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Yield Behavior of Green SRI *Sukuk*

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Abstract
Purpose- This paper aims to report practice-relevant investment yield behavior of two types of SRI *sukuk* - green *sukuk* and non-green *sukuk* – both having similar cash-flow-relevant characteristics and payment structure.
Design and methodology/approach- Green bonds are always being associated with green premium or "greenium" in the past literatures. In addition, Liquidity Premium Theory of term structure also suggests that investors that invest in long-term bond tend to have higher yield than short term bond. The authors collected the time series data from Bloomberg and Eikon databases on SRI *sukuk* all being fixed coupon paying *sukuk* from year 2017 to year 2020 to conduct the tests on *sukuk* yields. These *sukuk* were then further bisected according to the use of proceeds and different tenures as two match samples. As the yields distribution is not normal (based on non-zero skewness), authors use Wilcoxon Signed Rank Test to analyze the yield differences instead of using the t-test method.
Findings-The median yields for green *sukuk* are significantly different from non-green *sukuk*. The finding of the tests reveals that the median yields for green *sukuk* are greater than those for non-green *sukuk*. In addition, the long-term yields of green *sukuk* were also found to be significantly higher than long-term non-green *sukuk*. The authors observe the findings are consistent with the liquidity preference theory and past literatures on green premium.
Originality- This paper is original in that it is documenting the significant differences in pricing green SRI *sukuk* and non-green SRI *sukuk*. This has implications for both theory and practice in green *sukuk* valuation. Further research to identify the causal relationship between green *sukuk* and non-green *sukuk* is necessary in the future with greater data availability.

Keywords: SRI *sukuk*, *Sukuk* yields, Green *sukuk*, Non-green *sukuk*, Greenium
Paper type: Research paper

Introduction

Islamic finance system is a financial system that enables creation, preservation, and wealth distribution in ethical and morally acceptable manner to the member of society. For the developing country like Malaysia, the increasing size of funds raised from Islamic finance sources suggest the increasing importance of Islamic finance system in supporting the economic growth activities in Malaysia. Figure 1 depicts the movement in size of capital raised from Islamic financing sources from year 2005 to 2020. The data were collected from the December 2020 issue of Monthly Statistical Bulletin by Bank Negara Malaysia (BNM), the country's central bank.

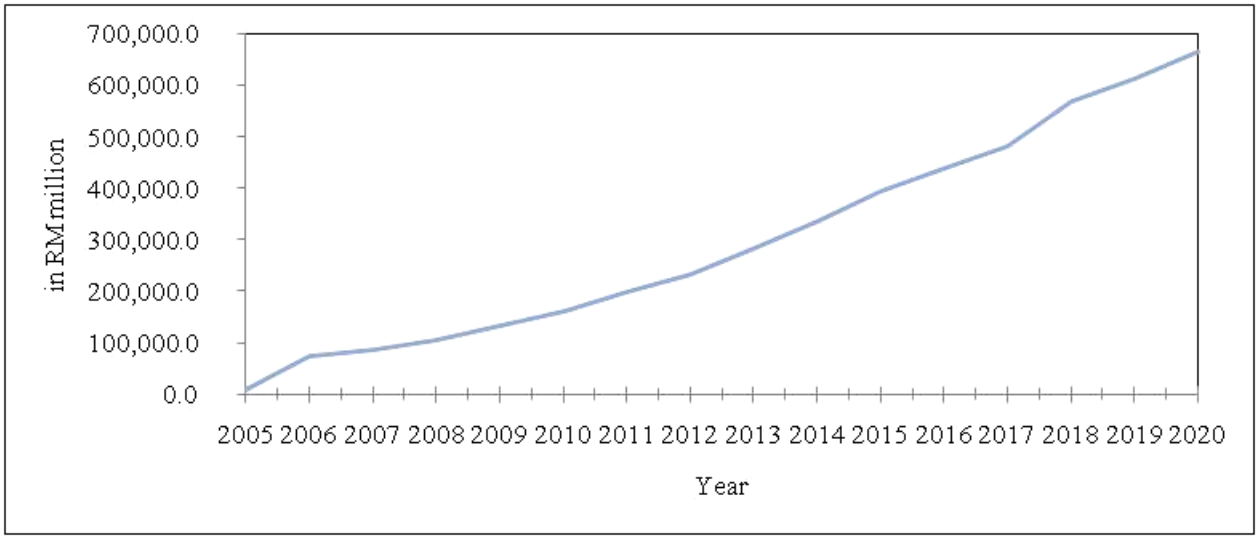

Figure 1: Size of Islamic Financing in Malaysia

The increasing size of funds raised from Islamic financing sources indirectly implies to what extent *sukuk* is important in supporting various business and investment activities in emerging market such as Malaysia. Motivated by this statistic, this study will focus on the investment yield behavior for two types of *sukuk* which are green and non-green *sukuk*.

