaysia. These yield data series from the market is similar to the YTM that could be computed using the available procedures such as Cox, Ingersoll and Ross (1985). The market series have been checked and verified to be correct.

between the minimum of 2.84 per cent (*ṣukūk* securities issued by BNM with 3 months maturity) and the maximum of 5.77 per cent (*ṣukūk* securities issued by AAA rated corporate with 20 years maturity). On the other hand, the mean yield of conventional bonds for all types of issuers and for all forms of maturities is 3.98 per cent. But on further examination of each type of *ṣukūk* versus its bond pairs, the means and medians are quite different. However, it varies between the minimum of 2.83 per cent (conventional bills issued by BNM with 3 months maturity) and the maximum of 5.69 per cent (conventional bonds issued by AAA rated corporate with 20 years maturity).

Table 1: Descriptive Statistics of *Ṣukūk* vs. Conventional Bonds

(Table 1 presents the descriptive statistics of yield of various classes of issuers at the aggregated level. Statistics provided are: the means, medians, and mode as central tendency measures. Standard deviation, range, minimum and maximum is also included to illustrate the dispersion behavior of the data set.)

	Mean	Median	Mode	Std. Dev.	Range	Min	Max
Government							
Conventional	3.55	3.57	3.45	0.69	3.36	1.82	5.18
Ṣukūk	3.59	3.62	3.69	0.69	3.36	1.82	5.18
Bank Negara Malaysia							
Conventional	2.92	2.94	1.92	0.54	2.15	1.82	3.97
Ṣukūk	2.94	2.96	2.84	0.55	2.25	1.82	4.07
Cagamas							
Conventional	4.01	3.92	3.57	0.79	4.20	2.21	6.41
Ṣukūk	4.03	3.95	3.94	0.80	4.20	2.21	6.41
Khazanah Nasional							
Conventional	3.75	3.75	3.60	0.72	3.57	1.94	5.51
Ṣukūk	3.74	3.75	4.23	0.72	3.57	1.94	5.51
AAA Financial Institutions							
Conventional	4.36	4.23	3.80	0.89	4.29	2.26	6.55
Ṣukūk	4.37	4.24	4.19	0.93	4.70	2.22	6.92
AAA Corporate Guaranteed							
Conventional	4.28	4.16	3.60	0.86	4.29	2.26	6.55
Ṣukūk	4.25	4.13	4.19	0.87	4.44	2.22	6.66
AAA Corporate							
Conventional	4.37	4.25	4.24	0.89	4.45	2.28	6.73
Ṣukūk	4.35	4.20	4.38	0.93	4.45	2.24	6.69

At issuer level, highest mean yields of *ṣukūk* securities (for all issue tenures) is for AAA rated financial institutions' issued *ṣukūk* securities with 4.36 per cent, while the lowest mean yield is for *ṣukūk* issued by

Bank Negara Malaysia with 2.93 per cent. On the other hand, the highest conventional mean yield is for AAA rated corporate issuers with 4.37 per cent, while the lowest mean yield is for conventional bills and notes issued by Bank Negara Malaysia with 2.91 per cent.

At particular issue level, minimum mean of *ṣukūk* yield is 2.84 per cent which is for 3-month maturity securities issued by BNM. However, maximum average *ṣukūk* yield is 5.77 per cent which is for 20 years maturity securities issued by AAA rated corporate issuers. On the other hand, minimum average conventional yield is 2.83 per cent which is for the 3-month maturity securities issued by either BNM or government of Malaysia (similar to *ṣukūk* issues). However, maximum average conventional yield is 5.69 per cent, which is for 20 years maturity securities issued by AAA rated corporate issuers.

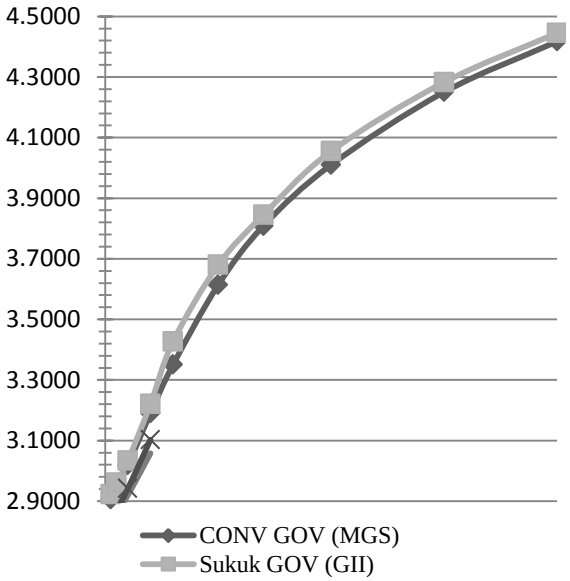
The median of yields of *ṣukūk* securities for all types of issuers and for all forms of maturities is 3.75 per cent. However, it varies between the minimum of 2.90 per cent (*ṣukūk* securities issued by BNM with 3 months maturity) and the maximum of 5.90 per cent (*ṣukūk* securities issued by AAA rated corporate with 20 years maturity). On the other hand, the median of yields of conventional bonds for all types of issuers and for all forms of maturities is 3.76 percent. Again, on details, one could see marked differences in different issue-types. However, it varies between the minimum of 2.90 per cent (conventional bills issued by BNM with 3 months maturity) and the maximum of 5.68 (conventional bonds issued by AAA rated financial institutions with 20 years maturity).

The mean of standard deviation of yields of *ṣukūk* securities for all types of issuers and for all forms of maturities is 0.44 per cent. However, it varies between the minimum of 0.29 (*ṣukūk* securities issued by AAA rated corporate guaranteed with 3 years maturity) and the maximum of 0.66 per cent (*ṣukūk* securities issued by AAA rated financial institutions with 15 years maturity). On the other hand, the mean of standard deviation of yields of conventional bonds for all types of issuers and for all forms of maturities is 0.43 per cent. However, it varies between the minimum of 0.31 per cent (MGS conventional bonds with 5 years maturity) and the maximum of 0.57 per cent (conventional bills issued by BNM with 3 months maturity).

B. Yield Curves

The results of the analyses are presented in this section. The yield curves are fitted and presented in four figures. Yield curve is the relation between cost of borrowing and time to maturity of a security for a given issuer. Yield curves for *ṣukūk* securities and conventional bonds issued by various issuers are plotted as in Figure 1A to Figure 1D. The plots are presented from YTM of (i) conventional against (ii) *ṣukūk* issues in four graphs. The four graphs are respectively for sovereign (government), quasi-sovereign (agencies), financial institution, and corporate issuers. The four issuer types are of increasingly higher risk rating with sovereign being the lowest risk – therefore with the lowest yields – on the one end, and the AAA corporate issues at the other end. This shows that both *ṣukūk* and bonds share similar hierarchical risk well known in the literature between risk-free and risky issues.

Figure: (1-*A*) *Yield Curve for Ṣukūk Securities vs. Conventional Bonds*



As Figure 1(A) suggests, the yields of Government Islamic Issues (GII) are higher than those of conventional bonds issued by the same issuer (Malaysian Government Securities, or MGS). The difference between *ṣukūk* yield and conventional bond yield tends to be larger as maturities increase from 2 years towards 15 years. The maximum

difference between yields of *ṣukūk* securities and conventional bonds issued by government is for securities with 3 years maturities. The difference is 7.64 basis points. Figure 1(A) also shows the yield curve of the BNM (Bank Negara Malaysia, the central bank) issued *ṣukūk* securities as well as conventional securities. These securities are only issued with maturities up to two years. As the graph shows the yield of former is higher than that of conventional yields, for all maturities. Moreover, difference between these yields increases as the maturity of the pair of securities increases. The maximum difference between yield of *ṣukūk* securities and conventional ones issued by BNM is 4.46 basis points for securities with 2 years maturity. For a $1000 face value, the *ṣukūk* yields $4.46 *more* than the conventional bonds although the issuer is the same, the term is the same and the rating is the same.

Figure: (1-B) *Yield Curve of Quasi-Government (Agency) Issued Securities*

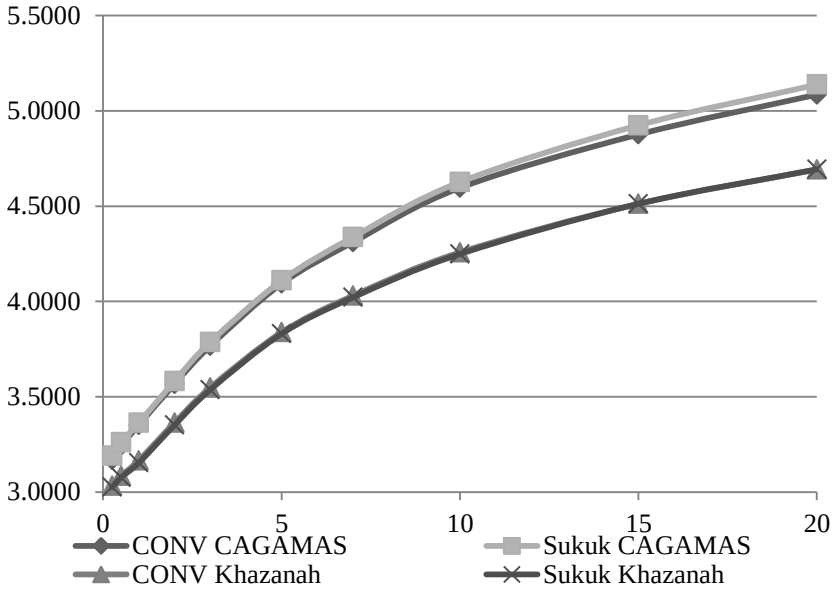


Figure 1(B) shows the yield curves of securities issued by quasi-government (i.e., government agencies) and firms namely such as Cagamas Berhad and Khazanah Nasional Berhad. The yields of *ṣukūk* securities issued by Cagamas Berhad are higher (see the graph) than the yield of Cagamas conventional bonds. This difference increases as the tenure of the securities grows beyond 5 years. The maximum difference

between yields issued by Cagamas occurs at 20 years maturities: it is 5.25 basis points. In contrast to Cagamas securities, yields of Khazanah Nasional issued securities show a very small difference. The maximum difference between yields of securities issued by Khazanah Nasional is for securities with 1- or 2-year maturities with -1.23 basis points. Interestingly the yield is lower for *ṣukūk*. For a $1000 face value, the *ṣukūk* yields $1.23 *lower* than the conventional bond although the issuer is the same, the term is the same and the rating is the same.

