

Relationship between Macroeconomic Variables and Malaysia Available Shariah Indices

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Abstract— This paper aims to study the relationship between local and foreign macroeconomic variables and Malaysia available Shariah Indices. In our study, we used the Vector Error Correction (VEC) framework by initially looking at the long run and short run relationship between Malaysia available Shariah indices (i.e. KLSI, FTSE Bursa Malaysia EMAS Shariah Index and FTSE Bursa Malaysia Hijrah Shariah Index) and the macroeconomic variables via the Johansen cointegration technique. Monthly data during the twenty two-year period (from January 1990 to December 2011) has been collected from DataStream and tested. The findings show positive relationship between the variables from 1990 to 2006. However, mix results were found after the period till 2011. This study then conclude that the standardized set of macroeconomic variables that specified by earlier researchers still can be relied but in careful policy formulation.

Keyword: Macroeconomics, Granger Causality, FTSE Shariah Index, EMAS Shariah Index, HIJRAH Shariah Index

I. INTRODUCTION

The growing linkages between macroeconomic variables and the movement of stock prices in various countries have well been documented in the past literatures (see [2]; [6]; [8]; [10]; [26]; [28]; [31]; [37]). In the Malaysian context, several studies have explored the vibrant interactions between equity market and economic actions. These study postulating that the equity market leads the movement of macroeconomic variables (see [13]; [17]; [18]; [19]; [20]; [32]). Previous studies also revealed that the inflation rate, money growth, interest rates, industrial production, reserves, exchange rates, and international monetary policy are the most popular significant factors in explaining the Malaysian stock market movement. The influence of developed country's monetary policy on Malaysian equity market occurs since the existence of the financial integration and trade interdependency between these countries (see [23]; [35]). While the association between market and economic activities is quite obvious regardless of its causality direction, a standardized set of macroeconomic variables is not found since macroeconomic variables selected to examine the determinants of stock market tend to differ slightly across studies (see [2]; [3]; [5]; [17]; [32]). Hence, does the standardized set of macroeconomic variables that specified by previous researcher can be relied specially in Shariah-compliant equity investments in Malaysia?

Shariah-compliant equity investments in Malaysia are a relatively new phenomenon. A great support in investment decision is very important whilst ability to understand the determinants of Shariah equity market may help on this matter. Since there is a whole long list of economic indicators and measures that investors can use to gauge the economy situation, hence, the ones that are more useful are those that are able to provide investors with more insights to the future direction of the economy.

Studying the interaction of domestic and foreign macroeconomic variables and the Malaysian Shariah Index is our primary interest because of three reasons; i) Investment in equities are acceptable investments for all Muslim and non-Muslim – domestic and non-domestic investors; ii) Malaysia pursues a trade-led approach to stimulate its economy; and iii) Unlike developed countries, Malaysia does not adopt a freely exchange rate system and has more capital control. Besides, the study also done since only few studies were found to relate the domestic and international macroeconomic variable and the Malaysian Shariah index in recent dates.

II. REVIEW OF THE RELATED LITERATURE

Results from previous studies were found in different variation of cointegration between macroeconomic variables and equity index. (see [1]; [2]; [3]; [4]; [5]; [10]; [11]; [23]; [27]; [38]). Since local and international investor demand more for the results, the latest standardized set of macroeconomic variables that can be relied by such investors are perceived needed. [5], by using VAR method and Granger test study the relationship between the ASEAN countries' stock market and macroeconomic variables which are GDP, inflation rate, interest rate and exchange rate. He found that there are weak Granger caused relationship between market price index and macroeconomic variables. The weak relationship revealed that the capitals market in ASEAN country unable to efficiently affect by the information of the movement in the macroeconomic variables.