Today, the use of *sukuk* financing is not mainly targeted on financing the core business activities of corporations such as acquisition, working capital, project finance, refinancing and even operating expenses. The scope of the use of proceeds from *sukuk* issuance has now expanded to solving global environmental issues that include air pollution, global climate change, and socially responsible investments in accordance to Islamic Law. As of January 2021, there are 16 issuers that have issued SRI *sukuk* in Malaysia with a total size of RM5.4 billion, subsequently positioned the country as the largest corporate issuer of sustainable *sukuk* in the world (Capital Market Malaysia, 2021).

This study is about the evaluation of the actual *sukuk* yield performance in comparison to the bond pricing theory. Although there have been many recent studies being conducted on the quantitative analyses of *sukuk* in the area of *sukuk* overview and growth (Smaoui and Ghouma, 2019, Mimouni *et al.*, 2019), *sukuk* performance in comparison to conventional bonds' performance (Uddin *et al.*, 2020; Pirgaip *et al.*, 2020; Qizam and Fong, 2019; Grassa and Miniaoui, 2018), and corporate governance (Ashraf *et al.*, 2020; Saad *et al.*, 2019), however the literature on the pricing of *sukuk* instruments is still scarce (Ariff *et al*., 2018). To fill in this gap, this study will examine the important element of *sukuk* pricing which is yield to maturity.

Theoretically, bonds and *sukuk* with the same rating and tenure should be priced the same given its similar risk characteristics. However, there are many empirical findings that prove otherwise. Some researcher believes that *sukuk* should be perceived to be identical with conventional bond in order to ease valuation process (Wilson, 2008). A study conducted by Ariff *et al.* (2017) on Malaysia *sukuk* market has shown that there is a significant difference in yield for *sukuk* and conventional bond. Similar findings were obtained in a research conducted by Saad *et al.* (2020). These could be justified by the lower risk characteristic of *sukuk* (Hassan *et al.*, 2018) as compared to conventional bond which may also explain the

diversification benefit (Pirgaip *et al.*, 2020; Sclip *et* al., 2016) that investors can have by including *sukuk* as part of the instruments in their portfolio. Although these evidences are proving the same results which is there is a significant difference between bonds and *sukuk* yield, but, to date no study has yet to prove if the differences occur due to methodological issues, or due to the study not including other debt instruments (Ariff *et al.*, 2019). In this study, researchers will assess if the difference in *sukuk* yield may be contributed by the type of SRI *sukuk* issued. Specifically, this study will observe the difference in *sukuk* yields for different type of SRI *sukuk* based on the use of proceeds. Findings obtained from this study are expected to provide more insight on the pricing of various types of *sukuk* and its critical assessment which found to be largely missing in many research (Razak *et al*., 2018).

Literature Review

Definition of Sukuk

The definition of *Sukuk* can be viewed from linguistic, *fiqh* and Islamic finance perspectives. From linguistic point of view, *sukuk* or its plural term "sakk", literally means 'to strike' or 'to hit' one seal on a document (Adam and Thomas, 2004). From the *fiqh* perspective, *Sukuk* can be defined as a written document that confirms a transaction and stipulates the rights and conditions of the contracting parties (Muhammad *et al.*, 2015). *Sukuk* definitions from Islamic finance perspective have been provided by many regulatory institutions which include the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI), Islamic Financial Services Board (IFSB) as well as by Securities Commissions of Malaysia (SC Malaysia). In general, all these institutions have defined *Sukuk* as a certificate that represents undivided shares or ownership in Shariah compliant projects and investments which are based on Shariah principles and concepts (Sairally and Abdullah, 2017). Three main pillars that need to be hold in the structuring of *Sukuk* includes: (1) *Sighah* of the contract (i.e. the offer and the acceptance), (2) contracting parties, and (3) the subject matter of the transactions. The form of the contract (*Sighah)* is denoted by the method of offer and acceptance in *Sukuk* contract. These two elements are important and must be clearly stated in the prospectus of *Sukuk* before the contracting parties are considered as legally bonded in the eyes of Shari'ah law (AAOIFI, 2015).