Figure: (A-C) *Yield Curve of Financial Corporate (AAA Rated) Issued Securities*

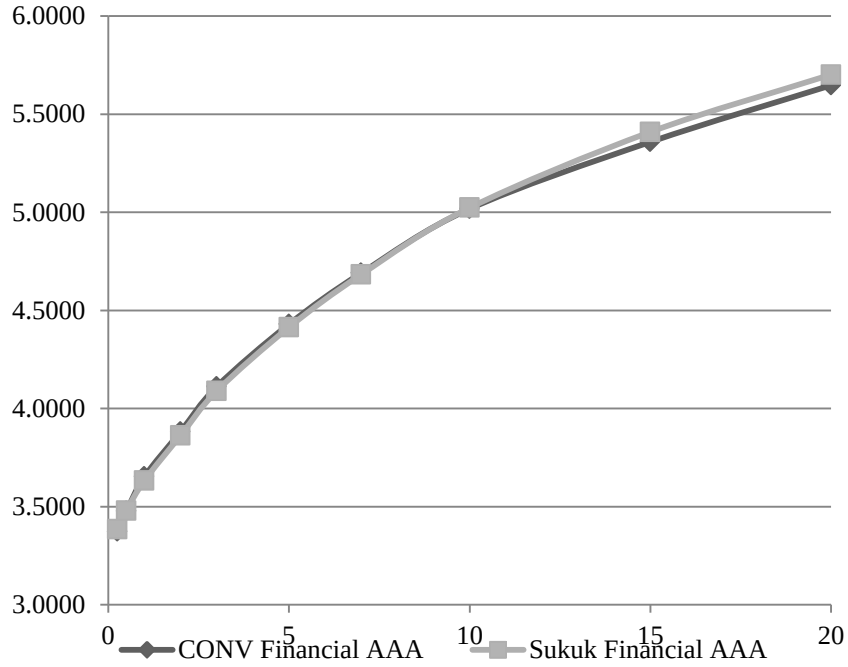


Figure 1 (C) shows the yield curves of securities issued by AAA rated financial institutions. Yield of *ṣukūk* securities tend to be very close to yields of conventional bonds for securities with maturities less than 10 years. However, for securities with longer maturity, yields of *ṣukūk* are higher than those of conventional bonds. The maximum difference between yields of securities issued by financial institutions with AAA rating is for 20 years maturities is 5.44 basis points. For a $1000 face

value, the *ṣukūk* yields $5.44 *more* than the conventional bonds although the issuer is the same, the term is the same and the rating is the same.

Figure: (A-D ***Yield Curve of Corporate (AAA Rated) Issued Securities***

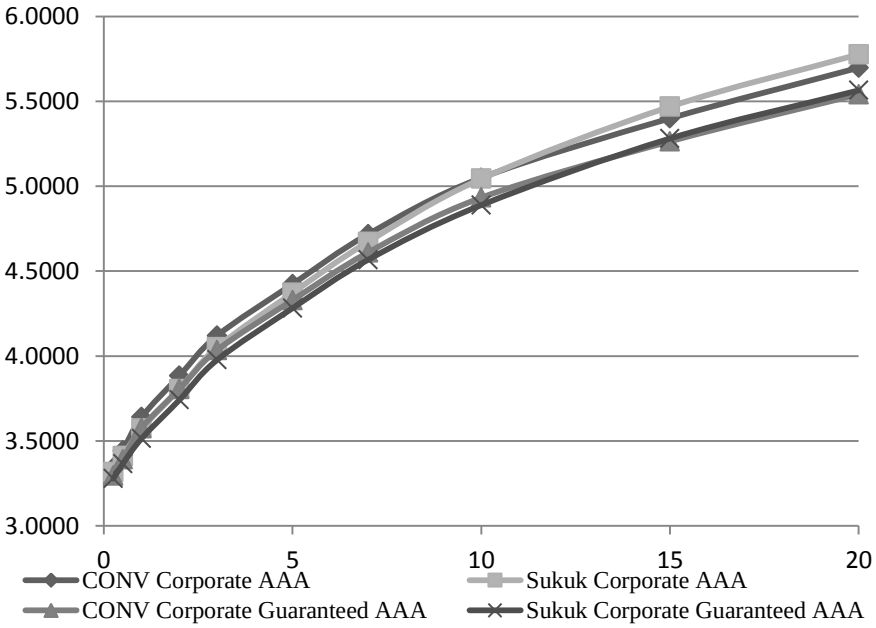


Figure 1(D) shows the yield curves of securities issued by AAA rated private corporate issuers. Yield curve is generated for both guaranteed securities as well as general forms of securities. For corporate issues, yields of *ṣukūk* securities are *less* than yields of conventional bonds for maturities less than 10 years: it is *more* for periods beyond 10 years. The maximum difference between yields of *ṣukūk* securities and conventional bonds issued by corporate issuers with maturities less than 10 years is for those with 2 years maturity with a -7.81 basis points. That means that the *ṣukūk* holders get $7.81 less for each face value of $1000. However, the maximum amount for securities with maturities longer than 10 years is +7.86 basis points for securities with 20 years maturity. That means the *ṣukūk* holders gain $7.86 by investing in *ṣukūk*. Long-dated *ṣukūk* securities are perceived by the market as being more risky, thereby attracting higher yields. Long dated *ṣukūk* are perhaps more risky given the risk of greater uncertainty beyond 10 years. It is puzzle why the same firms issuing short-dated securities provide a safer investment.

For corporate *guaranteed* issues, yield appears to be less than the yield of conventional bonds with maturities less than 15 years. However, yield of *ṣukūk* securities is more than yield of conventional bonds with maturities equal to or more than 15 years. The lower yield is consistent with the guarantee making the issue less risky. The higher yields for long-dated maturity and for the *ṣukūk* instruments are perhaps due to the inherent greater uncertainty. The maximum difference between yields of guaranteed *ṣukūk* securities and conventional guaranteed bonds issued by corporate issuers with maturities less than 15 years is observed for securities with 2 years maturities with -6.49 basis points: that means a lower payoff of $6.49 for $1000 face value. However, the maximum amount of this figure for securities with maturities longer than 10 years is +2.32 basis points (or $2.32) for securities with 20 years maturity.

C. Comparison of Yields of Ṣukūk Securities and Conventional Bonds

Results of the paired sample t-tests are summarized in Table 2 (A, B, C, and D), which is divided into two panels: one for test of means and the other for test of medians with further calculations done based on both. We perform test of median to overcome the criticism that the test of mean is likely to have errors due to the distribution of yields being leptokurtic.

Mean Yields: Out of the 64 tested pairs of mean yields of *ṣukūk* and conventional bonds, 47 cases (*i.e.* 73 per cent of all pairs) showed significant differences in their yields to maturities. In 32 cases, the null hypotheses were rejected at 1 per cent significance levels. Thus, one can conclude that the yield to maturity of *ṣukūk* securities differ from conventional bond counterparts, where the issuer and the issue tenure the same. Although, from a general perspective, the yields of *ṣukūk* differ from the yields of conventional bonds, this is not exactly the same for all issuers. This variation in the significance of difference between means of yields of *ṣukūk* and conventional bonds, suggest that issuer type may have some impact on the yield of *ṣukūk* security.

Median Yields: Similar tests applied on the median of yields of *ṣukūk* and conventional bonds are presented here. Out of 64 pairs of securities, 38 pairs (*i.e.* 60%) showed a significant difference between median of the yields of *ṣukūk* securities and conventional bonds: please see columns labeled “t-stat”. Moreover, for 30 pairs, the difference was significant at 0.01 significance levels. In other words, the null hypothesis

(yields of *ṣukūk* and conventional bonds are equal, holding the issuer and tenure the same) is rejected in 38 cases out of 64 cases.

Mean yield of *ṣukūk* and conventional bond is significantly different for all forms of securities issued by Government or BNM (see Table 2A). The difference between means is a positive figure, indicating that *ṣukūk* securities tend to yield more than conventional bonds issued by Government of Malaysia or Bank Negara Malaysia, *ceteris paribus*. Median of yields of *Ṣukūk* securities and conventional bonds issued by Government of Malaysia are significantly different for only 6 tested pairs. Difference is positive except for issues with 1 or 2 year maturities. However, median of yields of *Ṣukūk* securities and conventional bonds issued by government with 3 or 6 months or 20 years maturities are equal; hence, their difference cannot be tested by means of t-test on their medians. In a similar fashion, for securities issued by BNM, medians of yields of *ṣukūk* securities do not significantly differ from medians of yields of conventional bills.

