

# Predicting Probability of Defaults: The Case of Malaysian *Sukuk* Market

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## ABSTRACT

Of all rapidly growing Islamic capital market securities, none are gaining popularity as much as *sukuk*. Unfortunately, series of high profile *sukuk* defaults in the Gulf Cooperation Council (GCCs) e.g., Investment Dar, Saad Group and Dubai World's Nakheel *Sukuk* in 2009 have tarnished the credibility of *sukuk* as feasible and viable Islamic long-term project financing instrument. For Malaysian *sukuk* market, there were 26 cases of *sukuk* default documented since the first *sukuk* issuance in 1997 until 2013. Given this situation, it is interesting to investigate the reason for the defaults, more importantly, to predict the probability of default so that the occurrence of defaults may be minimized in the future. Such identification of default risks in *sukuk* is important for supervision and risk management purposes. The objective of this study is to develop an early warning model for predicting corporate *sukuk* defaults in the Malaysian capital market using financial as well as non-financial variables. This study employs a multiple regression using maximum likelihood (ML) based on binary logit. It provides important results: first, an empirical method for estimating corporate *sukuk* probability of default, where the default risk is forecastable on the basis of a number of financial and macroeconomic variables. Second, it shows that for solvent companies issuing *sukuk*, the probability of default is low. On the other hand, for insolvent companies, the probabilities of defaults are very high as early as the first year of issuance. These results have many important implications for Malaysian *sukuk* market.

Keyword: Capital market, Islamic finance; Malaysia; *sukuk* default.

## INTRODUCTION

*Sukuk* is an increasingly important asset class which enables governments and corporations to raise capital in a *shariah*-compliant<sup>5</sup> manner. In addition to the conventional bonds, *sukuk* provides access to

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<sup>5</sup> "*Shariah*-compliant" refers to activities that are permissible according to Islamic teachings, values, and ethics.

huge and growing Islamic liquidity pool. The *sukuk* market has grown rapidly over the last few years in terms of size, numbers, and sophistication. The instrument has gained popularity in Malaysia since its first inception in 2002 and has seen tremendous development since then. In the global arena, Malaysia is consistently being the largest market for *sukuk* with 69 percent and 62 percent of the total *sukuk* issuance and outstanding consecutively.

Malaysia's Islamic capital market continues to exhibit vibrant growth as can be seen from the ever-increasing size and diversity of *sukuk* offered. This is attributable to various factors, including well-executed policies, facilitative regulatory environment, increasing numbers and sophistication of intermediaries that continue to push the frontiers in terms of product innovation as well as the existence of a complete, matured and well-established Islamic financial system.

Of all rapidly growing Islamic capital market securities, none are gaining popularity as much as *sukuk*. Unfortunately, series of high profile *sukuk* defaults in the Gulf Cooperation Council (GCCs) e.g., Investment Dar, Saad Group and Dubai World's Nakheel *Sukuk* in 2009 have tarnished the credibility of *sukuk* as feasible and viable Islamic long-term project financing instrument. In Malaysian market, there were 26 cases of *sukuk* default documented since the first *sukuk* issuance in 1997 until 2013 (including two new cases being downgraded to D). Therefore, this study aims to provide model in predicting *sukuk* default using financial and non-financial indicators.

It is interesting to investigate the reason for the defaults. Also, it is more important to predict the probability of default so that the occurrence of defaults may be minimized in the future. It is important to address this issue as this study able to help *sukuk* issuers as well as rating agencies in estimating credit risks and setting corporate pricing on a risk-adjusted return basis. Such identification of default risks in *sukuk* is important for supervision and risk management purposes.

This paper is structured as follows. The following part discusses on overview of *sukuk* and default risk in Malaysia market. Next, it presents methodology, followed by deliberation on the findings. Final part concludes with policy implication.

## OVERVIEW OF SUKUK

### *Sukuk* Concept

*Sukuk* is derived from Arabic word, *sak*, which means certificate. *Sukuk* is defined as certificates of equal value which evidence undivided ownership or investment in the assets using shariah principles or concepts, e.g. *murabahah*, *bay' bithaman ajil*, *ijarah*, *istisna'*, *mudarabah*, *musharakah*, *wakalah*, *salam* and *istisna'*. In Malaysia, these principles in structuring *sukuk* must be approved by the Shariah Advisory Council (SAC) of the Securities Commission (SC). There are a few types of *sukuk*, namely asset-based (sale & lease-based); asset-backed (partnership & agency-based); and hybrid.