Green Sukuk and its Yield

Past literatures on bond and *sukuk* yield have been concentrated on the firm specific factors which include the ownership structure (Saad *et al.*, 2020), stock market volatility (Naifar, 2016), board of directors' independence (Ashraf *et al*., 2020) and also board size (Elhaj *et al*., 2018). In the area of green bond, there are several researchers that studied on the possible existence of "greenium" by comparing the prices and yield of green bond with the non-green bond. Greenium can be defined as the additional risk that investors have to bear for investing in green assets relative to identical non-green assets. Some researchers did not find any greenium effect in the green bond issuance (Larker and Watts, 2020) while some others do (Alessi *et al*., 2021). The possible justifications behind the greenium element in the green bonds issued include the types of issuers (government or corporate), bond ratings, and the issuers' compliance towards the standard green bond governance and reporting procedures (MacAskill *et al.*, 2020). Based on authors' knowledge, there is no study being conducted in identifying the yield difference in green *sukuk* as compared to non-green *sukuk*. By studying this area, findings obtained from this research is expected to contribute to the existing literatures by identifying if the "greenium" element do exists in green *sukuk* market.

To finance long-term socially responsible investment in a Shariah compliant way, the Securities Commission of Malaysia (SC) has launched the Socially Responsible Investment (SRI) *sukuk* framework on August 2014. In this study, this *sukuk* is presented as SRI *sukuk.* The literatures on SRI *sukuk* is still limited. Recent research on this instrument covers several areas which include the development of SRI *sukuk* market and its challenges (Rahman *et al*., 2020) as well as the structure and features of SRI *sukuk* (Zain and Sori, 2020; Marwan and Haneef, 2019; Noordin *et al*., 2018). As the sustainable investment is getting more attention by investors' worldwide, the green *sukuk* is expected to attract more funds and issuers in the future.

The yield characteristics of green *sukuk* against non-green *sukuk* may provide more information to the investors (issuers) if their involvement in green investments may results in better returns (costs) prospect. A study conducted by Noordin *et al*. (2018) shows that in the case of SRI *sukuk* Ihsan in Malaysia, the yield of the *sukuk* will be lower when the issuers managed to fulfill the initially outlined key performance indicators (KPIs). This is different from the way non-green bond returns being distributed. Investors in *sukuk* do expect some level of return even though there should be no guarantee of return to investors in Shariah compliant investments. If the project performs well, the investors will get higher return. However, will the same results shown if the SRI *sukuk* issued under the same program by the same issuer were used for different purpose? That is, will the yields for SRI *sukuk* issued for green investments are different from the yields of SRI *sukuk* for non-green investments? This is the main question to be answered in this research.

According to William (1938) valuation model, the price of fixed income securities can be computed by using the sum of present value expected future cash flows generated from the investments at a given discount rate. This model has been used as reference in much finance textbook in valuing the intrinsic value of various forms of investments such as stocks and bonds (Bodie, 2009). The application of William (1938) investment valuation model on bond is specified as in Equation 1.

$$V_o = PMT\left(\frac{1-\frac{1}{(1+YTM)^n}}{YTM}\right) + \frac{PAR}{(1+YTM)^n} \quad (1)$$

where, V_o is the intrinsic value of bond at time 0, PMT is the coupon payment at time t, YTM is the yield to maturity of the bond, PAR is the face value of the bond, and n is the maturity period of the bond. Rearranging Equation (1) will also allow the computation of bond yield. In Equation (1), it is clearly portrayed that the one of the factors that may affect bond yield is the time to maturity of the bond (t). Long-term bonds tend to have higher yield than short term bonds due to liquidity risk factor (Li *et al*., 2017) as suggested in Liquidity Preference Theory of term structure. The difference in liquidity risk for short term and long-term bonds were found to be contributed by the length of time investors have to face the non-availability of cash when they invested their money in a bond (Lutz, 1940; Hicks, 1939).

