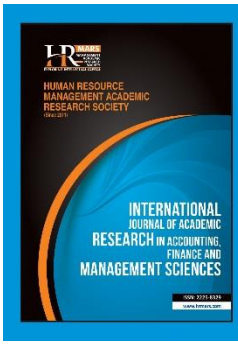

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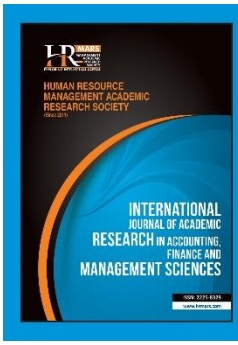
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Testing the Survival Model: Does Sukuk Offer a Better Trade-Off Than Bonds?

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Abstract
The trade-off theory assumes that there are benefits to leverage up until the optimal capital structure is reached. However, the fact yet remains puzzled whether *sukuk* companies possess the same trade-off effect because *sukuk* holds both debt and equity characteristics. The topic is prominent because of the increasing interest of sukuk issuance in the capital market, and series of financial distress occurrence especially among the debt issuers. The aims of the study are twofold, first is to identify whether *sukuk* issuance companies survive longer than bonds issuance companies, and second is to identify factors that contribute to the survival time. Samples of the study were consisting of all financially distressed *sukuk* and bonds issuance companies in Malaysia. The Cox regression model was conducted to develop the model. The result reveals a similar length of survival time for both *sukuk* and bonds companies. However, the results show that the liquidity ratio, measured by operating cash flow to current liability (OCFCL), is the most significant predictor in the case of *sukuk*. Contrary to expectations, none of the predictors tested are significant for bond companies. These results suggest a new theoretical understanding that even though the survival time between *sukuk* and bonds companies is similar, there is a unique factor in determining the survival time for *sukuk* companies. Future research may explore further on the importance of liquidity on asset-backed securities versus asset-based securities.
Keywords: Sukuk, Financial Distress, Survival, Trade-Off, Bonds

Introduction

There are still ongoing debates about either stocks or bonds should be issued when financial needs arise. This is because both stocks and bond issuance provide different benefits and expose the company to different risks. Issuing either stock or bonds has become a norm in the corporate world and hence, the different characteristics between stocks and bonds have been understood. Nevertheless, when *sukuk* was introduced in the market as an alternative to bonds; it created another understanding that *sukuk* does not bond. Scholars around the world have slightly different consensus on the differences between *sukuk* and bonds. However, there are few identical characteristics between *sukuk* and bonds such as rating process, pricing

methodology, and tax treatment, making *sukuk* a unique class of investment. From the practical point of view, *sukuk* documents look like bonds, and in fact, were developed based on the documentation of conventional bonds.

The most popular theory that can be related to the equity-debt financing decision is the trade-off theory. The trade-off theory discusses the idea of how a company (i.e., issuance company) should decide on issuing the amount of debt financing and equity financing by balancing the costs and benefits. The costs of bond issuance are bankruptcy cost, agency cost, and loss of future flexibility. On the other hand, the benefit is a compromise between the costs of bond issuance and the tax advantage. Besides, investors also view the bonds company as a more stable company because debt issuance reflects the management's commitment to servicing debt. Nevertheless, there is a limit in issuing bonds and the company must observe its debt ratios. Classical and contemporary research reveals that a higher amount of debt increases the probability of financial distress (Warner, 1977; Fitzpatrick & Ogden, 2011; Shafi et.al., 2017). Higher financial distress could lead to bankruptcy, which then the company might be acquired or taken over. However, in the case of *sukuk* versus bonds, little did we know the connection between the trade-off theory and how long the *sukuk* and bonds company could benefit from this issuance.

One of the ways to identify whether *sukuk* or bond companies could benefit from the issuance is by evaluating their lifetime period using survival analysis. Survival analysis is evaluating the continuity or lifetime of a person or a company until the occurrence of an event of interest. The event can be death, the occurrence of disease, insolvency, or the lifetime of a machine. In this research, the focus of the event is an occurrence of financial distress among *sukuk* and bonds issuing companies, where the lifetime period is taken from the date of *sukuk*/bonds issuance until the occurrence of financial distress.

Sukuk possess slightly different fundamental characteristics than bonds, particularly because of underlying assets used in *sukuk* issuance. *Sukuk* has been defined clearly by the Securities Commission (SC) of Malaysia, as follows:

"Certificates of equal value which evidence undivided ownership or investment in the assets using shariah principles and concepts endorsed by the Shariah Advisory Council (SAC), but shall not include any agreement for a financing/investment where the financier/investor and customer/investee are signatories to the agreement and where the financing/investment of money is in the ordinary course of business of the financier/investor, and any promissory note issued under the terms of such an agreement" (Guidelines on the Offering Islamic Securities 2012, pp.9).

Sukuk issuance requires an underlying asset, which backs *sukuk* issuance where returns of *sukuk* are dependent on the performance of assets. Unlike returns on bonds, which are based on the interest rate; returns on *sukuk* are volatile and subject to the price of the underlying assets. However, in the case of critical price volatility, a company can exercise a top-up mechanism[1] to ensure a smooth periodic distribution to the investors. *Sukuk* holders have

[1] In the case of asset-based *sukuk*, company can use their internal cash to pay the periodic distribution. Hence, investors have recourse on the asset-based *sukuk* company. Rating of

ownership rights on the cash flow of the specific underlying asset. The bondholders have rights only for return on investment, unlike the structure of the bond, which is based on the concept of interest rates. Besides, bondholders are credit lenders with no ownership possession of the company. Scholars argue that *sukuk* and bonds are two different financial securities because *sukuk* is an equity-based financial instrument and thus *sukuk* are not bonds (Ariff & Safari, 2012; Dusuki & Mokhtar 2010; Lahsasna & Lin, 2012).