For securities issued by government agencies such as Cagamas Bhd, mean yields of *ṣukūk* securities and conventional bonds are significantly different except for securities with 1 or 2 years maturity (Table 2B). The difference between means is a positive figure, indicating that *Ṣukūk* securities tend to yield more than conventional bonds issued by Cagamas Berhad, *ceteris paribus*. However, mean of yield of *ṣukūk* and conventional bonds is significantly different for only 5 pairs of securities issued by Khazanah Nasional (6 months, 1, 2, 3, and 7 years maturity).

The difference between means is a negative number for securities with 10 years maturity or less, while, for securities with 15 years maturity or more, the difference is positive. In other words yield of *ṣukūk* securities issued by Khazanah Nasional is less than its conventional bonds only for issues with less than 10 years maturity. For the securities with long term maturities (15 or 20 years) the mean yield is more than the conventional bonds, *ceteris paribus*.

Median yield of *ṣukūk* securities issued by Cagamas Bhd is significantly different from the median of its conventional bonds only for issues with maturities of 5 years, or more than 10 years. The difference between median of *ṣukūk* securities and conventional bonds issued by Cagamas Berhad is positive, indicating that *ṣukūk* securities, generally, yield higher than their conventional counterparts, *ceteris paribus*. Median

of yields of *ṣukūk* securities issued by Khazanah Nasional Berhad is significantly different from their conventional counterparts except for securities with maturity of 15 years or more. In contrast to Cagamas issued securities, difference between median of *ṣukūk* securities and conventional bonds issued by Khazanah is negative for issues with maturity of 10 years or less.

Table 2B: Paired Samples t-Test Results: Government Agencies

Table 2B provides results of paired sample t-tests on pairs of securities issued by quasi-sovereign issuers for the same period of time, one through *ṣukūk* structure and the other using conventional bond structures. Tests investigate the equality of means (left panel) as well as median (right panel) of the pairs of parameter estimates. In each panel, mean (or median) of yield of *ṣukūk*, conventional bonds and their differences are presented before the test statistics. Statistically significant pairs are identified using confidence levels. Results are interpreted accordingly in the paper.

	Mean				**Median**			
	Ṣukūk	Conv	Δ (*Ṣukūk* - Conv)	t-Stat	*Ṣukūk*	Conv	Δ (*Ṣukūk* - Conv)	t-Stat
Cagamas Berhad								
3M	3.1910	3.1686	0.0223	2.554**	3.1900	3.1900	0.0000	0.000
6M	3.2605	3.2417	0.0188	2.529**	3.2300	3.2200	0.0100	1.348
1Y	3.3627	3.3516	0.0111	1.385	3.3300	3.3300	0.0000	0.000
2Y	3.5815	3.5669	0.0146	1.606	3.5000	3.5000	0.0000	0.000
3Y	3.7863	3.7662	0.0201	1.824*	3.6800	3.6700	0.0100	0.906
5Y	4.1098	4.0932	0.0165	1.794*	4.0000	3.9800	0.0200	2.169**
7Y	4.3377	4.3105	0.0272	3.039***	4.2200	4.2100	0.0100	1.119
10Y	4.6265	4.5963	0.0302	3.186***	4.5200	4.4800	0.0400	4.213***
15Y	4.9240	4.8758	0.0481	3.844***	4.9000	4.8000	0.1000	7.984***
20Y	5.1375	5.0851	0.0525	3.627***	5.0800	4.9900	0.0900	6.221***
Khazanah Nasional Berhad								
3M	3.0248	3.0316	-0.0068	-1.121	3.0600	3.0600	0.0000	0.000
6M	3.0760	3.0847	-0.0086	-1.870*	3.1100	3.1200	-0.0100	-2.164**
1Y	3.1535	3.1658	-0.0123	-1.780*	3.1700	3.1800	-0.0100	-1.441
2Y	3.3512	3.3636	-0.0123	-2.297**	3.3100	3.3100	0.0000	0.000
3Y	3.5364	3.5474	-0.0110	-1.976*	3.4700	3.4800	-0.0100	-1.799*
5Y	3.8302	3.8377	-0.0074	-1.259	3.8000	3.8000	0.0000	0.000
7Y	4.0210	4.0296	-0.0086	-1.762*	3.9600	3.9700	-0.0100	-2.038**
10Y	4.2490	4.2573	-0.0083	-1.392	4.2200	4.2200	0.0000	0.000
15Y	4.5121	4.5120	0.0001	0.018	4.4800	4.4600	0.0200	2.973***
20Y	4.6932	4.6922	0.0010	0.124	4.7400	4.7000	0.0400	5.012***

Note: *, **, ***: significant at 0.10, 0.05 and 0.01 acceptance level, respectively.

Mean of yield of *ṣukūk* securities and conventional bonds issued by AAA rated financial institutions (Table 2C) are significantly different only for 3 pairs (1, 15 or 20 years maturity). The difference between means is a positive number for securities with 6 months maturity or less, or with 10 years or more. However, for securities with maturity between 1 to 7 years, the difference is negative. In other words mean of yield of *ṣukūk* securities issued by AAA rated financial institutions is higher than its conventional bonds for issues with 6 month or less maturity or with 10 years or more maturity. And for the securities with maturities between (1 to 10 years) the mean of yield of *ṣukūk* securities is less than the conventional bonds, *ceteris paribus*. Median yield of *ṣukūk* securities issued by AAA rated financial institutions is significantly different from median of yields of conventional bonds for maturities of 1, 2, 3, 7, 10, and 20 years. The difference is negative for issues with maturity of at most 10 years, and is positive for issues with maturity of 15 years or more. This indicates that the median yield of *ṣukūk* securities is less than their conventional counterparts for maturities of 10 years, or less, *ceteris paribus*.

Table 2C: Paired Samples t-Test Results: Financial Institutions

Table 2C provides results of paired sample t-tests on pairs of securities issued by financial institutional investors for the same period of time, one through *ṣukūk* structure and the other using conventional bond structures. Tests investigate the equality of means (left panel) as well as median (right panel) of the pairs of parameter estimates. In each panel, mean (or median) of yield of *ṣukūk*, conventional bonds and their differences are presented before the test statistics. Statistically significant pairs are identified using confidence levels. Results are interpreted accordingly in the paper.

	Mean				**Median**			
	Ṣukūk	Conv	Δ (*Ṣukūk* - Conv)	t-Stat	*Ṣukūk*	Conv	Δ (*Ṣukūk* - Conv)	t-Stat
AAA rated Financial								
3M	3.3847	3.3725	0.0122	0.907	3.4800	3.4600	0.0200	1.484
6M	3.4794	3.4764	0.0030	0.224	3.5100	3.5100	0.0000	0.000
1Y	3.6326	3.6526	-0.0200	-1.808*	3.5600	3.5900	-0.0300	-2.713***
2Y	3.8626	3.8821	-0.0195	-1.395	3.6800	3.7200	-0.0400	-2.861***
3Y	4.0893	4.1114	-0.0221	-1.481	3.9200	3.9500	-0.0300	-2.010**
5Y	4.4141	4.4298	-0.0157	-1.146	4.3100	4.3100	0.0000	0.000
7Y	4.6833	4.6906	-0.0073	-0.583	4.5600	4.6000	-0.0400	-3.203***
10Y	5.0233	5.0181	0.0052	0.438	4.9100	4.9500	-0.0400	-3.379***
15Y	5.4096	5.3588	0.0509	2.460**	5.3300	5.3200	0.0100	0.484
20Y	5.7020	5.6475	0.0544	2.572**	5.7100	5.6700	0.0400	1.890*

Note: *, **, ***: significant at 0.10, 0.05 and 0.01 acceptance level, respectively.

For AAA rated corporate issued securities, mean of yield of *ṣukūk* securities and conventional bonds are significantly different for all cases except for 10-years maturity securities (Table 2D). The difference between means is a negative number for securities with 7 years maturity or less, while, for securities with 10 years maturity or more, the difference is positive. In other words mean of yield of *ṣukūk* securities issued by AAA rated corporate issuers is lower than its conventional bonds for issues with 7 years or less maturity. And for the securities with long term maturities (10 years and more) the mean of yield of *ṣukūk* securities is more than the conventional bonds, *ceteris paribus*. For AAA rated corporate guaranteed securities, the yield of *ṣukūk* securities and conventional bonds are significantly different for all cases with maturity of shorter than 15 years. The difference between means is a negative number for securities with 10 years maturity or less, while, for securities with 15 years maturity or more, the difference is positive. In other words yield of *ṣukūk* securities issued by AAA rated guaranteed corporate issuers is lower than its conventional bonds for issues with 10 years or less maturity. And for the securities with long term maturities (15 years and more) the mean of yield of *ṣukūk* securities is more than the conventional bonds, *ceteris paribus*.

Median of yields of *ṣukūk* securities issued by AAA rated corporate issuers is significantly different from median of yields of conventional bond issued by same class of issuer, except for securities with 7 years maturities (see Table 2D). Difference between median of *ṣukūk* securities and conventional bonds is negative for issues with at most 7 years maturity. However, the difference is positive for issues with at least 10 years maturity. For guaranteed securities issued by AAA rated firms, median of yields differ from the median of yield of conventional bonds except for issues with maturity of 15 and 20 years. The difference between median of yields of *ṣukūk* securities and conventional bonds is negative for issues with maturity of at most 15 years. This indicate that the median of yields of *ṣukūk* guaranteed securities issued by AAA rated firms is less than the median of yields of conventional bonds issued by same type of issuer, *ceteris paribus*.