Methodology

Data descriptions

The data used in this study are on the yields of green *sukuk* and non-green *sukuk* from Malaysia market. The instruments were grouped as matched pairs of two classes of *sukuk* as stated earlier. Details of data collection procedures are as follow:

1. The data for this study were obtained from one market with data collected from Eikon database. The initial search focused on the corporate green bond issuance in Malaysia which resulted in 96 initial samples. Bonds with no fixed-rate coupons and non-*sukuk* are excluded from the study. As a result, there are 87 SRI *sukuk* in our final sample.
2. The samples were classified based on the use of proceeds of the SRI *sukuk* issued. Green *sukuk* are SRI *sukuk* being issued where the use of proceeds are meant for financing green investment, energy efficiency projects, and green constructions and buildings. Non-green *sukuk* are SRI *sukuk* being issued where the use of proceeds is meant for financing general corporate working capital purpose, acquisition, project finance and refinancing.
3. Subsequently, the samples were grouped according to the *sukuk* tenure. Following Ariff and Zarei (2017), short term bonds are those that mature in less than a year, medium-term is for bonds with one to five years maturity, and long-term bonds are those bonds with more than five years maturity.
4. All the green and non-green *sukuk* samples are in the group of medium- and long-term maturity. The maturity ranges from one to 21 years.

Tests and hypotheses statements

A Wilcoxon Signed Rank Test is applied to verify the existence of significant return differences in the pair of sample median yields between the green *sukuk* and non-green *sukuk*. This test is employed instead of the normal t-test since the yields collected are not normally distributed. The null hypotheses to be tested in this study are as follow:

H_{01}: There is no difference in the median yields for green and non-green *sukuk*
H_{02}: There is no difference in the median yields for long-term green and long-term non-green *sukuk*

The test statistics for the Wilcoxon Signed Rank Test can be computed by determining the sum of the positive ranks (W+) and sum of negative ranks in the first place. If the null hypothesis is true, there should be similar number of lower and higher ranks that are both positive and negative. In other words, the value of W+ and W- would be the same. In contrast, if the value of W+ is higher or lower than W-, then the null hypothesis will be rejected. Ignoring the positive and negative signs of the yield differences between the paired samples, the series were first ranked from lowest to highest. After that, taking into account the initially computed differences with signs, the sum of rank score for the positive and negative differences were determined. That is, determining the sum of the positive ranks (W+) and sum of negative ranks are computed. The sum of ranks will be computed as in Equation (2).

$$Sum\ of\ ranks = \frac{n(n+1)}{2} \quad (2)$$

The Wilcoxon Signed Rank test statistic known as W will be the smallest score out of the W+ and W- value. To determine if the observed test statistic, W supports the null hypothesis or not, similar approaches used in parametric testing were employed. Specifically, the critical value of W will be compared with the observed W value. If the observed W is less than or equal to the critical W, the null hypothesis will be rejected indicating that there is significant difference in yields median in the studied paired samples.

Findings

Descriptive statistics on mean and medians

In this section, the findings on the related tests are reported and discussed. Table 1 shows the summary of the descriptive statistics on the variables used in this study. The results in the table are descriptive statistics on green *sukuk* and non-green *sukuk* grouped as (i) medium-term for up to five years and (ii) long-term for above five years. The classification of *sukuk* based on the use of proceeds and time-based will allow researcher to observe the difference in *sukuk* yield based on different classes.

Table 1: Descriptive statistics of the series used in the tests

Types	Mean	Median	Max	Min	SD	Skewness	Kurtosis	Observation
Medium-term green *sukuk*	3.17	3.66	3.66	2.48	0.61	-1.27	1.50	3
Medium-term non-green *sukuk*	3.33	3.31	3.83	2.35	0.38	-1.32	2.72	13
Long-term green *sukuk*	4.94	4.77	5.70	3.98	0.50	0.02	-0.49	15
Long-term non-green *sukuk*	4.56	4.52	5.69	3.43	0.60	0.16	-0.78	56

Notes: This table provides the summary descriptive statistics of green *sukuk* and non-green *sukuk* yield rates. Accordingly, the series are divided in three different terms to maturity which covers short-, medium-, and long-term. However, based on the collected data, all the green and non-green *sukuk* in Malaysia are in the range or medium- to long-term *sukuk*. Therefore, the yield series for less than one-year is not included in this table.