Statement of Problem

Despite the expectation that issuing bonds (debt) could provide financial assistance and tax benefits, the previous study has revealed that issuing bonds and *sukuk* also led to increases in the probability of financial distress (Shafi et al., 2017). The research is questioning how long a company could survive after the issuance of *sukuk* or bonds, whether issuing *sukuk* or bonds could strengthen the financial position or the financial restructuring that the company currently plans. This is because; *sukuk* and bonds were only issued for capital-raising purposes. The decision to issue *sukuk* or bonds instead of selecting other methods of raising money can be driven by many factors. It can be motivated by capital needs, or due to the low cost of issuance (i.e., interest rate) as compared to equity and bank borrowing. Accordingly, this research intends to provide insights into whether there are any differences in survival time between *sukuk* and bonds companies, and whether issuing *sukuk* offers a better trade-off than issuing bonds. This is based on understanding that *sukuk* has a unique characteristic where it possesses both equity and debt characteristics. Hence, the research hypothesizes that the survival or the lifetime period of *sukuk* issuing companies could be longer than the bond issuing companies. Meaning that we are seeking whether the trade-off benefit is beyond the tax benefits and reflects the management's commitment. It is unknown whether a company could survive longer after issuing *sukuk* or bond because there were financial distress cases among *sukuk* and bonds companies. It is important to identify whether the company could survive once *sukuk* and bonds have been issued and how long is the survival time. In addition, there is also a lack of evidence to associate the theory of trade-off with *sukuk* issuance. Even though *sukuk* are regarded as like bonds, *sukuk* is a different class of financial securities. Besides, s*ukuk* are profit and loss sharing financial securities between the company and the *sukuk* holders, while bonds are based on the pure creditor-borrower relationship. Consequently, *sukuk* companies may have different risk exposure and this may suggest a different probability of financial distress as compared to bonds. Moreover, due to the different characteristics of *sukuk* and bonds, the determinants of survival time might also be different. The determinants are important to be identified so that special attention could be given to minimize the risk of financial distress.

Objectives of the Study

Based on the issue at hand, the focal point of the study is twofold. The first is to identify the survival time of *sukuk* and bond companies before the occurrence of financial distress. Longer survival time may indicate that the company enjoys the benefits of issuing either *sukuk* or bonds. The second objective aims to examine factors that influence the survival time of *sukuk* and bond companies. The research argues that both *sukuk* and bonds companies may have slightly different survival predictors due to some unique characteristics embedded in *sukuk.*

asset-based *sukuk* is benchmarked to the financial performance of the company (Elmalki and Dennis, 2010; Hasan, 2013).

Significance of the Study

Firstly, the research is vital to be carried out because *sukuk* and bonds are among the major financial sources among corporate companies. The growing number of *sukuk* issuance and an increasing number of financial distress cases among *sukuk* and bonds companies in Malaysia has also indicated that it is a timely manner to conduct this research (Shahida & Sapiyi, 2013; Shafi et.al., 2017).

Secondly, the theory of capital structure, specifically the trade-off theory suggests the optimal capital structure where the proportion of equity and debt should be well adjusted. However, the effect of *sukuk* issuance on the capital structure is still ambiguous because of the lack of evidence available. This motivates further why this research is worth to be conducted.

Thirdly, in the field of medicine, a patient that is diagnosed with a particular disease will be given special medical treatment, and the health condition will be observed as to confirm whether the health condition is improving or deteriorating. Similarly, a company that issued *sukuk* or bonds usually are financially sick (i.e., short in liquidity). When sufficient liquidity is needed, *sukuk* and bonds are issued as a remedy to ensure smooth operation and continuity of the business. Accordingly, once the company has issued either *sukuk* or bonds, the management needs to monitor the financial performance of the company and its capability to service the debt. It is critical to identify whether the company can survive once the capital is injected through the *sukuk* or bonds issuance because the issuance may affect the company's survival, and later may lead to financial distress problems.

More importantly, the outcomes of this study will offer evidence of the applicability of trade-off theory from an Islamic perspective, particularly in the *sukuk* issuance. The findings of this study should provide a new understanding of the characteristics of *sukuk* companies and possibly can be used to outline a new policy in *sukuk* issuance.

This study is divided into five sections. The remaining of the paper will discuss the literature review in Section 2, followed by Section 3 for data and methodology. Section 4 cover the finding and discussion and ends with Section 5, the conclusion and implication of the study.

Literature Review

In conventional finance, the capital structure theory has been well-developed and supported by strong empirical evidence. Capital structure theory constitutes of trade-off theory (Modigliani & Miller, 1958 cited in Banos-Caballero et al., 2014), irrelevance theory (Myers and Majluf, 1984 cited in Naranjo et al., 2013), pecking order theory (Jensen & Meckling, 1977; cited in Lim, 2012), agency theory, and bankruptcy cost of debt theory (Warner, 1977; cited in Elkamhi et al., 2012). However, the most relevant theory of this study is the existing trade-off theory. This theory asserts that the company can increase its value due to interest tax advantage but has the disadvantage of balancing the potential costs of financial distress. Nevertheless, *sukuk* have different characteristics, and the applicability of the trade-off theory in *sukuk* remains perplexing. Fundamental and conceptual studies on *sukuk* are in abundance., yet there is a lack of empirical research conducted using *sukuk* samples. Most of the empirical studies concentrate on the yield of *sukuk* (Cakir & Raei, 2007; Safari et al., 2013; Ariff & Safari, 2012), rating changes, *sukuk* defaults (Majid, Shahimi & Abdullah, 2011) and determinants of *sukuk* issuance (Haniffa et al., 2014; Nagano, 2013). More recently, Suhaidi & Hayati (2020)

studied the effect of sukuk ijarah issuance on profitability among companies in Indonesia, as expected the issuance increases companies' profitability.

Many studies have been conducted that provide evidence of financial distress and propose predictions for bankruptcy of the companies. Altman pioneered the study on bankruptcy in the year of 1968. Since then, many contemporary studies have been replicating the Altman model and trying to formulate the best model to predict financial distress. In the fact, the previous study still lacks in distinguishing the influence of conventional and Islamic debts on the costs of financial distress. This study believes that there must be a different economic impact that is unidentified by the researchers. This is because in Islam every financial product must be in line with the *shariah* principles (i.e., prohibition of *riba*). These principles are backed by solid reasons (i.e., prohibition of *riba* prevents the poor becomes poorer) with the confidence that it will bring *maslahah* (benefit) to society. However, very little work has been done to distinguish the effect of *sukuk* and bonds on financial distress. The research has yet to reach the level where these matters can be proven statistically.