Table 2D: Paired Samples t-Test Results: Corporate Issuers

Table 2D provides results of paired sample t-tests on pairs of securities issued by corporate issuers for the same period of time, one through *ṣukūk* structure and the other using conventional bond structures. Tests investigate the equality of means (left panel) as well as median (right panel) of the pairs of parameter estimates. In each panel, mean (or median) of yield of *ṣukūk*, conventional bonds and their differences are presented before the test statistics. Statistically significant pairs are identified using confidence levels. Results are interpreted accordingly in the paper.

	Mean				**Median**			
	Ṣukūk	Conv	Δ (*Ṣukūk* - Conv)	t-Stat	*Ṣukūk*	Conv	Δ (*Ṣukūk* - Conv)	t-Stat
AAA rated Corporate								
3M	3.3169	3.3414	-0.0244	-5.098***	3.3100	3.3500	-0.0400	-8.342***
6M	3.4101	3.4420	-0.0319	-6.422***	3.3900	3.4300	-0.0400	-8.064***
1Y	3.5719	3.6404	-0.0685	-6.877***	3.4900	3.5700	-0.0800	-8.030***
2Y	3.8049	3.8831	-0.0781	-6.406***	3.7000	3.7400	-0.0400	-3.279***
3Y	4.0510	4.1200	-0.0690	-5.637***	3.9800	4.0100	-0.0300	-2.450**
5Y	4.3720	4.4233	-0.0514	-5.152***	4.3400	4.3800	-0.0400	-4.013***
7Y	4.6721	4.7169	-0.0448	-6.545***	4.6200	4.6300	-0.0100	-1.460
10Y	5.0437	5.0493	-0.0056	-0.485	5.0500	4.9900	0.0600	5.236***
15Y	5.4681	5.3993	0.0689	2.653***	5.5300	5.4000	0.1300	5.007***
20Y	5.7762	5.6975	0.0786	2.797***	5.9000	5.6800	0.2200	7.823***
AAA rated Corporate Guaranteed								
3M	3.2780	3.2959	-0.0179	-2.860***	3.2900	3.3300	-0.0400	-6.390***
6M	3.3656	3.3912	-0.0257	-5.114***	3.3700	3.4100	-0.0400	-7.966***
1Y	3.5148	3.5769	-0.0621	-7.076***	3.4700	3.5100	-0.0400	-4.558***
2Y	3.7414	3.8063	-0.0649	-6.860***	3.6500	3.6800	-0.0300	-3.169***
3Y	3.9773	4.0349	-0.0577	-6.214***	3.9100	3.9300	-0.0200	-2.156**
5Y	4.2820	4.3293	-0.0473	-7.085***	4.1900	4.2300	-0.0400	-5.994***
7Y	4.5668	4.6096	-0.0428	-6.935***	4.4900	4.5300	-0.0400	-6.476***
10Y	4.8888	4.9327	-0.0440	-4.594***	4.8200	4.9100	-0.0900	-9.407***
15Y	5.2807	5.2638	0.0169	1.030	5.2800	5.3000	-0.0200	-1.218
20Y	5.5642	5.5410	0.0232	1.342	5.5600	5.5400	0.0200	1.156

Note: **, ***: 0.05 and 0.01 acceptance level, respectively.

In summary, these results suggest that the perception that *ṣukūk* are Islamic bonds is not statistically supported. In other words, *ṣukūk* and conventional bonds are two different types of financial products as priced by the market players, although they have some similar features. Thus, a distinct and separate model for valuation of *ṣukūk* is required, a research issue that emanates from our finding. This could be due to basic differences in the cash flows and also in the asset-backing principle of

ṣukūk. These are yet investigated, so a study of why three-quarters of issues are priced differently is an effort worthy of undertaking as a serious study.

D. Granger Causality Test of Yields of Ṣukūk and Conventional Bonds

Previous section showed that the mean yield of *ṣukūk* is statistically different from yield of conventional bonds. Since each pair of securities is issued by the same issuer for the same period of time, it is expected that the correlation between yields of these securities may be high. This may be a cornerstone for a hypothetical argument that they have causal relations. As a result, one may wish to test if changes in one can cause change in the other series. In other words, one may want to test for Granger Causality (Granger 1969) between yields of *ṣukūk* securities and conventional bonds.

In order to test the causal relationship between yields of *ṣukūk* and conventional counterparts, two Granger causality tests were conducted on each pair of securities. First, it is tested that change in yield of *ṣukūk* can cause change in yield of conventional bonds. Second, it is tested that change in yield of conventional bonds can cause change in yield of *ṣukūk*. In other words, the test is that the yields of conventional bonds Granger cause yields of *ṣukūk*. Results of pair-wise Granger causality test on each pair is presented in Table 3.

The first test conducted was to check for availability of Granger causal relation between *ṣukūk* and conventional bonds. The null hypothesis tested was "yield of *ṣukūk* security does not Granger cause the yield of conventional bond counterparts". As the figures in Table 3 suggest, out of 64 pairs of securities tested, in only 16 pairs the null hypothesis are rejected at 0.05 significance level. In other words, yields of *ṣukūk* securities Granger cause yield of conventional bonds in only 16 out of 64 pairs (or 25 per cent). This indicates that one may not generally conclude that yield of *ṣukūk* securities Granger cause the yield of conventional bond counterparts.

Results show that yield of *ṣukūk* issued by Government (6 months and 3 years), Cagamas (2 years, 3 years, and 5 years), Khazanah (6 months), AAA rated financial institutions (3 months, 6 months, and 1 year), AAA rated guaranteed corporate (6 moths, 1 year, and 7 years), and AAA rated corporate (1 year, 5, years, 7 years, and 10 years)

Granger cause their conventional bonds counterpart. Results do not show a concrete pattern in terms of issuer or maturity of the security for having a Granger causal effect. However, none of them have maturities of 15 years or more. Moreover, 8 out of 16 observed Granger causal relations pertain to securities with maximum 1 year maturity. Moreover, Granger causal relation between *ṣukūk* and conventional bonds is most common among the securities issued by AAA rated corporate issuers (4 pairs). However, it should be highlighted that these mentioned semi-patterns are not conclusive.

Table 3: Pair-wise Granger Causality Tests with Lags = 2

Table 3 provides the results of Granger causality tests on pairs of yields of securities issued by the same issuers for the same tenure. These results are used to test the potential causal relationship between the ṣukūk and ordinary bonds. The table includes results of both directions of causality. Left panel provide the test result of the hypothesis that the changes in yields of *ṣukūk* affect the changes of the yield of conventional bonds whilst the panel on the right presents the test statistics of the hypothesis that the changes in the yield of conventional bonds affect the yields of *ṣukūk* securities.

		Ṣukūk security does not Granger Cause conventional bond		Conventional bond does not Granger Cause *Ṣukūk* security	
Issuer	Maturity	F-Statistic	Prob	F-Statistic	Prob
Government	3M	1.324	0.2722	0.4743	0.6242
Government	6M	3.376**	0.0395	0.4704	0.6266
Government	1Y	1.492	0.2315	3.446**	0.0371
Government	2Y	2.666*	0.0761	2.383*	0.0993
Government	3Y	4.040**	0.0216	3.221**	0.0456
Government	5Y	1.333	0.2698	0.4734	0.6247
Government	7Y	0.5173	0.5982	0.0238	0.9765
Government	10Y	0.4388	0.6465	0.6029	0.5499
Government	15Y	0.0587	0.943	1.4308	0.2456
Government	20Y	0.6290	0.5359	3.097**	0.0511
BNM	3M	1.1887	0.3119	0.021	0.9789
BNM	6M	1.0310	0.3631	0.0672	0.935
BNM	1Y	0.7308	0.4859	0.4226	0.6573
BNM	2Y	3.0436*	0.0559	1.820	0.1717
Cagamas	3M	1.6454	0.1999	0.4852	0.6175
Cagamas	6M	2.6787*	0.0753	0.4056	0.668
Cagamas	1Y	2.5042*	0.0886	0.6739	0.5128
Cagamas	2Y	7.9141***	0.0008	3.066*	0.0525
Cagamas	3Y	9.6807***	0.0002	5.198***	0.0077
Cagamas	5Y	4.7749**	0.0112	3.562***	0.0333
Cagamas	7Y	1.9031	0.1563	3.570***	0.0331
Cagamas	10Y	0.5511	0.5786	3.1692***	0.0478