From the pattern of the yield distribution for green *sukuk*, it can be seen that the yield are generally increasing with increases in tenure of the *sukuk* (see Figure 2). This is in line with the Liquidity Preference Theory which stated that investors who choose to invest in long-term bonds will be rewarded with greater yield to compensate for the lower liquidity by holding long-term bonds. The same pattern observed from non-green *sukuk* as shown in Figure 3. The mean yield value for medium-term green *sukuk* is 3.17% while the long-term green *sukuk* mean yield is about 4.94%. For non-green *sukuk*, the mean value for medium-term and long-term are 3.33% and 4.56%, respectively.

Figure 2: Yield distribution of green *sukuk*

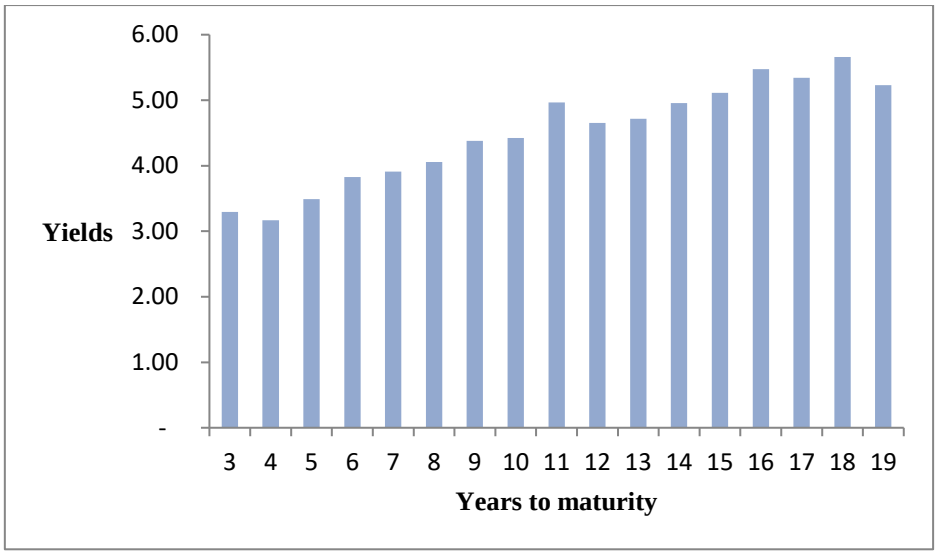

Figure 3: Yield distribution of non-green *sukuk*

The difference in mean for the green *sukuk* and non-green *sukuk* with medium-term tenure is 0.16% or 16 basis points and -0.38% or 38 basis points for long-term tenure *sukuk*. Green *sukuk* with long-term tenure has higher returns to investors than non-green long-term *sukuk*. The descriptive statistics in Table 1 provide initial evidence on the existence of different yield level offered for green and non-green bond with different term to maturity. The testing of these differences will be presented later.

A graphical illustration of the data is provided in Figure 4 based on the medium, lower and upper quartiles. The details of the lower and upper quarters of the boxplots are presented in Table 2. As the number of data for medium term green *sukuk* is very limited, therefore, there

is no clear boxplot for the short-term *sukuk*. Nevertheless, there is still relevant information captured from the analysis result from E-views. For medium-term *sukuk*, the median yield for green *sukuk* is 3.36%, while for non-green *sukuk*, the median yield is 3.31%. In addition, most of the medium-term non-green *sukuk* yields are at 3.21% to 3.61%, with the lowest maturity *sukuk* recorded a yield of 2.35% and as high as 3.83% for longest maturity *sukuk*.

