SOVEREIGN SUKUK PRICING ANALYSIS: DO MACROECONOMIC VARIABLES MATTER?

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ABSTRACT

Development of the global sukuk market has been pioneered by Malaysia with the launch of the first sovereign 5-year global sukuk of US$600 million in 2002. Since then, the sovereign sukuk market has developed rapidly, with sovereign sukuk being issued by the Governments of Turkey, Qatar, United Arab Emirates, Bahrain and Indonesia to name a few. In view that sovereign securities are not totally free from default, there is also a great deal of concern associated with them as some of the issuing countries have experienced major debt servicing problems in the past such as the Greek debt crisis. As such, it is essential to analyze whether the sovereign sukuk yields do reflect the macroeconomic fundamentals of the issuing country. Based on the analysis of five countries in Asia and the Middle East, this study employs panel data from 2006 to 2013 and shows that only the inflation rate is able to explain the movement of sovereign sukuk yields. The insignificance of other macroeconomic variables such as GDP growth and money supply indicate that tagging the economic growth of the issuing country onto the pricing of sovereign sukuk yields may not be feasible at this juncture. Hence, it is concluded that in order to develop a standalone pricing mechanism different from the one used by the conventional bond market, more efforts are needed so that the sukuk market will expand with even more market player participation to create the liquidity needed for it to develop its own pricing mechanism.

1. INTRODUCTION

The remarkable issuance of the sovereign sukuk marks its importance in supporting spending on government programs and its use as a pricing benchmark for corporate sukuk issuance. The global sukuk market development has been pioneered by Malaysia with the launch of the first sovereign 5-year global sukuk of USD 600 million in 2002 (IIFM, 2013). Since then, the sovereign sukuk market has been growing rapidly, with sovereign sukuk being issued by the Governments of Turkey, Qatar, United Arab Emirates, Bahrain, Sudan and Indonesia to name a few. Since 2001, the sovereign sukuk dominates the global sukuk issuance, with the value of sovereign sukuk recorded at USD 255 billion, or 54 percent as compared to the issuance of quasi-sovereign and corporate sukuk as at January 2013 (IIFM, 2013). The recent issuance of the GBP 200 million sukuk by Britain, being the first country outside the Islamic world to issue sovereign sukuk is another landmark supporting the views that sovereign sukuk issuances are likely to continue with strong growth momentum (Rasameel Structured Finance, 2014).

The outstanding issuance of sovereign sukuk, reached USD 40 billion and 109 issues from the abovementioned countries.[1] Malaysia leads in having the highest number of sovereign sukuk outstanding with a total value of USD 30 billion followed by Bahrain, Indonesia, Qatar, United Arab Emirates, Pakistan and Turkey. *Al-Ijārah*, *salam*, *murābaḥah* and *baī' al-'īnah* are the structures used in the issuance of sovereign sukuk with murabahah being the highly used structure by Malaysia and Qatar. Table 1 shows the breakdown of the sovereign sukuk among these countries:

Despite the fact that sovereign securities are issued by the government, they are not totally free from default. The recent Greek debt crisis marked one of the notable events of the sovereign debt crisis.[2] Even though there had been no cases of default recorded for sovereign sukuk, criticisms were more focused on the pricing methodology adopted, which is similar to the pricing method of the sovereign bonds (Wilson, 2008). A number of disapproval remarks by the Shariah scholars on the use of the London Interbank Offer Rate

(LIBOR) on US dollar or Kuala Lumpur Interbank Offer Rate (KLIBOR) for the respective issuance of sovereign sukuk internationally or locally had raised concerns, prompting the call for an alternative pricing method to be used for sovereign sukuk.

TABLE 1
Outstanding Sovereign Sukuk as at 20 October 2014

Country	No of sovereign sukuk outstanding	Types of sukuk structure	Total amount outstanding USD (mil)
Malaysia	80	70 issues based on *murābaḥah* and 10 issues based on *baī' al-'īnah*	30,142.53
Bahrain	12	6 issues based on *al-ijārah* and 6 based on salam	2,243.48
Indonesia	10	9 issues based on *al-ijārah* and 1 issue based on *wakālah*	3,477.73
Qatar	3	All 3 issues are based on *murābaḥah*	1,099.46
United Arab Emirates	2	All 2 issues are based on *al-ijārah*	1,500.00
Pakistan	2	*al-ijārah*	1,492.25
Turkey	1	*al-ijārah*	1,600.00
TOTAL	110		41,555.45

Source: Islamic Finance Information Service (IFIS) database, except for Turkey which is sourced from Reuters.