		Ṣukūk security does not Granger Cause conventional bond		Conventional bond does not Granger Cause *Ṣukūk* security	
Issuer	Maturity	F-Statistic	Prob	F-Statistic	Prob
Cagamas	15Y	0.0262	0.9741	2.771**	0.0691
Cagamas	20Y	0.3919	0.6771	1.9766	0.1458
Khazanah	3M	1.3298	0.2708	2.5820*	0.0824
Khazanah	6M	4.1218**	0.0201	2.3916*	0.0985
Khazanah	1Y	2.5058*	0.0885	3.2959**	0.0425
Khazanah	2Y	1.8216	0.1689	1.1260	0.3298
Khazanah	3Y	0.0383	0.9624	1.0169	0.3667
Khazanah	5Y	0.6717	0.5139	4.6248**	0.0128
Khazanah	7Y	1.0378	0.3593	4.7382**	0.0116
Khazanah	10Y	1.1979	0.3076	3.777**	0.0274
Khazanah	15Y	0.5609	0.5731	5.113***	0.0083
Khazanah	20Y	0.0139	0.9862	3.602**	0.0322
Financial Institutions	3M	7.915***	0.0008	2.714*	0.0729
Financial Institutions	6M	8.737***	0.0004	1.934	0.1517
Financial Institutions	1Y	4.723**	0.0117	0.0172	0.9829
Financial Institutions	2Y	0.6546	0.5226	0.3124	0.7326
Financial Institutions	3Y	1.4240	0.2473	1.2075	0.3048
Financial Institutions	5Y	1.6546	0.1982	1.8726	0.1609
Financial Institutions	7Y	1.2245	0.2998	0.0503	0.951
Financial Institutions	10Y	0.4280	0.6534	3.191**	0.0468
Financial Institutions	15Y	0.2281	0.7965	4.686**	0.0121
Financial Institutions	20Y	1.6299	0.2029	1.3442	0.267
Corporate Guaranteed	3M	1.8505	0.1643	0.0141	0.986
Corporate Guaranteed	6M	3.9604**	0.0232	0.0913	0.9128
Corporate Guaranteed	1Y	4.7358**	0.0116	3.578**	0.0328
Corporate Guaranteed	2Y	1.6329	0.2023	2.736**	0.0713
Corporate Guaranteed	3Y	2.379*	0.0996	3.809**	0.0266
Corporate Guaranteed	5Y	2.294	0.108	5.151***	0.008
Corporate Guaranteed	7Y	3.163**	0.048	11.105***	6.00E-05
Corporate Guaranteed	10Y	1.9493	0.1496	7.138***	0.0015
Corporate Guaranteed	15Y	1.0223	0.3648	6.7757***	0.002
Corporate Guaranteed	20Y	1.6308	0.2027	5.050***	0.0088
Corporate	3M	0.7150	0.4925	0.2803	0.7563

		Ṣukūk security does not Granger Cause conventional bond		Conventional bond does not Granger Cause *Ṣukūk* security	
Issuer	Maturity	F-Statistic	Prob	F-Statistic	Prob
Corporate	6M	0.6945	0.5025	0.9558	0.3892
Corporate	1Y	3.393**	0.0389	4.480**	0.0146
Corporate	2Y	2.2634	0.1111	3.257**	0.0441
Corporate	3Y	2.3571	0.1018	4.2991**	0.0171
Corporate	5Y	3.2842**	0.043	6.2905***	0.003
Corporate	7Y	3.3870**	0.0391	8.177***	0.0006
Corporate	10Y	3.455**	0.0367	6.902***	0.0018
Corporate	15Y	0.109	0.8965	5.222***	0.0076
Corporate	20Y	1.3967	0.2538	0.676	0.5113

Note: *, **, ***: significant at 0.10, 0.05 and 0.01 acceptance level, respectively.

The second test conducted was to check for presence of Granger causal relation between conventional bonds and *ṣukūk*. The null hypothesis tested was "yield of conventional bonds does not Granger cause the yield of *ṣukūk* security counterparts". Out of the 64 pairs of securities tested, in 28 pairs the null hypothesis is rejected at 0.05 significance levels. This indicates that one may not generally conclude that yield of conventional bonds Granger cause the yield of *ṣukūk* security counterparts. These results show that yield of conventional bonds issued by Government (1year and 3 years), Cagamas (3 years, 5 years, 7 years, and 10 years), Khazanah (1 year, 5 years, 7 years, 10 years, 15 years, and 20 years), AAA rated financial institutions (10 years and 15 year), AAA rated guaranteed corporate (1 year, 3 years, 5 years, 7 years, 10 years, and 20 years), and AAA rated corporate (1 year, 2 years, 3 years, 5 years, 7 years, 10 years, and 15 years) Granger cause their *ṣukūk* counterpart. Results do not show a definite pattern in terms of issuer or maturity of the security for having a Granger causal effect. However, 13 out of 28 satisfied Granger causal relations pertaining to securities with more than 10 years maturity. Moreover, Granger causal relation between conventional bonds and *ṣukūk* is more common among the securities issued by AAA rated guarantied corporate (7 out of 10 pairs), AAA rated corporate (7 out of 10), and Khazanah Nasional (6 out of 10 pairs). However, it should be highlighted that these mentioned semi-patterns are not conclusive.

Finally, as in the Table 3, bi-directional Granger causality (as expressed in: Enders 1995, Hossain 2005) between yield of *ṣukūk* and

conventional bonds is observable in 5 out of 64 pairs (or 7 per cent). In other words, in 9 pairs of securities, both null hypotheses are significantly rejected, or, yield of *ṣukūk* Granger cause yield of conventional bonds and the other way around. This may signal that both variables are Granger caused by a third variable yet to be explored. Results show that yield of *ṣukūk* and conventional bonds have bi-directional Granger causal relation in securities issued by Government (3 years), Cagamas (3 years and 5 years), AAA rated guaranteed corporate (1 year and 7 years), and AAA rated corporate (5 years, 7 years, and 10 years).

In summary, it is reasonable to conclude that, with few exceptions, there is no causal relationship between *ṣukūk* and conventional bonds. This is the second evidence apart from the yield differences tested earlier to affirm that the two types of debt instruments are *not the same*. This conclusion has important implication for market operation, valuation practices, risk estimation and regulatory rule setting. These are challenges to be addressed in future research.

E. Impact of Issuance of Ijārah Ṣukūk on Firm's Beta

A firm taking in debt re-arranges the capital structure *ex post* a debt funding. Should this affect the risk of the firm? Miller and Modigliani's proposition in their 1961 paper suggests that, in the presence of interest costs being tax-deductible, the firm could earn a tax shield value if the firm's capital structure moves from very low debt 'towards' the optimal capital structure. That value is equal to the tax shield value:

$$Tax\ Shield\ Value = \sum_{t=1}^{\infty} \frac{I}{(1+y)^t} . T_c \quad (5)$$

I is the interest coupon (payoff); *Tc* is the corporate tax rate; *y* is market yield; and t is the maturity. This can be shown to be equal to T_c.DBT, the tax shield value.

If the firm is already having a capital structure near to the optimal level, and it issues a *ṣukūk* funding and moves the capital structure further away from the optimal level, then the tax shield value will be lost. Thus, in this case, the risk will be higher, so the beta will increase. Therefore, the direction of the beta increases is contingent upon the actual capital structure *ex post* the funding issues relative to the optimal capital structure (perhaps the industry average). Thus, in the case of

ṣukūk funding, a firm issuing *ṣukūk* will undergo a change in beta after the issue date. This can be tested using the one sample t-test (this test is a variation of the Equation 2) to ascertain if there is a significant change in the risk (beta) of the issuing firms.

In order to investigate the impact of issuance of *ṣukūk* security on firm's risk, 16 companies that had issued a special type of *ṣukūk* requiring asset transfers were selected. This selection criterion was purposely imposed because the issuance of *ṣukūk* requires transferring of (*i.e.* backing security with) an asset from issuing company's balance sheet to the Special Purpose Vehicle company. Then, two betas for each of these firms were calculated, one for a period of one year before the issuance, and the other for the period of one year after issuance. Then, the null hypothesis was tested on whether the beta before and after issuance of *ṣukūk* are equal. Result of this test is summarized in Table 4.

Table 4: Impact of Issuing *Ijārah Ṣukūk* on beta of the Issuing Company

Table 4 is a summary of the calculated CAPM beta of firms before and after issuance of *ijārah ṣukūk* for a sample of Malaysian firms. The absolute difference in the value of each case is summarized for each of the firms in the sample. These data set is then used for testing the impact of *ijārah ṣukūk* issuance on the size of the beta of the firm.

	BETA (before)	**BETA (after)**	**Change in the Beta (Δ)**	**Absolute Change in the Beta (IΔI)**
1	0.317	0.032	-0.285	0.285
2	0.415	-0.838	-1.253	1.253
3	0.862	1.240	0.378	0.378
4	0.934	1.301	0.367	0.367
5	1.298	0.831	-0.468	0.468
6	0.929	1.117	0.188	0.188
7	0.865	1.010	0.145	0.145
8	1.275	0.861	-0.414	0.414
9	1.329	0.906	-0.422	0.422
10	0.645	0.580	-0.065	0.065
11	0.539	0.361	-0.178	0.178
12	0.645	0.580	-0.065	0.065
13	0.791	0.856	0.065	0.065
14	0.094	0.338	0.244	0.244
15	0.171	0.047	-0.123	0.123
16	1.200	1.059	-0.141	0.141
Average	**0.769**	**0.643**	**-0.127**	**0.300**

Note: the absolute average of the beta changes is statistically significant with a t-value of 4.16 significant at with 15 degrees of freedom.

As the statistics in Table 4 suggests, the impact of issuance of *ṣukūk* on firm's risk (the change in beta) might be either positive or negative, as is consistent with the Miller-Modigliani proposition. This variation in direction of changes in beta results in a situation that no unidirectional conclusion can be made on the effect of issuance of *ṣukūk* on issuing firm's risk.

The absolute changes in beta are computed: see the last column in the table. We computed the t-values on the mean of this variable, and tested against the null hypothesis that the mean is not different from zero. We find a t-statistic of 4.16, which is significant at 0.1 per cent significance level with 15 degrees of freedom. In other words, if one does not concern about the direction of change in beta (since the theory predicts bi-directional change in beta) one may conclude that issuance of *ṣukūk* will changes the firm's beta significantly, either in a positive or negative way. This is not anomalous to theory prediction. Risk is changed because the tax shield value of the firm gets re-arranged when a *ṣukūk* is issued in the same manner as a bond issue would re-arrange the tax-shield.