There was mixed agreement on the determinants used to predict financial distress[2] and bankruptcy. Besides, there are debates that statistical techniques are more important than the selection of predictors itself. In the field of financial distress, three financial distress models have been applied extensively by researchers. These models include the Altman Z-score model (1968); Ohlson model (1980); Shumway model (2000), where the Altman Z-score model is using the multiple discriminant analysis (MDA) technique (cited in Altman et al., 2014)[3]. The model was first developed using 22 initial variables and subjected to five ratio categories; namely, liquidity, leverage, activity, solvency, and profitability ratios[4]. The final ratios produced by the model are working capital to total assets (WCTA), retained earnings to total assets (RETA), earnings before interest and tax to total assets (EBIT/TA), the market value of equity to book value of total liabilities (MVE/BVTL) and sales to total assets (S/TA).

Many researchers have identified diverse findings on the importance of Altman's variables. Begley[5] et al. (1997; cited in Grice & Dugan, 2003) used 1980s samples and identified WCTA as the most important variable, while S/TA was the least important[6]. On the other hand, Grice & Ingram (2001)[7] identified different coefficient power than Altman's original model, which suggests that the model is not stationary. RETA and EBIT/TA show higher F-test significance

[2] Terminology of survival is used interchangeably with financial distress. Survival and financial distress/hazard have an inverse relationship. The higher the survival rate, the lower the financial distress/hazard probability.
[3] Multiple Discriminant Analysis (MDA) was first used in the field of biological and behavioral sciences before it became popular in the field of finance. MDA was initially applied to improve the work of Beaver (1966) who used univariate technique to predict financial distress. Beaver reveals that cash flow to debt ratio as the best single predictor for financial distress.
[4] Altman did not reveal the list of the 22 ratios. The ratios were not selected on theoretical basis, however were selected based on the popularity in the earlier researches and its relevancy to the study.
[5] Tested the Altman model using the 1980s manufacturing companies' sample. The findings show that the error rate is increasing to 18.5 percent for Type I error and 25.1 percent for Type II error, as compared to the Altman's original model
[6] Least importance based on scaled vector rankings and it also recorded negative coefficient sign
[7] Tested generalizability of the Altman model by using both of bankruptcy and financial distress companies[7] from the year of 1985 to 1987.

levels in 1985-1987 samples[8] than in Altman's original model. Like Begley et al. (1997), MVE/BVTL exhibit lower significance as compared to Altman's model. However, WCTA and S/TA recorded similar significance as in the Altman model. In contrast, Chava & Jarrow (2004)[9] and Bandyopadhyay (2006)[10] demonstrated that WCTA, EBIT/TA, MVE/BVTL, and S/TA are significant. However, Chava & Jarrow (2004) identified a negative coefficient sign and Bandyopadhyay (2006) identified a positive coefficient sign.

The second most popular model is the Ohlson model (1980; Hill et al., 2011) developed using logit regression based on a bankruptcy data set from the year 1970 until the year 1976. Ohlson combined the use of ratios from various notable studies based on simplicity reason. The model contains nine variables; namely, SIZE, total liability to total assets (TLTA), working capital to total assets (WCTA), current liabilities to current asset (CLCA), binary variable: one if total liabilities exceed total assets, zero otherwise (OENEG), net income to total assets (NITA), funds provided by operations divided by total liabilities (FUTL), binary variable: one if net income was negative for the last two years, zero otherwise (INTWO) and change in net income (CHIN). Ohlson identified SIZE as the most important variable in predicting bankruptcy, followed by TLTA. In addition to that, a combination of a performance measure, NITA and/or FUTL, and liquidity measures such as WCTA, or WCTA and CLCA is also significant in assessing bankruptcy.

Among the researcher that tested the Ohlson original model is Hillegeist et al. (2004), who applied the industrial bankruptcy sample[11]. All variables tested produced significant coefficients, but different coefficient signs as compared to Ohlson's original model[12]. Only CLCA is not significant, and it demonstrates a negative coefficient sign. Wu et al (2010) compared the performance of financial distress models using US companies, which covers the period of 1980 to 2006. Out of nine Ohlson's variables, only CHIN, WCTA, INTWO, TLTA and SIZE are significant. Another study is by Kordlar & Nikbakht (2011) who used a sample from the Tehran Stock Exchange from the year 2001-2009. Only two Ohlson's variables are identified as significant; namely, TLTA and OENEG (Low et al., 2001). Liquidity, profitability, and financial leverage are identified to be the most important variables for the logit technique (Sulaiman et al., 2001).

The third model is the hazard model, which is also known as the survival model and the Cox regression. It has become popular in financial distress studies, after its introduction by (Shumway, 2001). Shumway developed this model using accounting variables applied earlier

[8] Multivariate significance test also identified that RETA and EBIT/TA were significant at the 0.05 level.
[9] This study applied Altman's original model using sample from the years of 1962-1999 non-financial companies. The result shows that using different sample, Altman's original model is capable to predict correct classification up to 77.6 percent.
[10] Re-worked Altman's original model using the Indian bonds companies between the years of 1998 2004. The predictive accuracy is 80 percent and 88 percent for a year and two year before the bankruptcy.
[11] Hillegeist et al. (2004) argues that assets volatility is a crucial variable in predicting bankruptcy because it captures the probability that the value of the company's assets will decline to such an extent that the company will be unable to repay its debts. Two companies with identical leverage ratios can have substantially different probability of bankruptcy depending on their asset volatilities. Hence, volatility is an important omitted variable in both the Altman (1968) and Ohlson (1980) bankruptcy prediction models.
[12] The new coefficient sign is positive for SIZE, WCTA, NITA, FUTL, and OENEG. This is in contrast to negative sign as identified in original Ohlson model.

by Altman (1968 cited in Altman et al., 2014) and Zmijewski[13] (1984; cited in Lam & Trinkle, 2014). He also added market predictors including the size of the market, past returns of stock, and the stock returns' idiosyncratic standard deviation. Shumway identified that the hazard model is more powerful when market variables are added. Shumway suggested the size of the market, past returns of stock, and the stock returns' idiosyncratic standard deviation, NITA, and TLTA. Chancharat (2008); Spaliara & Tsoukas (2013) employed Cox proportional hazard and discovered that companies associated with high leverage, lower past excess returns, and the larger size can be classified as financial distress companies. Surviving companies are found to be less indebted, more profitable, and possess more collateral for external financing than failed companies. The hazard model is suggested due to the capacity to adjust the financial distress risks automatically by not detecting a particular company as a sample; when the company's financial position deteriorated due to bankruptcy or any other distress events i.e., defaults, acquisitions. Moreover, the hazard model incorporates annual observation as a time-varying covariate, which means it is considering the characteristics of the independent variables that change over time (Polemis & Gounopoulos, 2012). It can also produce higher accuracy prediction within the out-of-sample forecasts. Besides, the situation is like the logit model that can include each company's year as an independent observation.