These criticisms have been covered quite extensively in Wilson (2008), which led to the suggestion on using GDP growth and other relevant macroeconomic indicators as alternative to interest rate benchmark in sukuk pricing. It is also known that apart from interest rate having *ribā* element, it is also ambiguously determined and does not reflect the true value of the investment possessed by sukuk. Unlike bonds, sukuk is an equity rather than debt hence pricing it merely based on interest rate which is similar to bonds, has been widely criticized. Similar concerns were also expressed in the recent article by Ahmed, Islam and Alabdullah (2014).

Hence, the authors were motivated to test whether the movements of sovereign sukuk yields are reflected by economic growth, mainly GDP growth, inflation and money supply, whereby the variables must be significant in order for them to be used as an alternative pricing mechanism. We offer a possible alternative yield pricing method based on real macroeconomic variables rather than interest benchmarks as proposed by Wilson (2008). This paper investigates whether this alternative is practicable and reasonable. By employing the panel data regression model, only the significance of the inflation rate is documented, indicating that the use of GDP growth in pricing the sovereign sukuk as proposed by Wilson (2008) may not be feasible. However, as a novel approach in analyzing the sovereign sukuk yields, this study provides empirical evidence on the alternative pricing based on the macroeconomic variables which is beneficial to further improve the pricing method for sovereign sukuk.

The following section highlights previous studies that link the sovereign yields with the economic conditions and recent financial crisis. Studies showing the significance of the macroeconomic variables in explaining the movement of the sovereign yields are also reviewed. In addition, specific focus is also undertaken on reviewing the previous literature on the risk assessment and pricing of the sovereign sukuk yields. Section 3 embarks on the theoretical development of the estimation model while Section 4 discusses the data and methodology used. Section 5 provides the discussion on the estimation results while the conclusion and recommendations for further research are made in Section 6.

2. LITERATURE REVIEW

2.1 ECONOMIC CRISIS AND THE MISPRICING OF SOVEREIGN YIELDS

Empirical studies on sovereign yields have been extensively covered particularly on the developed bond market such as in the United States of America (USA), United Kingdom and Europe. The occurrence of the recent European sovereign debt crisis subsequent to the financial crash in 2007 has focused interest on the pricing of sovereign yields and whether it reflects true macroeconomic fundamentals of the country.

During periods of high market turmoil, it is asserted that bond yields may also reflect risks associated with excessive risk aversion that is out of sync with economic fundamentals and market conditions (Haan, Hessel and End, 2013). The yields of government bonds issued

by the European countries, for example, were thought to be severely distorted due to the unfounded fears on the part of the investors as the result of the reversibility of the euro (European Central Bank, 2012). This situation clearly indicates that sovereign yield movements are vulnerable to the state of the economy. The massive divergence of bond yields in the euro area particularly during the sovereign debt crisis also led to the finding by D'Agostino and Ehrmann (2013) suggesting that the reactions of bond yields to fundamentals are also time varying.

Besides that, several other studies have also found evidence of the overshooting of the financial markets, particularly during the later phase of the crisis and highlight that spreads in the euro zone were higher than could be explained by the fiscal fundamentals. The mispricing of sovereign yield continues to hold even when other economic factors are included such as the current account balances (De Grauwe and Ji, 2013), potential growth (Poghosyan, 2012), private debt (Giordano, Pericoli and Tommasino, 2012) and indicators of financial problems (Di Cesare et al., 2012).

With the aim of providing empirical evidence on whether bond yields of the European bonds are fairly priced with respect to macroeconomic fundamentals and market conditions, Haan, Hessel and End (2013) analyzes 17 countries (11 euro countries and six non-euro countries) and finds that even though sovereign yields cannot be fully explained by macroeconomic fundamentals alone, a significant part of yield increase can be explained by the deterioration of growth and government debt. In addition, Haan, Hessel and End (2013) also find that based on the different types of model specifications used, Greece, Portugal, Ireland and Belgium indicated some periods of misalignment and mispricing on their bond yields.