F. Theory vs. Actual Price

Summary of the results of paired sample t-tests on means and medians are presented in Table 5, along with results for pooled comparison as well as *ṣukūk* type specific comparison. The overall results should be the pooled results, while each type reveals how these different types produce different results. One sample that was left out is that of *istiṣna ʻ* (project finance issues) since there were just three such cases, which are insufficient for reliable test results.

Results of paired sample t-test between means and medians of market price of *ṣukūk* and theoretical price using conventional models show an overall difference of RM5.26 in Malaysia: see the pooled results in the last row of the table. This is confirmed by a t-statistic of 13.961 which is acceptable at 0.01 levels. This result, which is based on comparison of 371 pairs of prices, would appear to suggest that (i) the theory-based value is away from market prices and (ii) the market is overvaluing *ṣukūk* securities to a significant extent. Yields of bonds are in the range of 2 to 8 per cent. To have an average difference of RM5.26 on quoted price indexed at RM100.00 means that the difference is vast. This large gap in pricing rejects the applicability of conventional models to value *ṣukūk* securities unless the market is mis-valuing these securities!

Table 5: Results of Paired Sample t-Test between Market- and Theory-Based Prices (2001-2011)

(Table 5 presents the comparative results on the fitting of existing conventional pricing models on the *sukuk* securities. It compares the actual market prices and theory-derived prices, and compares them by means if paired sample t-test. The statistical test is conducted both for means as well as median)

Sukuk Type	Sample Size	Mean				Median			
		Market Price	Theory Price	Difference	t-stat	Market Price	Theory Price	Difference	t-stat
Mudarabah	43	103.48	92.57	10.92	18.169***	104.53	90.98	13.55	22.522***
Musharakah	135	95.32	94.72	0.61	1.700*	101.75	101.36	0.34	1.100
Murabahah	71	102.42	96.52	5.90	7.128***	101.87	99.28	2.59	3.127***
Ijarah	116	101.47	92.80	8.67	12.534***	101.47	93.45	8.02	11.590***
Istisna	6	101.67	106.01	-4.35	-1.094	100.03	104.96	-4.93	-1.240
Pooled	371	99.65	94.40	5.26	13.961***	101.83	97.43	4.40	11.680***

Note: ***, **, and * represent 0.01, 0.05, and 0.10 acceptance levels, respectively.

Similar test is conducted on the medians of market and theoretical prices. Median price of *ṣukūk* security is RM4.40 higher in market than what is expected based on the models. This is also significant as confirmed by t-statistic of 11.680, which is acceptable at 0.01 levels. Results of both tests confirm that the conventional models, if used to valuate *ṣukūk* securities, are generating prices less than is valued by the market participants. This large systematic overvaluation by the investors could not be due to merely the non-applicability of the conventional models (a first level conclusion) but may also be due to some unknown factors of *ṣukūk* that the investors know that is not in the models used but enters the market pricing. Hence, one may conclude that the tests show that the conventional models fail to correctly and accurately price these types of securities.

Conventional models are used to derive prices of each type of *ṣukūk* securities. Mean values of pairs of prices are compared and the results indicate that, except for *istiṣna' ṣukūk* securities (which have only 6 observations in the sample), all other types of *ṣukūk* securities have market prices higher than theoretical prices. The largest difference is in pure debt type *murābaḥah ṣukūk* securities where a difference of RM 10.92 is observed: t-statistics of 18.169 is significant. Asset-backed *ṣukūk* securities of *ijārah* and *murābahah* have RM overvaluation by RM 8.67 and RM 5.90 respectively by the market. *Mushārakah ṣukūk* securities are traded at an average RM 0.61 higher than their theoretical prices. This too is significantly different with t-statistic of 1.700 or p-value of 0.091, which is acceptable at 0.10 levels.

Medians of market prices are finally compared with their paired theoretical prices. Results are close to the findings highlighted above. Pure debt *Murābaḥah ṣukūk* securities have the largest gaps between market- and theory-prices: gap of RM 13.55 is supported by t-statistic of 22.552. Asset-backed *ṣukūk* securities of *ijārah* and *murābahah* have average differences of RM 8.02 and RM 2.59 respectively between their market price and theoretical prices. These gaps are statistically significant at 0.01 acceptance levels.

5. Conclusion

Some practitioners as well as some Islamic scholars assume that theories and models that have been developed over 60 years for conventional bonds are also applicable to value *ṣukūk* securities with no

necessary modifications to accommodate the significant design differences as dictated by Sharīʿah requirements for the *ṣukūk* securities. If so, this paper observes, and then documents evidence of an anomalous behavior of the *ṣukūk* to this belief in the market place. We observe significant differences between yields to maturities of *ṣukūk* securities and those of conventional bonds, despite controlling for the issuer, risk rating and issue tenure. The magnitude and the sign of this difference are fairly non-trivial for various issuers or for maturities, with significant higher yield differences ranging from 0.10 to 2.2 per cent.

Results of pair-wise Granger causality tests do not show a general and definite relation between yield of *ṣukūk* securities and conventional bonds. In other words, changes in yield of *ṣukūk* or conventional bonds do not generally change the other one. That is, the two markets are perceived as being separate with obvious differences. It implies that not only yields of *ṣukūk* differ from yields of conventional bonds, but also these yields do not have causal (in terms of Granger causality) relationship with each other.

Another finding of this research is the significant effect of the issuance of *ṣukūk* on the risk measure of the issuing company. It is documented that the risk, in terms of changes in CAPM beta computed from share price behavior, before and after an issuance of the ṣukūk security is significantly different from each other. The direction of changes in beta is not the same for all cases, and, the influential factors on the direction of change are yet to be studied: all this confirms is a clue that the share price ought to go down in order for the share returns to go up to compensate for the perceived higher risk if a firm issues ṣukūk. Our main conclusions are: *ṣukūk* securities should not be priced the same way as conventional bonds (new valuation models need to be derived); the market for equity of issuing companies appear to suggest that the risk of the firm changes significantly in the cases of issues of *ṣukūk* certificates (this means there are unknown risk increasing factor to be identified). Testing and documenting the reasons for differences in behavior of what is assumed to be similar securities is a challenge to be addressed in future research. This would require regulatory recognition of the difference of this new class of bonds in the 11 markets trading this debt instrument. Indeed, arising from all these, the market practices ought to change once valuation models and factors relating to their differences are identified in future research.

Test of applicability of conventional valuation models on *ṣukūk* securities show significant differences across all types. The valuation gap is large, which would indicate overvaluation by market or else that there is a missing factor not in the model or that the market overprices *ṣukūk* prices. Such mispricing by model voids the applicability of the current models of practitioners in valuation *ṣukūk* securities.

It appears that the two types of debt markets as bonds as presently described by policy makers are not the same as evidenced in this paper. One additional issue is that the word *ṣukūk* is general and includes another class of securities that are sometimes *share-like* in structure but with a finite life. This special *ṣukūk* security is called *mushārakah ṣukūk*, which are now being structured for listing, which has finite time period after which the security expires with repayments. Given our finding that the *ṣukūk* and conventional bonds are not the same, and *ṣukūk* includes a share-like security as well, it is pertinent that the *ṣukūk* securities are not treated as bonds, and are classed as a separate class of securities. We suggest that *ṣukūk* be simply termed and described as *ṣukūk* securities and not referred to as bonds.

References

Ariff, Mohamed, Fan Fah, Cheng and **Vee Heng, Neoh** (2009) *Bond Markets in Malaysia and Singapore*, Serdang, Selangor, Malaysia: University Putra Press.

Ariff, Mohamed, Munawar Iqbal and **Shamsher Mohamed** (2012) *The Islamic Debt Market for Ṣukūk Securities: The Theory and Practice of Profit Sharing Investment*, Cheltenham UK and Northampton USA: Edward Elgar Publishing Ltd.

Ariff, Mohamed, Shamsher M., T. Hassan and **A.M. Nassir** (2008) Capital Markets in Malaysia: Corporate Finance, Investment, Banking and Governance, McGraw-Hill Education, *International issue*, *Hardcover*: p. 458.

Bodie, Zvi, Mohamed Ariff and **Raymond da Silva Rosa** (2007) *Investments*. McGraw Hill.

Cox, John C., Jonathan E. Ingersoll, Jr. and **Stephen A. Ross** (1985) "A Theory of the Term Structure of Interest Rates", *Econometrica*, 385-407.

Cox, John C., Jonathan E. Ingersoll Jr. and **Stephen A. Ross** (1985) "An Intertemporal General Equilibrium Model of Asset Prices", *Econometrica*, 363-84.

Enders, Walter (1995) *Applied Econometrics Time Series*, New York: John. Wiley & Sons.

Granger, C.W.J. (1969) "Investigating Causal Relations by Econometric Models and Cross-spectral Methods", *Econometrica*, 424-38.

Hossain, Akhtar (2005) "Granger-Causality Between Inflation, Money Growth, Currency Devaluation and Economic Growth in Indonesia, 1951-2002", *International Journal of Applied Econometrics and Quantitative Studies*, 23.

Jobst, Andreas A., Peter Kunzel, Paul Mills and **Amadou Sy** (2008) "Islamic bond issuance: what sovereign debt managers need to know", *International Journal of Islamic and Middle Eastern Finance and Management*, 330- 44.