In reference to various past studies, companies applied data extraction using the balance sheet and income statement. Yet, there was a transition in the study where data from cash flow received more attention because it is more current than the balance sheet and historical income statement. Returns on *sukuk* are very much related to its cash flow management. Even though there are claims that most of the *sukuk* issuance imitates the cash flow of conventional bonds (Godlewski et al., 2011; Wilson, 2008), *sukuk* is different because its cash flow is depending on the performance of the underlying assets' value. Cash flow is crucial in *sukuk* issuing; it indicates the importance of cash position for *sukuk* companies.

The use of cash flow-based variables as predictors is not new in financial distress studies, due to which researchers emphasize the fact that "cash is the king". Beaver (1966 cited in Hill et al., 2011) pioneered the application of cash flow in his failure prediction model and revealed the best variable; cash flow to total debt encountered to be the most important variable. Figlewicz and Zeller (1991 cited in Bhandari & Iyer, 2013) and Mills and Yamamura (1998; cited in Lakshan & Wijekoon, 2014) suggested that a firm's ability could be assessed through the operating cash flow divided by current liabilities (OCF/CL). In addition, Carslaw and Mills (1991; cited in Dumont & Schmit, 2014), Figlewicz and Zeller (1991), and Mills and Yamamura (1998) recommended using cash flow coverage of interest (OCF+ interest+ tax/long-term interest) to measure the strength of the firm financially. Besides, the margin of operating cash flow is also a meaningful predictor, whereby this ratio can show how sales can be translated into cash. To measure how cash can be generated from the assets and operating cash flow return to total assets (OCF/TA) can be used. Replacing net income with OCF in the numerator is proven as more precise (Figlewicz and Zeller, 1991). Rizzi (1994; cited in Caballo, 2013) proposed a cash flow coverage ratio as a measure of default risk. He claimed that this measurement is suitable because debt is serviced using internal free cash flow where the assumption has been made that cash flow, debt servicing, and paying capacity are interrelated to financial distress.

[13] Zmijewski (1984) variables are returns on assets (ROA), total debt to total assets (TLTA) and current asset to current liabilities (CACL).

Gentry et al (1985; cited in Mohan & Mohan, 2015) discovered that operating cash flow is not significant, but the dividend component is important for the cash flow variables. Aziz et al (1988; cited in Mannasoo & Maripuu, 2015) revealed that cash tax paid is mainly the significant predictor followed by operating cash flow. On the other hand, Dambolena & Shulmen (1988; cited in Nimalathasan & Priya, 2013) reworked Altman's and Getry et al's model by adding the fund's flow ratio. Both models were improved where Gentry's model showed superior performance than Altman's.

Bhandari & Iyer (2013) predicted business failure in the US using cash flow ratio-based measures. Discriminant analysis was employed, as the model can produce 83 percent of correct predictions. Bhandari & Iyer believes that cash and earnings are important in business, where lack of both might result in default and consequently bankruptcy problem. For that OCF is recommended in developing the financial distress prediction model. Seven variables were used; namely, operating cash flow divided by current liabilities (OCF/CL), cash flow coverage of interest (OCF + INT + Tax/INT), operating cash flow margin (OCF/Sales), operating cash flow return on total assets (OCF/Asset), earning quality (EBIT/OCF), quick ratio or acid-test ratio (CA-INV)/CL and three-year sales growth (Sales 3 Yr CAGR).

Synthesizing the above works of literature shows that understandings of capital structure theories remain incomplete, especially concerning *sukuk*. A question arises whether *sukuk* issuance will bring the same effect as the other types of debt issuance as claimed by the trade-off theory. A company issuing bonds will possibly experience financial distress in the future due to the characteristic of bonds, which is purely debt. However, there is a lack of evidence to support that the sukuk company is also exposed to the same probability of financial distress.

Data and Methodology

The study employed a sample of asset-based *sukuk* companies and bonds issuing companies in Malaysia; of which financial distress events were taking place between the years 2000 and 2013. Data is collected from Bloomberg, Islamic Finance Information Service (IFIS), Rating Agency Malaysia (RAM), Malaysia Rating Corporation Berhad (MARC), Bursa Malaysia, and Securities Commission (SC) Malaysia. The sample fulfilled any of the following criteria:

i. Companies that fall under PN4, PN17, and Amended PN17 status as stipulated by the Bursa Malaysia,
ii. Companies that were delisted from the Bursa Malaysia (but do not file for bankruptcy),
iii. Companies where *sukuk* or bonds credit rating[14] was downgraded subsequently by leading credit rating agencies in Malaysia namely RAM and MARC,
iv. Companies where their *sukuk* or bonds are defaulted or structured,
v. Companies that experience a negative profit for two consecutive years, and
vi. Companies must not be listed under the finance or banking sector.

The total sample is 36 for *sukuk* companies and 24 for bonds companies. This sample limitation is notified in this research. However, it is emphasized that all data and information have been

[14] Grice & Ingram (2001) included companies whose bonds were rated CCC or below. However, this study is considering all types of downgraded. Any rating below BBB is considered as non-investment grade.

taken into consideration to the best effort. Some companies suffer data missing and this is regarded as normal because it is an indicator of failure (Sobehart and Stein, 2000).