By employing the fixed effect (FE) panel data study, Kinoshita (2006) highlighted that a 1 percentage point increase in the USA debt as indicated by its debt-to-GDP ratio leads to the increase of the long-term sovereign yield by about two to five basis points, signaling the significance of the macroeconomic factor on sovereign yield movement. These studies provide a platform for us to embark on whether sovereign sukuk yields can be influenced by the macroeconomic fundamentals of the issuing countries.

2.2 RISK ASSESSMENT AND PRICING OF SOVEREIGN SUKUK

With the rapid growth of the sukuk market initiated some twelve years ago,[3] studies focusing on risk assessment of sukuk and its structures are still growing, albeit at a slower pace. Nonetheless, Tariq (2004) provides a comprehensive discussion on the risks associated with sovereign and corporate sukuk. Tariq (2004) highlights eight different risks relevant to the different types of sukuk structure, that need to be managed, namely credit or default risk, rate of return risk, *sharīʻah* compliance risk, foreign exchange risk, price risk relating to market price of the underlying assets or commodity, liquidity risk, business risk and the risk of infrastructure rigidities. His research also emphasized that adequate risk management techniques are essential for the continuing growth of a strong sukuk market of which Tariq (2004) presented the possible mechanisms via Islamic embedded options and floating to fixed rate swaps of sukuk.

          Apart from that, sukuk risk assessments are also being analyzed in many different perspectives including the analysis on the sukuk rating and default risk (Arundina and Omar, 2010; Zakaria, Isa, and Abidin, 2012), implications of sukuk risk structure for resource mobilization (Tariq and Dar, 2007) and risk premium of corporate sukuk based on sukuk spread analysis (Naifar and Mseddi, 2013; Rahman, 2008; Rahman and Omar, 2012; Rahman, Omar, and Kassim, 2013).

          On the pricing of sukuk particularly the sovereign, Wilson (2008) highlights that the return is usually benchmarked to LIBOR on US dollar funds or the equivalent local rate such as KLIBOR in the case of issues in the Malaysian Ringgit. This practice is subject to major criticisms especially on its application on *ijārah* sukuk structure as it is deemed to have a close link with the interest-based pricing with *ribā*. According to Wilson (2008), one of the main predicaments in the sukuk pricing is the market convention, whereby the financiers would want the investors to regard sukuk as identical to their equivalent conventional asset classes to simplify risk assessment. This is because investors are more confident if a security has a familiar structure to what is already offered in the market, leading to the idea that innovations of sukuk are limited to the distinctive characteristics being Shariah compliant only, without any financial innovation. With regard to this matter, Tariq (2004) also highlighted that global investors are attracted to sukuk mainly due to the relative simplicity and similarity between the conventional fixed income securities and sukuk certificates.

As such, Wilson (2008) emphasizes in the effort to be distinctive from conventional securities on the pricing innovation, real macroeconomic variables such as GDP growth could be used for sovereign sukuk pricing rather than interest benchmarks. The rationale behind this newly proposed pricing method is that for countries with income or sales taxes, increases in GDP growth would enable governments to pay higher return to sovereign sukuk investors. On the other hand, when GDP growth was lower so will be the revenue which will imply a reduced capacity to pay sukuk holders. Hence, sukuk holders will be sharing risks with governments which will reduce the risk of default in times of difficulty (Tariq, 2004). Though this may sound like an innovation to the pricing of sovereign sukuk, there is no study undertaken on the feasibility of this idea. Hence, in the effort to fill up the gap, this research analyzes the sovereign sukuk yields issued by the Muslim countries and empirically evaluates whether they can be explained by changes in macroeconomic fundamentals.

3. THEORETICAL DEVELOPMENT OF THE MODEL

In developing an empirical model for our analysis, we review the factors that may affect the required return of a bond. According to Madura (2012), the yield on a treasury bond reflects the prevailing risk-free rate which may also be applicable to the yield of sovereign bonds. However, it is important to note that in consideration that sovereign bonds are accessible to foreign investors and that some country governments have defaulted on their bonds (Argentina, Brazil, Costa Rica and Russia), they are also exposed to credit risk and often credit ratings are assigned to them by Moody's and Standard and Poor's.