There are many other previous studies publicized that there are weak relationship between macroeconomic variables and countries' equity market for example [39] and [40]. Based on [14] and [15], the relationship was found differ due to the economic condition of a particular country. A study conducted by [21] examined the linkages between the stock market and

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macroeconomic variables such as real economic activity, inflation, interest rate, money supply and exchange rate for developed and emerging market. The study investigates the relationship by using 25 stock market developed countries and 23 emerging countries including Malaysia. This study proves there is a causal relationship between macroeconomic variables with the interest rate and money supply, and stock prices for developed and emerging market. Besides, [21] also highlighted that there is a positive relationship in long run between real economic activity level and stock price for developed market. They noted, moreover, the relationship between macro economic variables and stock return in emerging countries is significantly more established than in develop countries. Additionally, [41], by using the exponential GARCH model, found a positive relationship between GDP, interest rate, and exchange rate and the stock markets. Though, in his another research, [42] found a mix result with a positive relationship of real GDP, ratio of the government debt to GDP and the market, and a negative relationship between real interest rate, expected inflation and the equity market.

There are also several studies that hold up the theory of existence relationship between macroeconomic variables and the equity market for example studies conducted to examine the relationship between exchange rate, inflation, interest rate and the Malaysian conventional price index, namely Kuala Lumpur Composite Index (KLCI) (see [7]; [13]; [17]; [20]). One of the comprehensive studies to determine the relationship between exchange rate, inflation, interest rate and stock prices is performed by [19]. They analyzed vibrant interactions among macroeconomic variables (real output, price level, and money supply), exchange rate, and equity prices for the Malaysian case. By using time series techniques of co integration and vector auto regression, the found that the Malaysian stock prices appear to be driven by changes in domestic factors, primarily money supply. In particular, they have noted that, in the short run, money supply present a positive effect on the stock prices. Other research by [22], in their study, investigates the interaction between selected macroeconomic variables and stock prices for the case of Malaysia in an autoregressive distributed lag (ARDL) approach. They applied the conventional econometric techniques to trace out both short and long run dynamics relationship. Upon testing their model, they found that Malaysian stock market index do perform a cointegrating relationship with changes in money supply, interest rate, exchange rate, reserves and industrial production index. They concluded the Malaysian market is sensitive to changes in the macroeconomic variables.

The latest study on the interactions between selected macroeconomic variables and Malaysian equity prices [32] also support the significant relationship between equity and the aggregate economic activity. Based on VEC model, they found the evidence of long run relationship between real stock return and selected macroeconomic variables. [16] in their study on monthly data of stock price indices, money supply and output (GDP) Malaysia using an application of the cointegration test to predict the information regarding stocks price. Their result document that macroeconomic activity is a major information for the investor to formulate some

profitable trading rule and they also support the hypothesis with two-step trivariate cointegrated approach. Meanwhile, [27] investigate the short run and long run effect of macroeconomic variable in five ASEAN countries (Indonesia, Malaysia, Singapore, Thailand and Indonesia) to stocks price. Through Granger causality test they found that macroeconomic variable significance and able to predict future changes in stock price. The available of past and current information of the macroeconomic variable such as money supply and exchange rate already incorporated with stock price.

Based on the study on the dynamic interaction between Malaysian Shariah equity prices and economic activity, [12] reveals that the Kuala Lumpur Shariah Index (KLSI) is highly depends on domestic and international macroeconomic variables. They revealed that Shariah common share return has significant relationship with inflation, monetary instrument, economic growth and currency exchange rate. They also found that KLSI has significant influence on the Malaysian conventional index namely Kuala Lumpur Composite Index (KLCI) because Shariah compliance equity is part of KLCI's component.

Since there is still insufficient study that reveals on Malaysian Islamic market, hence, this further supports our desire to enhance the existing literature. Our study is important for the future uses as this study will enlighten people who interested in investing in Malaysian Islamic equity market. Moreover, the study results for the new Shariah indices could facilitate market participants in terms of investment benchmark, market policy, and Islamic capital market product development.

