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Investigating the Presence of Long Memory in DJIM Index Yield Spreads

Nursilah Ahmad[a*], Sulistya Rusgianto[b]

[a,b]*Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia (USIM), 71800 Bandar Baru Nilai, Negeri Sembilan, Malaysia*

Abstract

The aim of this study is to investigate the presence of long memory in *sukuk* yield spreads and forecast the future yield spreads for *sukuk*. Specifically, the focus is on the yield spread between Dow Jones Islamic Markets Index (DJIM) and the Malaysian Government Investment Issues (GII). The study uses monthly data on the DJIM Index and GII yields from 2005:08 to 2012:04. Data are sourced from Bloomberg database and Datastream. Using ARMA (*autoregressive moving average*) estimator method, the data are used to test the hypothesis that the yield spreads has long memory. The findings show no evidence that the yield spreads have long memory. Since yield spreads can serve as a leading indicator of economic conditions, the empirical estimator method used in this research has an implication for forecasting future yield spreads of Islamic debt market financial instruments.

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***Keywords*: Sukuk; yield spreads; long memory; ARMA, DJIM**

1. Introduction

The yield spread analysis helps investors understand the market's trend and the direction the economy is going to take. When spreads widen between two *sukuk* instruments with different quality ratings, it implies that the market is factoring more risk of default on lower grade *sukuk*. The anticipation of greater risk of default implies a slowing economy. On the other hand, a narrowing of spreads implies that the market is factoring in less risk. This might be due to higher expectation of economic growth. This paper attempts to investigate the presence of long memory in DJIM as an early indication of economic conditions. If there is a

* Correspondin gauthor.
Email address: nursilah@usim.edu.my

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significant evidence of the presence of long memory in *sukuk* spreads, it can be used as forecasting tools in Islamic capital market.

2. Background

The Dow Jones Islamic Market Index (DJIM), launched in 1999 in Bahrain, was the first index created for investors seeking *Shari'ah*-compliance investments. The DJIM measure the performance of a global universe of investable equities that have been screened for *Shari'ah* compliance consistent with Dow Jones Indexes' methodology, which provides approximately 95 percent market coverage of 44 countries.

There are three ways to explain the spreads. First, the volatility of the yield and the behaviour of embedded options in the *sukuk* contracts. Second, the effect of yield volatility on the business cycles. Third, yield volatility and transaction liquidity. The presence of long memory in the spreads suggests that a time element exists and should be accounted for when analyzing yield spreads or when using yield spreads as forecasting tools in the case of *sukuk*. The long memory process in yield spreads will be indicated by slow decay of the autocorrelation coefficients, and therefore, the existence of long memory, or long-range dependence. *Sukuk* are the most active Islamic debt market financial instrument to date. Therefore, empirical study on *sukuk* market behavior in terms of the long range dependence will help both investors and issuers understand more the structure and price risk exposures of the instruments.

2.1 Research Methods

In this study, the yield spread is measured as the yield spread of the DJIM as a measure of stock market performance over Government Investment Issues (GII) as the benchmark measure for *sukuk* yield. It measures the percentage return on investment (ROI) from DJIM minus the percentage return on investment from GII per annum. In short, the yield spread compares the performance of DJIM and GII and indicates the risk premium for investing in the former over the latter. Market yield is calculated as the difference between $DJIM_t$ and $DJIM_{t-1.}$

The study employs autoregressive moving average (ARMA) estimator method to detect the presence of long memory in the DJIM yield spread. For that purpose, monthly data on the DJIM Index yield and GII of specified maturity (3, 6, 12, 24, 36, 60, 84, 120, 180, 240 months) yields from 2005:08 to 2012:04 (81 observations) are collected and sourced from Bloomberg database and Datastream. Using the ARMA estimation method, these data are used to test the hypothesis that the yield spreads has long memory. The presence of a long memory process in yield spreads will be indicated by slow decay of the autocorrelation coefficients, and therefore, the existence of long memory, or long-range dependence. The DJIM is used as a measure for stock performance and GII is used as a measure for *sukuk* yield as the benchmark. The study employs the benchmark issues of 10-month GIIs to capture the changes in the levels of the term structure following the literature. Examining how the spread between DJIM Index and GIIs has varied over time can shed insight into what determines the relative pricing of the two.

To assess the accuracy and reliability of the yield spread, we use the RMSE statistics and Theil inequality coefficient. The RMSE measures the degree to which the predicted change of the yield spread deviates from the actual change from the forecast period. The RMSE is forecast error statistic which depends on the scale of the dependent variable. However, the Theil inequality coefficient is scale invariant. It always lies between zero and one, where zero indicates a perfect fit.

The bias proportion explains how far the mean of the forecast is from the mean of the actual series. The variance proportion indicates how far the variation of the forecast is from the variation of the actual series.