Nonetheless, it is sufficient to put forward an assumption that one of the main elements of the sovereign yields is the risk free rate. Haan, Hessel and End (2013) in examining the macroeconomic fundamentals of the euro sovereign yields make use of the preferred habitat theory of the yield curve by Modigliani and Shiller (1973). Based on the theory, the sovereign yields (r_{it}) consists of three components; a risk-free component (rf_{it}), a risk premium (rp_{it}) and a residual term (e_{it}):

(1) $$r_{it} = rf_{it} + rp_{it} + \varepsilon_{it}$$

where i denotes the country and t the time period.

Madura (2012) and Mishkin and Eakins (2012) further break down the factors influencing the risk free rate being the inflationary expectations (*cpi*), economic growth (*growth*), money supply (*ms*). As such, the risk free rate (*rf*$_{it}$) can be rewritten as:

(2) $$rf_{it} = f(cpi, growth, ms)$$

As for the risk premium, Haan, Hessel and End (2013) use some latent variable assumed to be capturing both the volatility and liquidity of government bond markets in the individual countries. On this, we put forward the perspective of Madura (2012) whereby the changes in risk premium (*rp*$_{it}$) are essentially influenced by the changes in economic growth (*growth*). As the main focus in our analysis is the yield on sovereign sukuk which is assumed to be associated with the country credit risk, the risk premium (*rp*$_{it}$) must be associated with the ability of that country to service its debt and is directly linked to economic growth. Hence, in order to test whether the sovereign sukuk yield can be influenced by the abovementioned fundamentals, our empirical model modifies the Haan, Hessel and End (2013) model to include the money supply (*ms*) expressed in (3):

(3) $$r_{it} = \alpha + \beta_1 cpi + \beta_2 growth + \beta_3 ms + \varepsilon_{it}$$

The expectations are that *β₁ and β₂ ≥ 0* in consideration that any increase in these variables shall induce the sovereign yields to increase as well. On the other hand, it is expected that *β₃ ≤ 0* because any increase in money supply to the economy would place an upward pressure on the prices of sovereign bonds. Since these securities offer a fixed value to investors at maturity, a higher price translates into a lower yield for those who buy and hold them until maturity (Madura, 2012). The residuals (*ε*$_{it}$) in (3) would reflect market effect of sentiments unrelated to macroeconomic fundamentals.

4. DATA AND METHODOLOGY

4.1 SAMPLE OF DATA

One of the main challenges in undertaking the analysis with regard to the sovereign sukuk yields is to obtain a sufficient data sample from a reliable database. As highlighted by Jobst et al. (2008), limited historical performance data on *sharīʿah* compliant assets and untested stress scenarios contribute to the limited confidence when estimating likely recovery rates used in sukuk pricing and rating.

Accordingly, with the absence of a proper database maintaining all bond and sukuk prices in most of the countries that have issued sovereign sukuk (Table 1), the data on sovereign sukuk yields are sourced from various databases available. For countries possessing a bond pricing agency such as Malaysia and Indonesia, the data are reliable and comprehensive. Where the data for sovereign sukuk yields are unavailable such as Pakistan and Bahrain, we resort to the sovereign bond yield of the country, based on the assumption that pricing of bonds and sukuk are purely technical and neutral, where the yields are normally converging and bear only few basis points of difference. This assumption is also made based on the evidence that the yield movements between sovereign bonds and sukuk are similar (Rahman, 2015) apart from the highlight of the convergence of the bond and sukuk yields particularly for the Qatar sovereign USD yield curve[4]. Hence for Qatar, as the pricing of its sovereign sukuk in 2003 was only 40 basis points exceeding LIBOR, we use similar method to proxy for sovereign sukuk yields in this analysis. As for Turkey, even though the first sovereign sukuk was issued in 2012, the yields data are taken from the sovereign bond yields, in consideration of its similarity. Nevertheless, as for United Arab Emirates, because of unavailability of proper records of the macroeconomic data (i.e. inflation), it is dropped from the data sample. It is also important to highlight that the dependent variable being the sovereign sukuk yields are expressed in percentage form (rates) based on the respective maturity of the sukuk, rather than the number of outstanding sukuk in the market.