III. RESEARCH METHODOLOGY

In our study, examination of the relationship involved the co integration analysis technique [30] using [34] procedure. The establishment of co-integration analysis has offered an empirical approach in doing time-series analysis (for e.g. analyzing the relationship between macroeconomic variables and the stock market). For instance, the existence of long-term equilibrium between stock prices and macroeconomic variables via the co-integration approach which has been verified by [16]. Many other researches, such like [13], [19], [31], and [33], also used VAR framework in their analysis. Our study is done by looking at the long run and short run relationship between Malaysian Shariah Index and the macroeconomic variables. Based on [34], if cointegration is found during cointegration test, Vector Error-Correction Model (VECM) of Granger causality will be used. On the other hand, if no cointegration is found, the analyses will then be based on the regression of the first difference (1) of the variables using a standard VAR model. Based on intuitive financial theory (see [9]; [25]), this study hypothesizes certain relationships between domestic variables (i.e. inflation rate, exchange rate, interest rates, industrial production, money supply), and US monetary policy with the selected Malaysian Shariah Indices. Any movement in macroeconomics variables presume can influence the performance of Shariah Indices in short-term and long – term. Incorporating interest rate in this study could provide signal to investors in their investment choice. According to

[22], investors are guided by interest rates in their investment decision. [22] also claimed that when the fall in interest rates, Muslim investors may not end up buying more Shariah compliant stocks. In order to examine the global pressure on the Malaysia Islamic equity market, this study take in the United States Federal Fund Rate as a proxy for international monetary policy.

A. Data

For the macroeconomic variables, the data used are Consumer Price Index (CPI), Real Effective Exchange Rate (EX), Treasury bill rate (TBR), Industrial Production Index (IPI), Money Supply (M3), and US Federal Fund Rate (USFR). These components represent domestic and international activities relation to stock price. For the Malaysia Islamic equity market indices (MSI), our study used the KLSE Shariah Index (KLSI) (period of 1990 to 2006), FTSE Bursa Malaysia EMAS Shariah Index (period of 2007 to 2011) and the FTSE Bursa Malaysia Hijrah Shariah Index (FTSE) (period of 2007 to 2011). The variables are transformed into their natural logarithms prior to the analysis to ensure the data is normally distributed. In exploring the relationship between the Malaysian Islamic equity market and macroeconomic variables, we taking into consideration the following model:

$$MSI_t = a + b CPI_t + c EX_t + d TBR_t + e IPI_t + f M3_t + g USFR_t + E_t \quad (1)$$

B. Econometric Models

Suitable econometric models are required in order to examine the hypotheses, hence our study proceed with the appropriate multivariate times series models. We begin our study by examining stationarity in financial time series as most of studies had shown that most of economic variables follow a random walk. This is based on the assumption that the economic variables of some systems are in equilibrium in the long run. To test the financial series are stationary, this study employed the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) test. The ADF test that is an extension of Dickey-Fuller regression allows for more dynamics in the ADF regression and consequently is over-parametrized in the first order case but correctly specified in the higher order cases (see [35]). The Phillips-Perron (PP) test regression makes a correction to the t-statistic of the γ coefficient. It uses nonparametric statistical methods in considering the serial correlation in the error terms with no lagged difference terms added. Moreover, the PP lag length follows the default available in the quantitative software. The unit root test using both ADF and PP tests, are run at the level and first difference of the series in order to determine the number of unit roots in the series. If the mean and autocovariances of the series do not rely on time, then the time series is said to be stationary. In addition, the null hypotheses for both tests are that $\delta=0$; that is, the unit root is present in which means that the time series is nonstationary. The null hypothesis is rejected if the calculated value obtained is large and negative as compared to the critical values set.

As the raw data in the series are nonstationary in nature, the next step is to proceed with testing the cointegration of the variables. In general, a set of variable is said to be cointegrated

if their linear combination is stationary. [34] is employed once the study had determined the order of integration of each series. Null hypothesis of no cointegration is tested and compare with the critical value. Based on the [34] concept of cointegration, if the cointegration is found in these tests, the study will proceed to use the Granger causality test based on the Vector Error Correction (VECM) model. An estimated long-run relationship can be determined by the cointegration vector. If the tests show no cointegration, a standard vector-autoregressive (VAR) model in first difference will be employed dimensionally.