### *Sukuk* and Default Risk

*Sukuk* are different from conventional bonds in some risks that each issuer and investor must take into consideration. The risks that *sukuk* encounter vary according to the structure of their underlying contracts as well as the underlying assets of these *Sukuk*. Furthermore, lack of efficient institutional support increases the risk of *sukuk* as compared to traditional fixed incomes (Sundararajan & Luca 2002).

Credit (default) risk is one of the risks that apparently associated to *sukuk* instruments. Khan and Ahmed (2001) define credit risk as the risk that the counterparty will fail to meet its obligations promptly and fully in accordance with the agreed terms. It also refers to the probability that an asset or loan becomes irrecoverable due to a default or delay in settlements (Tariq & Dar 2007). Chapra and Khan (2000) identify various unique credit specific to *sukuk*. Meanwhile, Khan and Ahmed (2001) conclude that *sukuk salam* entail unique bases of credit risks, while *sukuk musharakah* has high default risks. For *sukuk mudarabah*, poor performance of projects and problems emanating from asymmetric information may contribute to credit risk.<sup>6</sup>

*Sukuk ijarah* in particular is exposed to credit risk in two occasions: (1) credit risks while the contract is enforced; and (2) credit risk when the contract matures. During the term of the contract, an issuer is obliged to pay the specified rent at the specified time to the *sukuk ijarah* holders. Failure to pay rent at the specified time imposes credit risks. The floating rate of *sukuk ijarah* is more susceptible to this

<sup>6</sup> Generally, asymmetric information occurs when the *mudharib* (entrepreneur/firm) accesses more information compared to investors, and encourages the said *mudharib* to not fully disclose information for its benefits

risk as the rise in reference rate could increase the burden of rental payment. On the other hand, when the contract matures, the SPV under *sukuk ijarah* will sell the underlying assets back to the issuer at a predetermined price. Proceeds from this sale will be distributed among *sukuk*holders. However, the credit risk can occur at maturity if the issuer is unable to buy back the underlying asset at the predetermined value.

Howladar (2006) insists that *sukuk*holders must own the beneficial title of the underlying asset to avoid the risk of “claw back”.<sup>7</sup> By owning the asset legally, *sukuk* investors are entitled to all rights on the assets, including the right to liquidate the asset should the originator becomes insolvent. However, the actual sale of asset may not occur due to the tendency of contractual parties to sign both the sell-and-leaseback and buy-back contracts concurrently (Mohd Hafizuddin et al., 2010). Accordingly, Vicary (2010) highlights that if investors are unable to dispose the asset in case of default; the underlying asset has no genuine role in the *sukuk* structure. In this case, the structure of *sukuk* is merely a metaphor for the purpose of legitimacy under *shariah* law.

Under the *mudarabah* structure, bankruptcy risk can happen if the project fails or if the *sukuk* issuer becomes insolvent. In the former, it is clearly understood that *rabbul-maal* would bear the entire loss should the project not perform well, but the *mudarib* will be responsible for the losses due to negligence, mismanagement, and dishonesty. However, in case the originator goes bankrupt, which then leads to the project’s failure, can investors claim for recovery of their investment?<sup>8</sup> The presence of SPV is not compulsory for *sukuk mudarabah* but many issuers in Malaysia (or even worldwide) tend to use SPVs for tax incentives purposes as well as for their bankruptcy-remote feature. Although the originator owns the SPV<sup>9</sup>, its liability is limited to the capital invested in SPV and prevents the *rabbul-maal* to make claims against the originator in the event of insolvency. Therefore, the bankruptcy risk the investor faces is solely on the performance of the project and not to the originator. In addition, the *Shariah* Advisory Council (SAC) of the Securities Commission of Malaysia allows third-party guarantee on capital invested by *rabbul-maal* under *sukuk mudarabah*. Thus, the major credit risk faced by the *rabbul-maal* is the non-payment of profit share by the *mudarib* at specified times.