As such, the complete yearly data covers Malaysia, Bahrain, Indonesia, Qatar, Pakistan and Turkey for the years 2006 until 2013 with all variables presented in Table 2. With six countries over the span of eight years, the analysis will be based on a balanced panel data. It is also much comprehended that in analyzing for the pricing of sovereign yields, a higher frequency of data (i.e. months) is desirable in order to enable a more timely analysis and to reflect the practical aspects of monthly change in the macroeconomic variables. Nonetheless, due to the availability of data, this is another limitation that needs to be taken into consideration in carrying out this inaugural analysis. At this juncture, however, it is believed that the data used will suffice and is able to meet the research objective. Table 3 presents the summary statistics of all the variables:

TABLE 2
Data Requirement and Source of Data

Var.	Description	Data sources	Expected sign
r_{it}	Sovereign sukuk yield or government bond yield (or relevant rates) are used (%)	Bond Pricing Agency Malaysia, Bloomberg, Investing.com, World Bank	Not applicable
cpi	Inflation (%)	World Bank	Positive (+)
growth	Gross Domestic Product (GDP) growth (%)	World Bank	Positive (+)
ms	Money supply	World Bank	Negative (-)

TABLE 3
Summary Statistics

Var.	Mean	Std. Dev.	Min	Max	Number of observations
r_{it}	5.97	4.11	1.00	16.06	48
cpi	8.74	5.48	0.20	26.20	48
growth	7.40	5.09	0.20	26.20	48
ms	15.60	8.18	3.40	39.60	48

4.2 METHODOLOGY

Considering that the data represent different countries with different set of variables over a period of time, panel data methodology is the most suitable approach in this study. According to Baltagi (2008), working with panel data allows researchers to have more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency. Unlike pure cross-section data, individual heterogeneity can be controlled whereas biases from aggregation over firms or individuals (in this case, countries) can also be reduced or eliminated.

By using the Stata software, the unit roots test is performed on all the variables in the panel datasets. The Levin-Lin-Chu panel unit root test in Stata have as the null hypothesis that all the panels contain a unit root. As presented in Table 4, the presence of a unit root in all panels can be rejected for all variables. Then, (3) is first regressed by running the pooled ordinary least squares (OLS) before running the random effect model. The Breusch and Pagan Lagrangian multiplier

test for random effect will be able to indicate whether pooled OLS is appropriate versus the random effect model. Should the calculated value exceed the tabulated chi-squared value, it would lead us to conclude that the random effect model is more appropriate than pooled OLS, indicating that there are country-specific effects in the data. For robustness, the fixed effect model is carried out with the Hausman test to indicate which model is better as compared to random effect, for this analysis. The significance of each variable (*cpi, growth, ms*) against the sovereign yield will then be assessed. The estimation result table is presented and discussed in the following section.

TABLE 4
Levin, Lin and Chu Panel Unit Root Tests

H_o: Panels contains unit root	H_a: Panels are stationary	
Panel means: Included	Time trends: Not included	
Variable	Adjusted t	p-value
r_{it}	-23.9929	0.0000
cpi	-2.1101	0.0174
growth	-3.3477	0.0004
ms	-8.4742	0.0000

Note: ADF regressions: 1 lag. LR variance: Bartlett kernel, 6.00 lags average (chosen by LLC).

5. ESTIMATION RESULTS

The results for (3) based on panel OLS, random effect and fixed effect are presented in the following Table 5. As indicated by the Breusch and Pagan Lagrangian multiplier test, the random effect model is more appropriate than pooled OLS. For robustness, after running the equation for fixed effect, the Hausman test favored the random effect model. Based on the random effect model selection, the most significant macroeconomic variable in explaining the movement in sovereign yields is the rate of inflation (*cpi*). This finding is however inconsistent with the benchmark model of Haan, Hessel and End (2013) who find that there is no statistical significance of the inflation rate in explaining the yield. Nonetheless, our finding of positive coefficient between the inflation rate and the yield is in line with the Fisher effect theory where interest rates will rise as and when the expectation of inflation rises. The insignificance of *growth* is also inconsistent with previous studies discussed in Section 2. As for the

money supply, though it is significant at the 10% level of confidence, it has a different sign than expected. On these premise, we deduce that the sovereign yields of sukuk do not reflect the growth of the economy and are not influenced by the money supply. The random effect model is also tested for diagnostic testing on serial correlation and it was concluded that the null hypothesis of no serial correlation cannot be rejected.