Miller, Merton H. and **Franco Modigliani** (1961) "Dividend Policy, Growth, and the Valuation of Shares", *The Journal of Business*, 411-33.

Modigliani, Franco and **Merton H. Miller** (1958) "The Cost of Capital, Corporation Finance and the Theory of Investment", *The American Economic Review*, 261-97.

Rohmatunnisa, Dinna (2008) "Design of *Ijārah Ṣukūk*", *Finance and Investment*, pp. 80. Nottingham, UK: University of Nottingham.

Sharpe, William (1964) "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk", *The Journal of Finance*, 425-42.

Sole, Juan (2008) "Prospects and challenges for developing corporate *ṣukūk* and bond markets: Lessons from a Kuwait case study", *International Journal of Islamic and Middle Eastern Finance and Management*, 20 - 30.

Tariq, Ali Arsalan (2004) "*Managing Financial Risks of Ṣukūk Structures*", School of Business and Economics, pp. 86. Leicestershire, UK: Loughborough University.

Tariq, Ali Arsalan and **Humayon Dar** (2007) "Risks of *Ṣukūk* structures: Implications for resource mobilization", *Thunderbird International Business Review*, 203-23.

Williams, John Burr (1938) *The Theory of Investment Value*, Cambridge, MA: Harvard University Press.

Wilson, Rodney (2008) "*Innovation in the structuring of Islamic ṣukūk securities*", *Humanomics*, 170-81.

Appendix Tables

Table 1A: Descriptive Statistics of *Ṣukūk* vs. Conventional Bonds: Government and BNM (central bank)

(Table 1A presents the descriptive statistics of yields of sovereign issuers based on the security types and tenure. It provides the mean, median, and mode as central tendency measures along with standard deviation, range, minimum and maximum to illustrate the dispersion behavior of the data set.)

	N Valid	Mean	Median	Mode	Std. Dev	Range	Min	Max
Government Issued Securities (MGS vs. GII)								
CONV(3M)	81	2.9058	2.92	1.88	0.5569	1.84	1.82	3.66
CONV(6M)	81	2.9464	2.94	2.84	0.5654	1.98	1.85	3.83
CONV(1Y)	81	3.0184	2.99	2.86	0.5626	2.06	1.92	3.98
CONV(2Y)	81	3.1902	3.2	3.2	0.4753	2.1	2.2	4.3
CONV(3Y)	81	3.3502	3.29	3.21	0.3942	2.13	2.37	4.5
CONV(5Y)	81	3.6138	3.58	3.35	0.3112	1.8	2.78	4.58
CONV(7Y)	81	3.8085	3.79	3.91	0.3119	1.84	2.91	4.75
CONV(10Y)	81	4.0104	4.02	4.19	0.3746	1.93	3.09	5.02
CONV(15Y)	81	4.2504	4.23	4.01	0.3906	1.77	3.35	5.12
CONV(20Y)	81	4.4173	4.48	4.15	0.3847	1.58	3.6	5.18
Ṣukūk (3M)	81	2.9232	2.92	1.88	0.5771	1.96	1.82	3.78
Ṣukūk (6M)	81	2.9602	2.94	2.84	0.5829	2.04	1.85	3.89
Ṣukūk (1Y)	81	3.0336	2.98	2.86	0.5682	2.11	1.97	4.08
Ṣukūk (2Y)	81	3.2202	3.13	3.04	0.4654	2	2.3	4.3
Ṣukūk (3Y)	81	3.4267	3.37	3.26	0.3551	1.84	2.63	4.47
Ṣukūk (5Y)	81	3.6798	3.65	3.37	0.3083	1.8	2.85	4.65
Ṣukūk (7Y)	81	3.8448	3.81	3.64	0.3099	1.79	3	4.79
Ṣukūk (10Y)	81	4.0552	4.05	3.88	0.3461	1.81	3.17	4.98
Ṣukūk (15Y)	81	4.2827	4.25	4.1	0.3698	1.67	3.45	5.12
Ṣukūk (20Y)	81	4.4451	4.48	4.2	0.3700	1.5	3.68	5.18
Bank Negara Malaysia Issued securities (MGS vs. GII)								
CONV(3M)	65	2.8315	2.9	1.88	0.5787	1.9	1.82	3.72
CONV(6M)	65	2.8608	2.91	2.84	0.5754	1.91	1.85	3.76
CONV(1Y)	65	2.9195	2.93	2.86	0.5544	1.9	1.92	3.82
CONV(2Y)	61	3.0580	3.09	3.2	0.4332	1.77	2.2	3.97
Ṣukūk (3M)	65	2.8411	2.9	1.88	0.5898	1.92	1.82	3.74
Ṣukūk (6M)	65	2.8715	2.91	2.84	0.5881	1.95	1.85	3.8
Ṣukūk (1Y)	65	2.9412	2.93	2.86	0.5593	1.93	1.97	3.9
Ṣukūk (2Y)	61	3.1026	3.09	3.13	0.4339	1.77	2.3	4.07

Table 1B: Descriptive Statistics of *Ṣukūk* vs. Conventional Bonds: Government Agencies

(Table 1B presents the descriptive statistics of yields of quasi-sovereign issuers based on the security types and tenure. It provides the mean, median, and mode as central tendency measures along with standard deviation, range, minimum and maximum to illustrate the dispersion behavior of the data set.)

	N Valid	Mean	Median	Mode	Std. Dev	Range	Min	Max
Cagamas Berhad Securities								
CONV(3M)	81	3.1686	3.19	3.53	0.4784	1.93	2.21	4.14
CONV(6M)	81	3.2417	3.22	3.56	0.4629	1.87	2.34	4.21
CONV(1Y)	81	3.3516	3.33	3.73	0.4489	1.83	2.5	4.33
CONV(2Y)	81	3.5669	3.5	3.36	0.3837	1.65	2.95	4.6
CONV(3Y)	81	3.7662	3.67	3.68	0.3399	1.59	3.23	4.82
CONV(5Y)	81	4.0932	3.98	3.91	0.3538	1.4	3.51	4.91
CONV(7Y)	81	4.3105	4.21	4.13	0.3764	1.46	3.72	5.18
CONV(10Y)	81	4.5963	4.48	4.32	0.4512	1.87	3.8	5.67
CONV(15Y)	81	4.8758	4.8	4.8	0.4707	2.16	3.89	6.05
CONV(20Y)	81	5.0851	4.99	4.84	0.5152	2.39	4.02	6.41
Ṣukūk (3M)	81	3.1910	3.19	3.53	0.4994	1.93	2.21	4.14
Ṣukūk (6M)	81	3.2605	3.23	3.56	0.4799	1.87	2.34	4.21
Ṣukūk (1Y)	81	3.3627	3.33	3.73	0.4639	1.83	2.5	4.33
Ṣukūk (2Y)	81	3.5815	3.5	3.33	0.3810	1.57	2.95	4.52
Ṣukūk (3Y)	81	3.7863	3.68	3.68	0.3303	1.45	3.23	4.68
Ṣukūk (5Y)	81	4.1098	4	3.94	0.3495	1.38	3.53	4.91
Ṣukūk (7Y)	81	4.3377	4.22	4.13	0.3785	1.45	3.73	5.18
Ṣukūk (10Y)	81	4.6265	4.52	4.52	0.4518	1.85	3.82	5.67
Ṣukūk (15Y)	81	4.9240	4.9	4.58	0.4742	2.11	3.94	6.05
Ṣukūk (20Y)	81	5.1375	5.08	5.08	0.5132	2.37	4.04	6.41
Khazanah Nasional Berhad Securities								
CONV(3M)	81	3.0316	3.06	2.92	0.5334	1.86	1.94	3.8
CONV(6M)	81	3.0847	3.12	3.46	0.5424	1.96	1.97	3.93
CONV(1Y)	81	3.1658	3.18	3.13	0.5468	2.02	2.06	4.08
CONV(2Y)	81	3.3636	3.31	3.3	0.4659	2.14	2.42	4.56
CONV(3Y)	81	3.5474	3.48	3.42	0.3826	2.07	2.72	4.79
CONV(5Y)	81	3.8377	3.8	3.6	0.3177	1.81	3.05	4.86
CONV(7Y)	81	4.0296	3.97	3.91	0.3126	1.81	3.19	5
CONV(10Y)	81	4.2573	4.22	4.19	0.3584	1.81	3.4	5.21
CONV(15Y)	81	4.5120	4.46	4.69	0.3782	1.61	3.7	5.31
CONV(20Y)	81	4.6922	4.7	4.77	0.3798	1.7	3.81	5.51
Ṣukūk (3M)	81	3.0248	3.06	3.06	0.5383	1.86	1.94	3.8
Ṣukūk (6M)	81	3.0760	3.11	3.12	0.5411	1.92	1.97	3.89
Ṣukūk (1Y)	81	3.1535	3.17	3.23	0.5486	2.11	2.06	4.17
Ṣukūk (2Y)	81	3.3512	3.31	3.32	0.4561	2.03	2.42	4.45
Ṣukūk (3Y)	81	3.5364	3.47	3.42	0.3748	1.94	2.72	4.66
Ṣukūk (5Y)	81	3.8302	3.8	3.6	0.3116	1.8	3.05	4.85
Ṣukūk (7Y)	81	4.0210	3.96	3.8	0.3073	1.78	3.19	4.97
Ṣukūk (10Y)	81	4.2490	4.22	4.19	0.3494	1.74	3.4	5.14
Ṣukūk (15Y)	81	4.5121	4.48	4.2	0.3738	1.61	3.7	5.31
Ṣukūk (20Y)	81	4.6932	4.74	5	0.3841	1.68	3.83	5.51

Table 1C: Descriptive Statistics of *Ṣukūk* vs. Conventional Bonds: Financial Institutions

(Table 1C presents the descriptive statistics of yields of financial institutional issuers based on the security types and tenure. It provides the mean, median, and mode as central tendency measures along with standard deviation, range, minimum and maximum to illustrate the dispersion behavior of the data set.)