Table 2: Numerical summary of boxplot for series used in the tests

Types	Mean	Min	Q1	Median	Q3	Max	Observation
Medium-term green *sukuk*	3.17	2.48	-	3.66	-	3.66	3
Medium-term non-green *sukuk*	3.33	2.35	3.21	3.31	3.61	3.83	13
Long-term green *sukuk*	4.94	3.98	4.62	4.77	5.40	5.70	15
Long-term non-green *sukuk*	4.56	3.43	4.11	4.52	4.99	5.69	56

Notes: This table provides the summary of boxplots for green *sukuk* and non-green *sukuk* yield rates. Accordingly, the series are divided into three different terms to maturity which cover short-, medium-, and long-term. Q1 and Q3 represent the lower and upper quartiles of the boxplots. The Q1 and Q3 values for yield series that is less than one-year is not included in this table as the number of observations is too small.

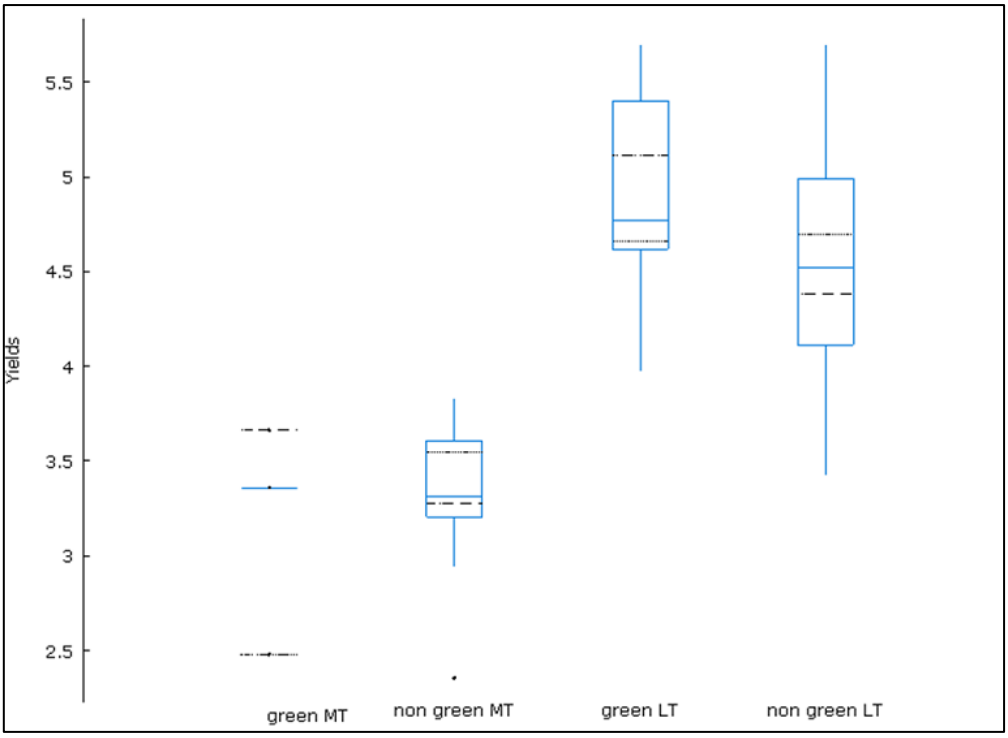

Figure 4: Box plot of the samples

The third and the fourth plots show that there is some difference in the distribution of yield for long-term green *sukuk* and long-term non-green *sukuk*. Firstly, the median yield for long-term green *sukuk* is higher than the long-term non-green *sukuk*. In addition, the median value

of long-term green *sukuk* is close to the upper quartile of long-term non-green *sukuk*. Based on this finding, it can be safely said that the use of proceeds from SRI *sukuk* issuance is related with the yield offered to the *sukuk* holders. Secondly, the inter-quartile ranges are reasonably similar as shown by the height of the box plot for each long-term *sukuk*, though the overall range of the yield distribution is greater for the long-term non-green *sukuk* (see the distances between the end of the two whiskers for each boxplot). Most of the long-term green *sukuk* are having yields between 4.62% to 5.40%. For long-term non-green *sukuk*, most of the yields are between 4.11% to 4.99%. These evidences indicate that, the distribution of yields for long-term non-green *sukuk* is much more concentrated than long-term green *sukuk*.

Test on differences in yields median

Table 3 is a summary of the findings on the difference between the observed yields to *sukuk* holders in the green *sukuk* and non-green *sukuk*. The test was conducted on the median difference in the paired samples of green *sukuk* and non-green *sukuk* as a whole and also in comparing the long-term *sukuk* median for both types.