Hence, corporate liabilities such as *sukuk* may also carry credit or default risks. There is always a chance that a corporate borrower will not meet its contractual obligations and may renege from paying the principal and the profit due. Although high grade issuer is also exposing to credit risk at minimum, the exposure can even increase significantly. Further, the margins in corporate lending are very tight; even small miscalculations of default risks can undermine the profitability of lending. Unexpected realizations of default risk have destabilized, decapitalized, and destroyed many internationally active corporate institutions. Bandyopadhyay (2006) reports that as the credit quality of a corporate bond worsens (i.e., its rating grade declines), the probability of default (PD) increases. Furthermore, the probability of default jumps sharply as soon as the rating moves from investment to non-investment grades (i.e., from BBB rating to BB). He also observes that rating stability declines as the credit quality worsens. The higher risk in the bottom grades (mainly non-investment grades) calls for developing a corporate default predictor model that would better capture the firm’s characteristics and could give an early warning of corporate distress.

### **Sukuk and Credit Ratings**

In conjunction to credit risk exposure, the need for a *sukuk* credit rating becomes more evident. A credit rating is a mechanism through which an independent third party, i.e., the credit rating agency (CRA),<sup>10</sup> makes an assessment on the likelihood a corporate issuer will default on its debt repayments. It focuses on a specific debt instrument and not on the overall creditworthiness or financial standing of the corporate issuer. A rating will take into consideration various enhancement tools such as guarantees, sinking funds, letters of credit, or any other mechanism devised to reduce the default risk

<sup>7</sup> Claw back refers to the possibility that those assets may now be reclaimed by the administrator of the insolvent estate and will not be available to repay *sukuk* investors (Howladar 2006).

<sup>8</sup> It is permissible by *shariah* law to establish reserves for contingencies but it only covers the shortfall of expected profits.

<sup>9</sup> Most SPVs in Malaysia are owned by the originator.

<sup>10</sup> To date, there are two licensed CRAs in Malaysia that provide independent opinions on the credit risks and potential default risks of specific issuers. The first rating agency, RAM Rating Services Berhad (then, Rating Agency Malaysia Berhad – RAM), was established in November 1990. The second is the Malaysian Rating Corporation Berhad (MARC), which was incorporated in October 1995. Some international rating agencies such as Moody’s, Standard & Poor’s (S&P) and Fitch Ratings are also recognized by the Malaysian Securities Commission.

of specific issues. Thus, a corporation may be assigned different rating categories for different debt issues across time (RAM 2010).<sup>11</sup>

The *sukuk* credit rating reflects credit worthiness of the underlying asset and issuers of the certificate. In general, *sukuk* with good credit ratings (e.g., AAA, AA) entail low credit risk, and vice-versa. Similar to conventional bond, *sukuk* also entail credit or default risk. Chances of failure for corporate borrower to meet contractual obligation are always exist due to default in paying principal and outstanding profit. In fact, typical high-grade borrower is exposed to credit risk although it may relatively small, perhaps 1/10 of 1 percent per year.

Malaysia is one of the first countries in the world to require CRAs' ratings on *sukuk* issue.<sup>12</sup> *Sukuk* to be issued in Malaysia must have at least one credit rating, i.e. initial rating, and throughout its tenure (SC & Bank Negara Malaysia 2007).<sup>13</sup> The measure recognizes CRA's vital role in evaluating the credit risk, and the importance investors place on ratings for their investment decisions. This is important to boost the confidence of *sukuk* investors and market participants.

## METHODOLOGY

This study employs a multiple regression using maximum likelihood (ML) based on binary logit. As the sample chosen is relatively small, panel data regression is employed. Specifically, logit regression analysis is conducted to obtain the coefficient of each explanatory variable. Then, these coefficient values are used to derive the Logistic Distribution Function (LDF). The logit model method<sup>9</sup> is employed to estimate several data sets that have a qualitative-dependent variable. It is an alternative estimation method over the Linear Probability Model (LPM) since the former could overcome many of LPM estimation problems.