	N Valid	Mean	Median	Mode	Std. Dev	Range	Min	Max
AAA Rated Financial Institutions Securities								
CONV(3M)	81	3.3725	3.46	3.62	0.4982	2.16	2.26	4.42
CONV(6M)	81	3.4764	3.51	3.41	0.4578	1.87	2.58	4.45
CONV(1Y)	81	3.6526	3.59	3.51	0.4198	1.52	3.08	4.6
CONV(2Y)	81	3.8821	3.72	3.5	0.3899	1.45	3.48	4.93
CONV(3Y)	81	4.1114	3.95	3.91	0.3802	1.63	3.6	5.23
CONV(5Y)	81	4.4298	4.31	4.22	0.4099	1.67	3.74	5.41
CONV(7Y)	81	4.6906	4.6	4.6	0.4275	1.81	3.84	5.65
CONV(10Y)	81	5.0181	4.95	5.35	0.5004	2.04	3.98	6.02
CONV(15Y)	81	5.3588	5.32	5.76	0.5599	2.19	4.17	6.36
CONV(20Y)	81	5.6475	5.67	5.64	0.5720	2.2	4.35	6.55
Ṣukūk (3M)	81	3.3847	3.48	3.23	0.5519	2.27	2.22	4.49
Ṣukūk (6M)	81	3.4794	3.51	3.37	0.5099	2.05	2.54	4.59
Ṣukūk (1Y)	81	3.6326	3.56	3.47	0.4406	1.62	3.04	4.66
Ṣukūk (2Y)	81	3.8626	3.68	3.46	0.4100	1.43	3.44	4.87
Ṣukūk (3Y)	81	4.0893	3.92	3.89	0.3925	1.51	3.56	5.07
Ṣukūk (5Y)	81	4.4141	4.31	4.18	0.4391	1.75	3.71	5.46
Ṣukūk (7Y)	81	4.6833	4.56	4.49	0.4548	1.74	3.81	5.55
Ṣukūk (10Y)	81	5.0233	4.91	4.47	0.5467	2.16	3.95	6.11
Ṣukūk (15Y)	81	5.4096	5.33	4.79	0.6613	2.63	4.13	6.76
Ṣukūk (20Y)	81	5.7020	5.71	5.6	0.6568	2.6	4.32	6.92

Table 1D: Descriptive Statistics of *Ṣukūk* vs. Conventional Bonds: Corporate
(Table 1D presents the descriptive statistics of yields of conventional corporate bonds based on the security types and tenure. It provides the mean, median, and mode as central tendency measures along with standard deviation, range, minimum and maximum to illustrate the dispersion behavior of the data set.)

	N Valid	Mean	Median	Mode	Std. Dev	Range	Min	Max
AAA Rated Corporate Issued Securities								
CONV(3M)	81	3.3414	3.35	3.29	0.4860	2.17	2.28	4.45
CONV(6M)	81	3.4420	3.43	3.43	0.4409	1.9	2.6	4.5
CONV(1Y)	81	3.6404	3.57	3.53	0.3966	1.59	3.1	4.69
CONV(2Y)	81	3.8831	3.74	3.74	0.3697	1.61	3.32	4.93
CONV(3Y)	81	4.1200	4.01	3.92	0.3621	1.61	3.62	5.23
CONV(5Y)	81	4.4233	4.38	4.51	0.3692	1.57	3.87	5.44
CONV(7Y)	81	4.7169	4.63	4.57	0.3919	1.7	4.03	5.73
CONV(10Y)	81	5.0493	4.99	4.93	0.4339	1.85	4.21	6.06
CONV(15Y)	81	5.3993	5.4	5.8	0.4516	1.98	4.41	6.39
CONV(20Y)	81	5.6975	5.68	5.7	0.4881	2.12	4.61	6.73
Ṣukūk (3M)	81	3.3169	3.31	3.25	0.4877	2.17	2.24	4.41
Ṣukūk (6M)	81	3.4101	3.39	3.39	0.4331	1.9	2.56	4.46
Ṣukūk (1Y)	81	3.5719	3.49	3.49	0.3815	1.61	3.04	4.65
Ṣukūk (2Y)	81	3.8049	3.7	3.7	0.3360	1.56	3.3	4.86
Ṣukūk (3Y)	81	4.0510	3.98	3.98	0.3160	1.54	3.58	5.12
Ṣukūk (5Y)	81	4.3720	4.34	4.2	0.3330	1.57	3.83	5.4
Ṣukūk (7Y)	81	4.6721	4.62	4.21	0.3752	1.7	3.99	5.69
Ṣukūk (10Y)	81	5.0437	5.05	4.89	0.4353	1.84	4.18	6.02
Ṣukūk (15Y)	81	5.4681	5.53	5.8	0.5359	2.15	4.38	6.53
Ṣukūk (20Y)	81	5.7762	5.9	5.66	0.5292	2.11	4.58	6.69
AAA Rated Corporate Guaranteed Issued Securities								
CONV(3M)	81	3.2959	3.33	3.6	0.4657	2.16	2.26	4.42
CONV(6M)	81	3.3912	3.41	3.63	0.4168	1.87	2.58	4.45
CONV(1Y)	81	3.5769	3.51	3.51	0.3642	1.52	3.08	4.6
CONV(2Y)	81	3.8063	3.68	3.5	0.3333	1.54	3.27	4.81
CONV(3Y)	81	4.0349	3.93	3.91	0.3282	1.5	3.6	5.1
CONV(5Y)	81	4.3293	4.23	4.22	0.3440	1.57	3.74	5.31
CONV(7Y)	81	4.6096	4.53	4.53	0.3848	1.75	3.84	5.59
CONV(10Y)	81	4.9327	4.91	4.72	0.4420	1.91	3.98	5.89
CONV(15Y)	81	5.2638	5.3	5.76	0.4750	2.05	4.17	6.22
CONV(20Y)	81	5.5410	5.54	5.64	0.5235	2.2	4.35	6.55
Ṣukūk (3M)	81	3.2780	3.29	3.23	0.4738	2.16	2.22	4.38
Ṣukūk (6M)	81	3.3656	3.37	3.37	0.4160	1.87	2.54	4.41
Ṣukūk (1Y)	81	3.5148	3.47	3.47	0.3536	1.54	3.02	4.56
Ṣukūk (2Y)	81	3.7414	3.65	3.46	0.3067	1.47	3.28	4.75
Ṣukūk (3Y)	81	3.9773	3.91	3.89	0.2916	1.43	3.56	4.99
Ṣukūk (5Y)	81	4.2820	4.19	4.18	0.3290	1.56	3.71	5.27
Ṣukūk (7Y)	81	4.5668	4.49	4.4	0.3878	1.74	3.81	5.55
Ṣukūk (10Y)	81	4.8888	4.82	4.74	0.4579	1.98	3.95	5.93
Ṣukūk (15Y)	81	5.2807	5.28	4.79	0.5205	2.39	4.13	6.52
Ṣukūk (20Y)	81	5.5642	5.56	5.56	0.5512	2.34	4.32	6.66

هل تُسَعِّر أسواق الدَّيْن الصكوك والسندات التقليدية بشكل مختلف؟

ميثم صفرى محمد عارف وشمشير محمد

المستخلص. لقد نما نوع جديد من أدوات الدَّيْن – تعرف بشهادات الصكوك– إلى مستوى ٨٤٠ مليار دولار في أحد عشر مركزًا ماليًا. تشترك هذه الأدوات المالية الإسلامية في عدد من الخصائص مع السندات التقليدية، ولذا فإن المتعاملين في هذه الأسواق يعاملون كلا النوعين؛ السندات والصكوك كأنها سندات دَيْنٍ تقليدية. تقوم هذه الورقة اختبار قياسي ودراسة تجريبية لهذه القناعة التي توصل لها المتعاملون. فلو كانت عوائد الصكوك مساوية لعوائد السندات التقليدية فإن اختبار سببية جرانجر (Granger) سيثبت ذلك؛ غير أن النتائج التي توصلت لها الورقة تثبت عكس ذلك. كما أثبتت الدراسة أن عوائد الصكوك أعلى بكثير من عوائد السندات حتى في ظل فرض بعض المحددات مثل مراقبة المصدرين، ونوعية التصنيف الائتماني. وأخيرًا فإن إصدار الصكوك يؤثر بشكل معتبر في قيمة بيتا (Beta) لمخاطر الإصدار، وهذا ما يتسق مع نظرية هيكلة رأس المال للشركات. إن لهذه النتائج الجديدة على أسواق الدَّيْن الإسلامية انعكاسات فيما يتعلق بكيفية التعامل مع هذا النوع من الأدوات المالية؛ حيث يجب أن تُعامل على أنها أدوات مالية جديدة وليست سندات. كما أن نتائج الدراسة لها انعكاسات وتحديات بالنسبة لنماذج التقييم الجديدة للأدوات المالية.