The distressed sample in this study requires a matched sample of non-distressed companies. The matched sample[15] is selected based on the closest market size from the same industry. The sample is matched using the same industry to eliminate the industry's effect and to ensure that the conclusion drawn is correct. Distinctive occurrences among the industries will prevent comparisons to be made from different industries (Beaver, 1966; cited in Hill et al., 2011). Procedures to select non-distress companies are adopted based on Abdullah et al (2008), Altman (1968), Bandyopadhyay (2006; cited in Korol et al., 2013), Beaver (1966) and Blum (1974; cited in Chen, 2011), which fulfilled the following criteria:

i. Distressed companies were matched with the non-distressed companies by using the same industry as determined by Bursa Malaysia,
ii. Distressed companies were matched with the non-distressed companies, according to the closest market size based on the same year of financial reporting.

The predictors (variables) of this study were selected considering the theories of Altman (1968); Ohlson (1980); Shumway (2001), as well as cash flow variables from Bhandari & Iyer (2013). Stepwise regression is conducted and resulted in final predictors as follows:

i. SIZE: log (total assets / GNP price-level index)
ii. STDEV: standard deviation measured by
iii. WCTA: working capital to total assets
iv. TLTA: total liabilities to total assets
v. OCFCL: operating cash flow to current liabilities
vi. OCFTA: operating cash flow to total assets
vii. OCF Sales: operating cash flow to total sales
viii. EBITOCF: earnings before interest and tax to operating cash flow

Two interrelated statistical techniques will be applied in this study. The first is the Kaplan-Meier Survival (KMS) and the second is the Cox regression, also known as hazard regression. Kaplan-Meier Survival (KMS) estimates are conducted before hazard analysis. In KMS, an event of financial distress after the issuing of *sukuk* and bonds is measured using two groups. The groups are *sukuk* companies (group 1) and bonds companies (group 2). The KMS is important because it can identify whether there is any significant difference in the survival time between *sukuk* and bonds companies. Survival time is defined as starting time of issuing *sukuk* or bonds until the distress time and this is represented as an event (1). However, if the company experienced any other events such as early redemption of *sukuk* / bonds, mergers, or any other causes that are not in the interest of this study, then the company is considered as 'censored' and is represented as a non-event (0). KMS produced survival plots, which show the log hazard versus the log time indicating how the survival rate declines with time. In KMS,

[15] The paired sample technique has been extensively used by a number of studies (for example, Altman 1968; Back et al. 1996; Beaver 1966; Blum 1974; Charitou, Neophytou & Charalambous 2004; Dambolena & Khoury 1980; Darayseh, Waples & Tsoukalas 2003; Deakin 1972; Dimitras et al. 1999; Gentry, Newbold & Whitford 1985; Ginoglou, Agorastos & Hatzigagios 2002; He & Kamath 2006; McKee and Greenstein, 2000; and Ugurlu & Aksoy 2006).

an assumption must be fulfilled that the censoring is similar between the groups tested; meaning that the number of censorship and the pattern of censorship per group must be similar. A big difference in the number of censors between the groups will lead to bias.

Cox regression is used as a statistical technique to identify the hazard/survival functions. Cox regression possesses the following assumptions:

i. The individual sample has an independent survival time
ii. The predictors and the hazard have a multiplicative relationship
iii. The hazard ratio is constant over time

In Cox, there are no assumptions on the shape of the hazard functions, yet it assumes of how the covariates (predictors) affect the hazard functions[16]. Unlike the logit model, which is static, the hazard is used to model the duration of time; that hazard model is known as a dynamic model. A higher survival rate indicates a lower hazard rate, and the other way round.

The following proportional hazard model should be conducted:

$$\emptyset_{i,t} = \frac{e^{\alpha(t) + \beta X i,t}}{1 + e^{\alpha(t) + \beta X i,t}} \quad (1)$$

Where:
$\emptyset_{i,t}$ = represents hazard function
X = used in forecasting failure, vector of explanatory variables
$\alpha(t)$ = time-varying covariates
β = coefficient vector

In the hazard model, a company will be classified as one (1) if it fails at a given time *t* and else zero (0). For instance, if the firm has been operating for five years and is categorized as PN17 by Bursa Malaysia in year five, only year five will have a value of one (1), and the rest of the four years will be indicated as zero (0).

The application of the hazard model is more robust than traditional accounting-based models because it can observe the entire data over years (Shumway, 2001; Sun, 2007; Agarwal & Taffler, 2008). The hazard model is one of the techniques for survival analysis and is a competing risk model where it can decide the different endpoints of various healthy companies. Abdullah et al (2008); Beaver et al (2005); suggested that the hazard model is better due to its ability to generate more accurate results in the estimation model. It can be classified into a time-variant and time-invariant model. The model with time-varying variables outperformed the model with time-invariant in deciding the covariates of financial distress (LeClere, 2005; Hillegeist et al., 2004).

Even though the hazard model produces better prediction power compared to MDA and logit, it also has some limitations. Firstly, the hazard model requires specific procedures for classification purposes, as it is not designed to predict failure. To cater to these issues, the

[16] Survival analysis is a semi-parametric because it does not assumed shape for the hazard functions. This is unlike parametric model, which set the parameter for the functions.

sample size needs to be divided into two categories: namely, the distressed and non-distressed companies. It is based on the firm's hazard rate estimated by the model developed by Luoma & Laitinen (1991; cited in Garcia et al., 2013) or divides the companies by computing their survival probability based on a particular cut-off value as per Lane et al (1986; cited as Huang et al, 2012). The second problem is that the hazard model is quite random because it categorizes the starting time of the failure process at the closing date of an annual report. Thirdly, some failing and non-failing companies may lead the results to be sample-specific, hence it may affect the hazard rate and finally, the hazard model is subjected to a problem of multicollinearity.

Findings and Discussion

In KMS, an assumption must be fulfilled that censoring is similar between the groups tested. A big difference in the number of censors between the groups will lead to bias. The censoring is demonstrated in Table 1 below.

Table 1
Case Processing Summary

Group	Total N	Censored		
		N of Events	N	Percent
1	35	18	17	48.6
2	23	11	12	52.2
Overall	58	29	29	50

Note: Group 1 is *sukuk* and Group 2 bonds.

Table 1 shows the censored cases for group 1 (*sukuk*) and group 2 (bonds) are within the range where the percentages are 48.6 percent (17 cases) and 52.2 percent (12 cases), respectively. A similar number of censors between *sukuk* and bonds were allowed for further analysis in KMS. Firstly, there is a need to test the hypothesis; a significant difference is not identified for the survival times between group 1 and group 2. To address this matter, a comparison using the test statistic of Log-rank, Beslow, and Tarone-Ware is used.