### Probability of *Sukuk* Default: The Model

The logit model is derived from the LPM equation to form the Z-score model to obtain coefficient values for each explanatory variable where  $P_i$  is the cumulative logistic distribution, as below:

$$P_i = \beta_1 + \beta_2 X_i \quad (\text{Eq. 1})$$

Where, the following represent the probability of event will happen:

$$P_i = \frac{1}{1 + e^{-Z_i}} = \frac{e^Z}{1 + e^Z} \quad (\text{Eq. 2})$$

Thus, the logit equation takes the following form:

$$PD_{it} = F(Z) \quad (\text{Eq. 3})$$

Where,  $F(Z)$  is the cumulative logistic distribution from Equation 2, i.e. Z-score. The common form of the Z-score model is shown below:

$$Z_i = \beta_1 + \beta_2 X_2 + \beta_3 X_3 \dots \dots \beta_k X_k \quad (\text{Eq. 4})$$

We develop our model by replicating Bandyopadhyay (2006) on the probability of bond default. We include macroeconomic variable i.e. gross domestic product (GDP) to further assess the macroeconomic effect on the probability of *sukuk* defaults and earnings before interest and tax (EBIT). According to Samsuddin et al. (2011), EBIT is significant in predicting default of *sukuk* in Malaysia. Furthermore, the ability of companies to service its bondholder is largely depends on profit

<sup>11</sup> The rating itself is not a recommendation to purchase, sell, or hold a security's market price or its suitability for a particular investment, nor does it involve any audit by the rating agency (RAM 2010).

<sup>12</sup> The CRAs must be recognized by the SC for the purpose of rating debt or *sukuk* issues in Malaysia, pursuant to the Guidelines on Recognition of Credit Rating Agencies by the Securities Commission for the Purpose of Rating Bond Issues

<sup>13</sup> Mandatory ratings will be lifted starting 2015.

performance, which could be severely affected during economic recession (Helwege & Kleiman 2006). The GDP is the natural measure of economic condition (Helwege & Kleiman 2006; Bishop et al. 2013) and has been applied for many years. The probability of *sukuk* default of Banyopadhyay (2006) is shown in Eq. 5 and Eq.6 presents the modified version of Banyopadhyay (2006) with the incorporation of EBIT and GDP.

$$Z_{it} = \beta_1 + \beta_2WK\_TA_{it} + \beta_3CASHPROF\_TA_{it} + \beta_4SOLVR_{it} + \beta_5OPPROF\_TA_{it} + \beta_6SALES\_TA_{it} + \mu_{it} \quad (\text{Eq. 5})$$

$$Z_{it} = \beta_1 + \beta_2WC_{it} + \beta_3CASHPROF_{it} + \beta_4SALES_{it} + \beta_5SOLVR\_AB_{it} + \beta_6MVE\_BVE_{it} + \beta_7EBIT_{it} + \beta_8GDP_{it} + \mu_{it} \quad (\text{Eq. 6})$$

where,

$PD = Z_{it}$	=	Defaulted = 1, non-default=0
$WC$	=	Working capital (total working capital over total asset ratio).
$CASHPROF$	=	Cash profit (total cash profit over total asset ratio).
$SALES$	=	Sales (total sales over total assets ratio).
$SOLVR\_AB$	=	Solvency ratio-asset based.
$MVE\_BVE$	=	Market value (market value to book value ratio).
$EBIT$	=	Earnings before interest and tax.
$GDP$	=	Economic condition (Gross domestic product).

As the  $Z_i$  value is acquired, by using expositions from LPM derived model, the estimated probability value of a company with defaulted *sukuk* can be derived individually. By putting the actual financial data of the companies in the estimated logit model given in Table 2, the estimated values are:

$$PD = 8.667 + 6.386(WC) + 4.374(CASHPROF) - 0.76(SALES) - 0.185(SOLVR\_AB) - 0.29(MVE\_BVE) - 0.00006(EBIT) + 0.428(GDP) \quad (\text{Eq. 7})$$

Based on cumulative logistic distribution function derived from Eq. 1 and the probability of default values from Eq. 7, the estimated probability values for each company are then calculated.