The Wilcoxon Signed Rank tests on the medians all shows that there are significant differences in the returns to *sukuk* holders in the paired securities. The first test indicates that there is a significant difference between the yield of green *sukuk* and non-green *sukuk*. The green *sukuk* yields were statistically significantly higher than non-green *sukuk* with the score of green *sukuk* equal to 3.59, p-value < 0.00. The higher yield could be termed as the green premium. This premium suggested that *sukuk* holders in green *sukuk* market are willing to trade off wealth for environmental and sustainability benefits and this risk shall be compensated by the positive green premium (Cheong and Choi, 2020). The idea of green premium is not only applicable in an financial securities investment context, but also in product branding perspective. When a product is labeled as green products, consumers are willing to pay more (premium) for it (Akturan, 2020; Okada and Mais, 2010). In the context of green products, the premium may be justified by the additional costs that need to be borne by the producers in producing the green products (Morri and Soffietti, 2013). From the perspective of green *sukuk*, the additional price paid to by *sukuk* holders can be explained by the costs incurred in meeting the corporate governance and reporting requirements (MacAskill *et al*.,2020) so that the external reviewers can validate the green status (Simeth, 2021) of the *sukuk*.

In the case of long-term *sukuk*, the green *sukuk* yields also are significantly higher. From this result, it can be fairly said that the premium of green *sukuk* yield were mainly contributed by long-term *sukuk*. This is because, majority of the SRI *sukuk* issued in Malaysia are in the form of long-term *sukuk* rather than medium-term or short-term. In Malaysia, the introduction of Capital Market Plan 2 (CMP2) in year 2011 was directed towards providing guidelines to capital market participants on the long-term strategies to develop the Shariah-based investments. The use of long-term SRI *sukuk* in financing green investments is aligned with the long-term objectives of the CMP2 and also fit the key principle of Islamic economic system. The continuous efforts towards fulfilling the key principle of Islamic economic system will allow the issuing country have a balance of financial and social goals for long-term sustainable development (Rahman *et al.*, 2020) by taking advantage over the "feel good factor" among *sukuk* holders knowing that they are contributing to the society (Zain and Sori, 2020) in the long run from the green investment.

Table 3: Median difference test statistics on green and non-green *sukuk*

Variables	Mean	Median	Difference in median	Test statistic	p-value	Conclusion
Green *sukuk*	4.68	4.77	0.45***	3.59	0.00	Green *sukuk* yields are higher
Non-green *sukuk*	4.32	4.32				
Long-term green *sukuk*	4.94	4.77	0.25***	3.26	0.00	Long-term green *sukuk* yields are higher
Long-term non-green *sukuk*	4.56	4.52				

Notes: This table shows the summary test statistics on the median of green *sukuk* and non-green *sukuk*. The difference in median is computed by taking the median of the first type minus the second type for each pair. For example, for green and non-green *sukuk* pairs, the difference in median is calculated by taking the median for green *sukuk* minus the median of non-green *sukuk*. The score values are significant at 0.01 probability level. For the short-term maturity *sukuk*, no test is conducted as the number of samples is too small. *** indicates statistically significant differences at the acceptance level of 0.01 or more.

Conclusion

This paper started with the aim of providing quantitative evidence to establish if the two types of SRI *sukuk*, green and non-green are yielding higher (or lower) returns to *sukuk* holders. The issue at stake is whether the use proceeds of SRI *sukuk* provide differential yields to *sukuk* holders. The yields of almost all SRI *sukuk* were largely dominated by long-term *sukuk* either in green or non-green *sukuk*. This is proven by the large number of issuance of SRI *sukuk* in the form on long-term tenure than medium-term tenure. Secondly, this research also found that SRI *sukuk* issued for the purpose of financing green investments has higher returns than in non-green *sukuk*. In addition, there is also evidence of smaller (more concentrated) inter-quartile ranges of the yields of long-term non-green *sukuk* versus long-term green *sukuk*. This study however is limited to simple statistical testing on the SRI *sukuk* yields due to limited data sets on the number of issuance. With greater data availability, further research can be conducted in analyzing the short-term and long-term causality relationship between the green *sukuk* and non-green *sukuk* in order to establish whether green *sukuk* yields are driven by non-green *sukuk* or vice versa.

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