Table 2
Overall Comparison

	Chi-square	df	Sig.
Log Rank (Mantel-Cox)	0.006	1	0.936
Breslow (Generalized Wilcoxon)	0.318	1	0.573
Tarone-Ware	0.137	1	0.711

Table 2 demonstrates three statistical tests Log-rank, Beslow, and Tarone-Ware. The p-value (sig.) is representing the probability to get a test statistic (chi-square). The p-value for all three tests is greater than $p > 0.05$, which means the hypothesis failed to be rejected. This signifies that there is no significant difference in survival time between *sukuk* and bond companies. In other words, the time to distress is similar regardless of whether the company is issuing *sukuk* or bonds. The estimated time until distress for *sukuk* is 4.769 and for bonds is 5.180, which indicates, that bonds have slightly longer chances of survival. The result is supported by the plot of cumulative survival functions, which shows how survival times are similar between *sukuk* and bonds groups. The higher the event of distress occurs, the lower the cumulative

survival proportion and the lower the survival curve. For that, a survival curve, which is above or located at the upper right, is considered better. Figure 1 demonstrates the curve for group 1 and group 2, where both of the curves are crossing each other. This signifies that the two groups are having similar survival times. Also from Figure 1, we can identify that the survival curve for both *sukuk* and bonds is in proportion over time, which implies that the effect of risk factors is constant over time.

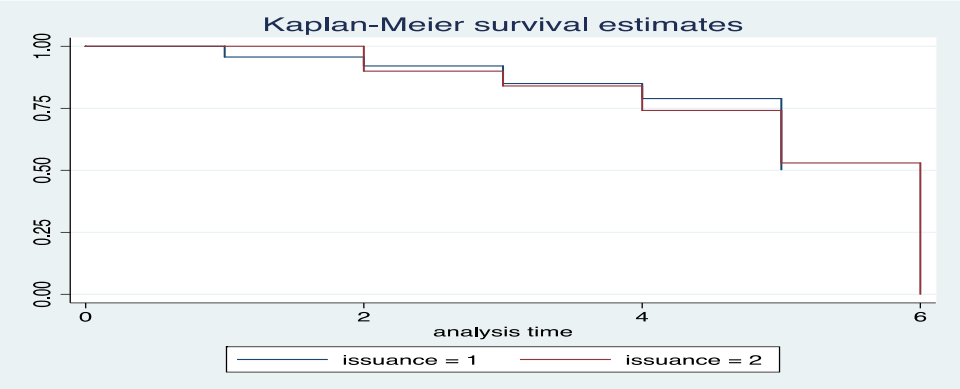

Figure 1: Survival Function Curve
Note: Issuance 1: *sukuk,* issuance 2: bonds

However, the survival rate is only meant for testing survival time, hence, to identify the factors that contribute to survival time, a Cox regression or hazard model needs to be conducted. Cox regression allows exploring the effect of different independent variables on survival time. Simple Cox regression is conducted on the *sukuk* sample and bonds sample separately. Cox assumed that shape of the hazard function is unknown. Therefore, Cox has been used for testing the effect of the variables upon the specified time an event takes place. The predictors that are identified as significant in the previous logit model are used in the Cox regression. To develop the model, hazard function h (*t*) will be modelled, and it can be calculated from the survival function. The below equation explains why Cox regression is considered a semi-parametric model:

Given X covariates, is an assumption for the hazard at time *t*.
h (*t*, x) = h_o (*t*) x Z (x), where:
h_o is non-parametric, and Z (x) is parametric. For that Cox is considered
as semi-parametric
and Z= exp ($\beta_1 X_1 + \beta_2 X_2 + \ldots$)

Testing Hazard Model on Sukuk

It is a known fact that financial data changes over time due to time variation[17]. This situation is known as time-dependent covariates. However, Cox assumed that there is a constant relationship between the dependent variable (hazard rate) and explanatory variables[18]. This situation is known as a proportional hazard (PH). If constant time is violated then the simple

[17] Often skewed and not likely to be normal distribution.
[18] The form of a time-varying covariate is much more complicated than in Cox models with fix
(non–time-varying) covariates which involves constructing a function of time (Fisher & Lin, 1999).

Cox model is invalid and time-dependent Cox must be conducted. For this purpose, before *sukuk* data is regressed using Cox, the PH assumption needs to be tested either numerically or graphically. Test of PH assumption using the 'estat phtest' command in Stata is used. The test within the following case of *sukuk* depends on whether distress and non-distress *sukuk* companies are in proportion with time or not.

Table 3
Test of Proportional Hazard Assumption

	Chi2	df	prob>chi2
Global test	2.9	8	0.945

Table 3 shows obtained outcomes of the test of PH assumption. The p-value is 0.9405, which is not significant, indicating that it does not contradict the proportionate assumption. For that H_o cannot be rejected. In other words, it indicates that the distress and non-distress *sukuk* companies are having hazard rate in proportion to time. These results are validated graphically as demonstrated in Figures 2 and 3.

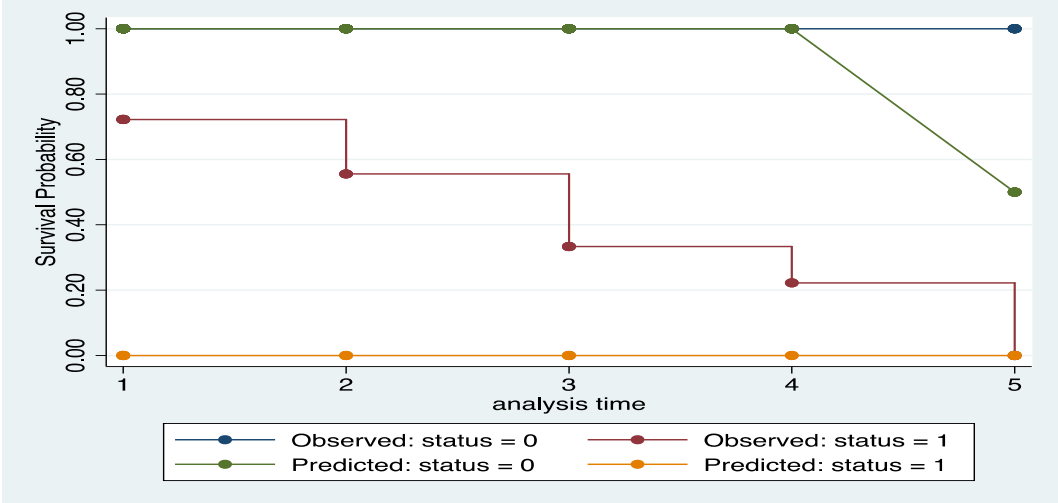

Figure 2: Kaplan Meier Plot for *Sukuk*
Note: Status 1: distress, status 0: non-distress