### Predictive Power of the Logistic Model

This model has been tested by using the same holdout sample from 2000 until 2010. The holdout sample consist of equal number of 7 *sukuk* defaulted cases and 7 solvent *sukuk* cases in Malaysian capital market. As shown in Table 3, our model clearly shows good capacity to discriminate between defaulted and solvent *sukuk*.

### Sample and Sources of Data

A sample of public listed companies (PLC) issuing *sukuk* is selected for the period of 2000 to 2010 (11 years). During this period, there were more than 20 *sukuk* that have been defaulted but only seven of the issuing companies were listed in Bursa Malaysia. In order to produce fair evaluation and assessment, balanced sample of 132 observations comprising of 14 companies – seven with defaulted *sukuk* and seven with non-defaulted *sukuk* are employed in order to obtain the beta value. The company information and financial data are extracted from the SC website Thompson Reuters DataStream 5.1 and OSIRIS, respectively.

This paper will only report and analyse four cases of *sukuk* issuing companies (two non-default, 2 defaulted); namely Tenaga Nasional Bhd, TSH Resource Bhd (for non-default companies); and EngloTech Holdings Bhd and Tracoma Holdings Bhd (for defaulted companies). These companies showed evident change on financial performances after five years of *sukuk* issuances. The two non-default companies are chosen due to their strong financial condition by mean to compare with the other two defaulted companies.

### **PROBABILITY OF SUKUK DEFAULT BY COMPANY: AN ANALYSIS**

The companies' probability values of default for each year under observation will be presented by two ways, namely, (a) by using a table, the probability values for every company every year is the said company's probability to default a year onward; and (b) by using a graphical line consisting of five years' threshold bound for further analysis. The defaulted *sukuk* take the value 1, while the non-default is 0.

#### **(i) Solvent companies**

For companies with good financial strength, i.e. solvent, their probabilities of default are very low. The *sukuk* were performing well in tandem with the company's financial performance and have no risk of default. For example, TSH Resource Bhd (Figure 1) and Tenaga Nasional Bhd (Figure 2) are generally doing well for the first five years of *sukuk* issuance. After the fifth year, Tenaga Nasional Bhd also shows stability with very low probability of default, while TSH Resource Bhd was also doing well for the following years.

#### **(ii) Insolvent companies**

For companies with less financial strength, i.e. insolvent, their probabilities of default are very high. The companies appeared to have higher Z-Score value than before five years threshold. The *sukuk* were not performing due to the companies' bad financial performance. For the first five years of issuance, the *sukuk* credit qualities deteriorate for both issuing companies, namely EngloTech Holdings Bhd (Figure 3) and Tracoma Holdings Bhd (Figure 4). After the fifth year, both *sukuk* show very high probability of default, and were announced as defaulted on the following year. Both companies have high Z-Score values and experienced the worst default events, as compared to other five companies i.e. bankrupt.

### **CONCLUSION & POLICY IMPLICATION**

This study aimed to develop an early warning model for predicting corporate *sukuk* defaults in the Malaysian capital market. It provides important results: first, it provides an empirical method for estimating corporate *sukuk* probability of default, where the default risk is forecastable on the basis of a number of financial and macroeconomic variables. Second, it shows that for solvent companies issuing *sukuk*, the probability of default is low. On the other hand, for insolvent companies, the probabilities of defaults are very high as early as the first year of issuance. These results have many important implications for Malaysian *sukuk* markets.

Findings show that default risks of *sukuk* are forecastable empirically using financial and macroeconomic variables. This study has some policy relevance since the default probability estimate could help *sukuk* issuers and rating agencies in estimating credit risk and setting corporate pricing on a risk-adjusted return basis. The identification of default risks in *sukuk* is important for supervision and risk management purposes. Having an efficient risk management in Islamic capital market instruments is crucial as the markets are coping with with the challenges of financial liberalization. This will also help regulators ensure market stability and efficiency.