TABLE 5
Estimation Results

	Pooled OLS	Random Effect	Fixed Effect
Constant	5.744***	3.587*	3.541***
	(4.41)	(1.85)	(5.31)
cpi	0.328***	0.213***	0.211***
	(2.85)	(3.51)	(3.38)
growth	-0.377***	-0.066	-0.062
	(-2.56)	(-0.95)	(-0.84)
ms	0.009	0.065*	0.065*
	(0.11)	(1.84)	(1.83)
Breusch-Pagan LM test χ^2	86.62***		-
Hausman test χ^2	-	1.50	
Adjusted R^2	0.1549	0.0501	0.0452
Number of observations	48	48	48
Number of countries	6	6	6
Serial Correlation	-	-	1.86
(*F*-stat)			(0.2307)

Notes:
1. Dependent variable is 10-year sovereign sukuk yield. Some countries are using the 10-year government bond yield, or deposit rate as in the case of Qatar, Bahrain and Turkey respectively.
2. *t*-statistic in parentheses for pool and fixed-effects regressions and *z*-statistic in parentheses for random-effects regression.
3. The type of model either fixed or random-effects is based on Hausman test.
4. ***, **, * indicates significant at 1% level, 5% level and 10% level respectively.

In consideration that the sovereign yield sukuk is explained only by the inflation rate, the suggestions made by Wilson (2008) to develop a pricing mechanism for sovereign sukuk based on the changes in the growth of the issuing country, may not yet be feasible. It may require the sukuk market to grow even bigger and to have even more players be involved in the sukuk issuance and trading. This will further improve the liquidity in the marketplace which will result in a more transparent benchmark for sovereign sukuk to appear.

6. CONCLUSION

This study examines the macroeconomic variables that can best explain the movement of the sovereign sukuk yield. Given that sovereign sukuk is not entirely free from default as shown by the European sovereign debt crisis, this study is believed to be timely and essential in analyzing what explains the yields of sovereign sukuk. With the importance and the remarkable growth of sovereign sukuk in the sukuk market, some researchers have raised the issues on the pricing mechanism of sovereign sukuk and claimed that these should be more reflective of the economic health of the issuing country. This is also important as it should detach itself from the mechanism of sovereign bond pricing deemed to be *ribā* based.

Based on five different countries that have outstanding issues of sovereign sukuk, this study shows that only the inflation rate is able to explain the movement of sovereign sukuk yields. In line with the Fisher effect theory, the finding indicates that sovereign sukuk yield would with rise in the rate of inflation increase. The insignificance of other macroeconomic variables such as the GDP growth and money supply indicate that tagging the economic growth of the issuing country onto the pricing of sovereign sukuk yields may not be feasible. Our findings suggest that pricing of sovereign sukuk yields depends more on the movement of the inflation rate, but not on the changes in the GDP and money supply of the issuing country.

More concerted efforts are needed for continued sukuk market growth and enhanced participation by market players. This would create the liquidity needed in the sukuk market for it to develop a standalone pricing mechanism different from that used by the conventional market. One of the main challenges would be to educate investors regarding the new pricing mechanism and the associated risks. Proper records related to sovereign sukuk liquidity and the yields are essential to bring the research to another level. With the strong growth of the sovereign sukuk market, the sovereign sukuk pricing mechanism is one of the most important topics for regulators and market players.

ENDNOTES

1.   Islamic Finance Information Service (IFIS) database as at 24 October 2014.

2.   In 2010 that had caused a massive 'bail out' by the eurozone countries and International Monetary Fund (IMF) with EUR 110 billion loan extended to Greece over a three year period (Madura, 2012).

3.   Based on the issuance of the first sovereign sukuk by the Government of Malaysia in 2002 (IIFM, 2013).

4.   Mohammed, N. Chart showing integration of Qatar sovereign USD yield curve of conventional and sukuk. April 2014. http://www.sukuk.com/index.php/article/chart-showing-integration-qatar-sovereign-usd-yield-curve-conventional-sukuk-1139/

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