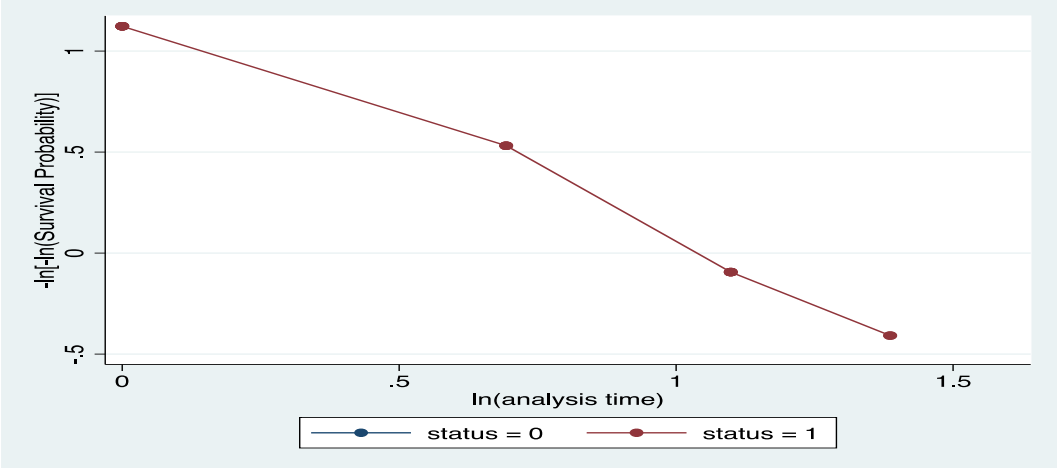

Figure 3: Log-log Plot for *Sukuk*
Note: Status 1: distress, status 0: non-distress

Table 4
Test for the Assumptions of Proportional Hazard for Variables in Sukuk

Variable	Chi2	Prob > chi2
Size	2.06	0.1511
STDEV	0.15	0.6965
WCTA	0.00	0.9768
TLTA	0.03	0.8707
OCFCL	0.40	0.5275
OCFTA	0.38	0.5359
OCF Sales	0.00	0.9790
EBITOCF	0.11	0.7453

Test for the assumptions of proportional hazard considering each of the variables that need to be tested. Table 4 reveals that all the hazard rates of the variables tested are proportion over time. The *sukuk* sample is then tested using the Cox regression. Table 5 shows the results for the variables tested.

Table 5
Cox Regression Coefficient Value for Sukuk

Variable	Coefficient	P-value
Size	1.6133	0.125
STDEV	-2.1447	0.314
WCTA	-0.961	0.610
TLTA	1.1071	0.697
OCFCL	-3.6029	0.068*
OCFTA	9.0161	0.281
OCF Sales	-3.15E-07	0.895
EBITOCF	-3.85E-06	0.687

The output only shows OCFCL as a significant variable with a p-value of 0.068 at a significant level of 0.10. The result may signify that the liquidity ratio measured by operating cash flows to current liabilities is important in determining the hazard of financial distress for *sukuk* companies. The coefficient value of -3.6029 demonstrates a negative relationship between financial distress and OCFCL. The lower the OCFCL means the higher the chances of financial distress occurrence. This indicates that *sukuk* companies need to have a higher OCFCL to minimize the potential for financial distress. Day-to-day cash flows and short-term liabilities should be managed efficiently.

Although *sukuk* is a medium to the long-term instrument, *sukuk* cash flows are closely related to the management of current liabilities because *sukuk* holders are entitled to periodic returns. For that *sukuk* issuing company must manage operating cash flows wisely. *Sukuk* companies need many current assets to pay their current liabilities. This will ensure the company maintains its liquidity position.

Testing Hazard Model on Bonds

The same predictors (variables) in *sukuk* companies are tested for bond companies. Tests for bonds are conducted simply to identify whether the same variables could predict the hazard for bonds. The test of proportional hazard assumption as shown in Table 6 demonstrates that the p-value is not significant. This signifies that the bond sample also has a hazard rate in proportion over time.

Table 6
Test of Proportional Hazard Assumption

	Chi2	df	Prob>chi2
Global test	11.06	8	0.1984

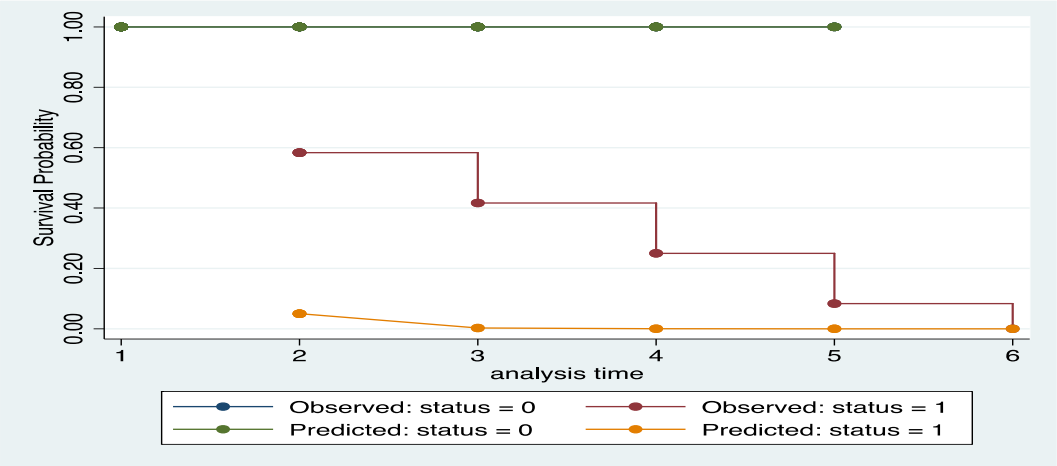

Figure 4: Kaplan Meier Plot for Bonds
Note: 1= distress, 0= non-distress

Using graphic evidence, Figure 4 shows that the hazard rate for distress bonds (status 1) is declining over time, while for non-distress bonds (status 0) the hazard rate is constant.