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TABLE 1: Malaysian Sukuk Market, 2011 –2013

<b>Sukuk Issued (USD billion)</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Malaysia	<b>68.4</b>	<b>113.2</b>	<b>86.7</b>
Global	93.7	149.3	125.3
% to Global	73%	76%	69%
<b>No. of Global Issuers</b>	<b>125</b>	<b>144</b>	<b>142</b>
<b>No. of Global Sukuk</b>	<b>811</b>	<b>861</b>	<b>894</b>
<b>Sukuk Outstanding (USD million)</b>			
Malaysia	81.7	129.5	161.5
Global	113.0	193.7	260.3
% to Global	72%	67%	62%
<b>No. of Global Issuers</b>	<b>222</b>	<b>290</b>	<b>356</b>
<b>No. of Global Sukuk</b>	<b>1,031</b>	<b>1,435</b>	<b>1,928</b>

Source: Reproduced from Securities Commission (2014).

TABLE 2: Estimated Logit Model Dependent variable: Probability of Default

Variables	Coefficients	z-Statistics
<i>C</i>	8.6671	3.4773
<i>WC</i>	6.3859	2.5327
<i>CASHPROF</i>	4.3738	0.5175
<i>SALES</i>	-0.7595	-0.7040
<i>SOLVR_AB</i>	-0.1848	-4.0963
<i>MVE_BVE</i>	-0.2897	-1.3288
<i>EBIT</i>	-6.06E-05	-3.5239
<i>GDP</i>	0.4276	2.3957
McFadden R-squared	0.6677	
LR statistic	119.7290	

TABLE 3: Classification Power of the Logistic Model for the Holdout Sample from Years 2000 and 2010

Original Case	Predicted Case		
	Defaulted (n=7)	Solvent (n=7)	Total
Defaulted (n=7)	7	-	7
Solvent (n=7)	-	7	7
Total	7	7	14

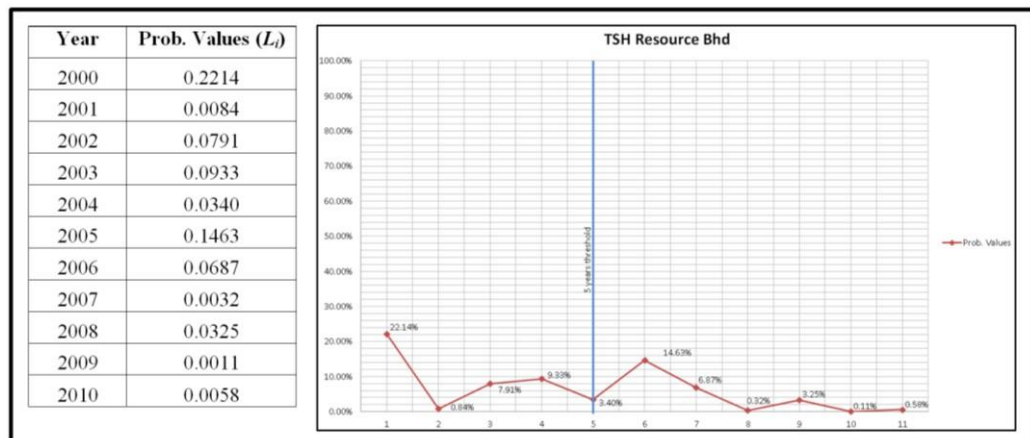


FIGURE 1: Probability Values of TSH Resource Bhd.



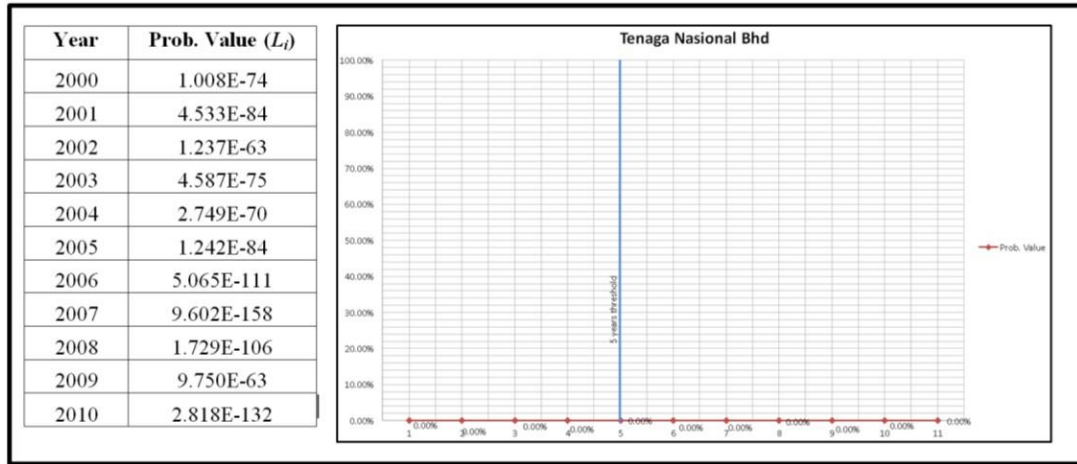


FIGURE 2: Probability Values of Tenaga Nasional Bhd

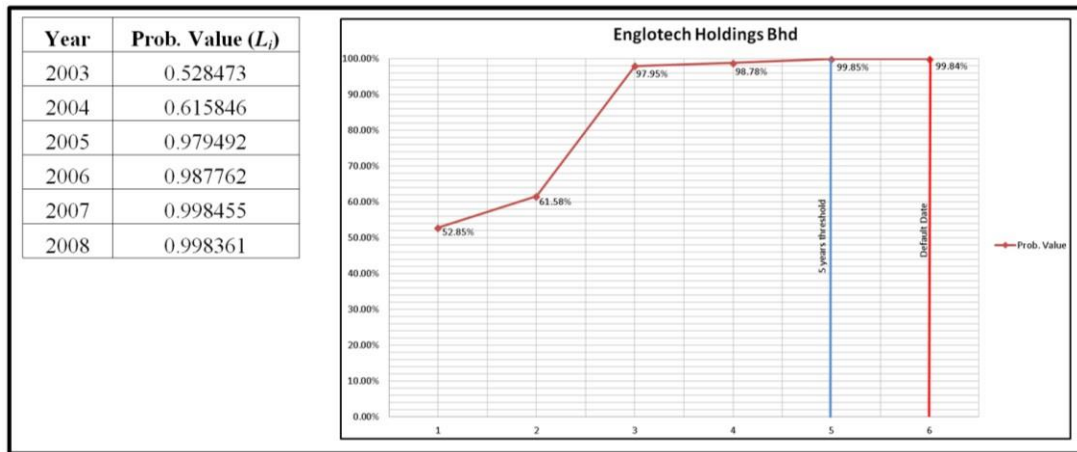


FIGURE 3: Probability Value of EngloTech Holdings Bhd.

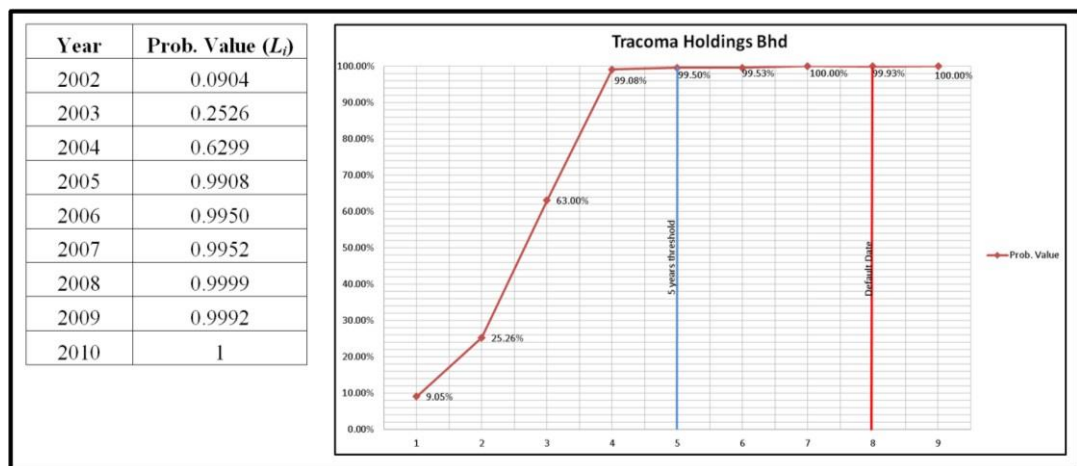


FIGURE 4: Probability Value of Tracoma Holdings Bhd.