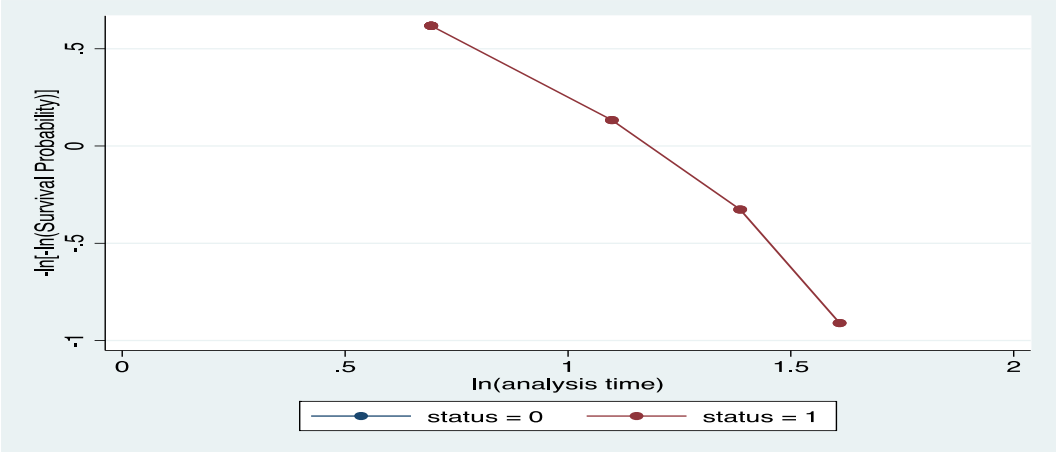

Figure 5: Log-log Plot for Bonds
Note: Status 1= distress, status 0= non-distress

Table 7
Test for the Assumptions of Proportional Hazard for Variables in Bonds

Variable	Chi2	Prob > chi2
Size	0.70	0.4014
STDEV	4.68	0.0305*
WCTA	0.48	0.4872
TLTA	0.01	0.9376
OCFCL	0.08	0.7794
OCFTA	4.73	0.0296*
OCF Sales	3.54	0.0597*
EBITOCF	0.01	0.9145

Note: * indicate violating hazard assumption

Table 8
Cox Regression Coefficient Value for Bonds

Variable	Coefficient	P-value
Size	-0.2960	0.760
STDEV	-3.7066	0.235
WCTA	-1.1143	0.725
TLTA	-2.9066	0.490
OCFCL	-2.8129	0.700
OCFTA	-26.7287	0.260
OCF Sales	7.9040	0.108
EBITOCF	0.0007	0.920

In general, the variables tested in bonds sample is showing contradict coefficient signs as compared to *sukuk* sample. Only STDEV, WCTA, and OCFTL recorded the same coefficient signs as in the *sukuk* sample. None of the variables recorded significant values. This reflects that variables used in predicting the financial distress of *sukuk* companies are not suitable for bond companies. This is also explained by the test of proportional hazard assumption for each of the variables. Variables STDEV, OCFTA, and OCF sales have p-value less than 0.05 indicating that the hazard rates for variables are not in proportion over time. These results may contribute to the insignificant predictors for bonds.

Conclusion and Implication of The Study

This research analysed the practicality of the theory of capital structure with bond and *sukuk* companies. The conventional capital structure theory argues that the amount of debt increases the likelihood of bankruptcy. However, the research proposed that this agreement was made based on the understanding that bonds are simply a debt. Unlike *sukuk,* which is unique because it has both debt and equity characteristics. Consequently, this research argues that *sukuk* might have a different impact on the survival time and probability of financial distress. This study contributes to the literature findings by addressing the financial distress concerns associated with *sukuk* and bonds companies. The results of this research will assist future studies in identifying the survival time of *sukuk* and bonds companies before the actual

financial distress occur. The main finding of this study is the recognition of the factors that contribute to the survival time of *sukuk* and bonds companies. Predictors of the survival time of *sukuk* and bonds issuing companies can be applied in future research for a broader perspective.

This research has theoretical as well as practical advantages to address the concern of financial distress within the bonds and *sukuk* companies. Subsequently, the results of the research suggest the theoretical implication based on the understanding of bankruptcy and trade-off theory, while particularly focusing on the perspective of *sukuk.* In summary, the KMS test produced a slightly different estimated survival time, 4.769 for *sukuk* and 5.180 for bonds. This reflects that there is no significant difference recorded between the survival time of *sukuk* and bonds, which means the choice of *sukuk* companies to have debt and equity at the same time has no relevant impact on the financial distress or survival of the companies. It further indicates that both companies have a similar lifetime for the estimated time of survival until actual distress takes place. Cox regression analysis was conducted, to identify the predictors that contributed to this survival time. It provides new insight that the liquidity ratio measured by operating cash flow to current liabilities (OCFCL) is significant in the case of *sukuk.* Contrary to the expectations, none of the selected predictors are significant for bonds. This implies that bonds companies might need different predictors to identify factors that contribute to their survival time. It is recommended that future research analyse the potential predictors of bond companies, as well as their impact on the survival time of the companies. The research offers new insight into why the liquidity measured through cash flow variables is more important to *sukuk* companies in determining their survival time. Consequently, this has signified the role of liquidity in predicting financial distress among the *sukuk* companies.

This research also suffers several limitations, which include the lack of data to compare asset-based *sukuk* and asset-backed *sukuk.* Should the data be sufficient in the future; the study would recommend the potential researcher investigate this matter. Secondly, it is interesting to see whether the proposed model could be tested in other countries that are issuing *sukuk.* This test is vital because it is important to identify whether the model is merely country-specific or is influenced by the characteristics of the *sukuk* itself. Thirdly, to recommend the researcher employs another statistical model such as artificial neural networks (ANN) which usually practices in the field of information technology.

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