C. Granger Causality Test

The Granger causality is employed to test the null hypothesis that independent variable does not Granger-cause dependent variable, or vice-versa. In this study, we also aim to examine the relationship among macroeconomic variables. We hypothesizes that there is a Granger-causality among the macroeconomic variables (i.e. There is a Granger-causality between inflation rate and the exchange rate). In our case, this study uses two-way causation; X Granger-cause Y (e.g. MSI Granger-cause CPI) and Y Granger-cause X . We run multivariate regressions of the form for all possible pairs of series and for the group.

IV. RESULTS AND DISCUSSIONS

A. Unit Root Test Results

This study employed Augmented Dickey-Fuller test (ADF test) and Phillip-Perron Test in order to test the present of unit root. The results in Table I show that there are all acceptance of H_0 in the series at levels, in both ADF test and PP test. Since the ADF test results fail to reject the null hypothesis, hence, the majority of the series can be concluded as non-stationary. Therefore, it is essential to continue ADF test for all series in first difference. The results of this second test are that all series are now stationary except that the rejection of H_0 for M3 only occurs in PP test. As the results tend to propose non-stationarity in levels of the variables but stationarity in their first differences, this study is proceed by coping that the variables belong to the I(1) process.

TABLE I. THE UNIT ROOT TESTS

Variables	ADF Test		PP Test	
	At Level	First Different	At Level	First Different
KLSI	Accept H_0	Reject H_0	Accept H_0	Reject H_0
FTSEBMHJR	Accept H_0	Reject H_0	Accept H_0	Reject H_0
FTSEBMEMS	Accept H_0	Reject H_0	Accept H_0	Reject H_0
CPI	Accept H_0	Reject H_0	Accept H_0	Reject H_0
EX	Accept H_0	Reject H_0	Accept H_0	Reject H_0
IPI	Accept H_0	Reject H_0	Accept H_0	Reject H_0
TBR	Accept H_0	Reject H_0	Accept H_0	Reject H_0
M3	Accept H_0	Fail to Reject H_0	Accept H_0	Reject H_0
USFR	Accept H_0	Reject H_0	Accept H_0	Reject H_0

B. Estimation Results

1) Cointegration Analysis

This study assumes an existence of possibility that the selected variables share a long-run relationship, since the six

variables are noted to be I(1). To test the possibility, this study applies Johansen cointegration procedure. The result indicates rejection of the null hypothesis at the 0.05 level that imply the presence of cointegration among the variables (based on trace statistics and maximal eigenvalue statistics). In this study, the number of lags is chosen using the Akaike Information Criterion (AIC) criteria. Based on the analysis, this study found that at least two cointegrating vectors during 1990-2006 and at least four cointegrating vectors after the periods (both FTBMHJS and FTBMEMS). Hence, the results enlighten that there are long term relationship between Malaysian Shariah Indices and the selected macroeconomic variables which correspond closely to those stated by economic theory. The test results represent long-term elasticity measures, due to logarithmic transformation of KLSI (normalized), CPI, EX, IPI, M3, TBR, and USFR. Thus, the cointegration relationship can be re-expressed as:

$$KLSIt = 24.80CPIt + 21.96EXt + 3.79IPIt + 15.58M3t + 2.54TBRt + 1.49USFRt \quad (2)$$

$$FTBMEMSt = -15.81CPIt - 6.68EXt + 0.87IPIt + 5.67M3t - 1.18TBRt - 0.02LUSFRt \quad (3)$$

$$FTBMHJSt = -7.01CPIt - 14.87EXt + 4.47IPIt + 3.41M3t - 7.05TBRt - 0.62USFRt \quad (4)$$

Based on the cointegration results in the above equation, the long-term impacts of all selected variables on Kuala Lumpur Shariah index for the period of 1990 to 2006 are positive. However, the effect of increases in consumer price index, exchange rate, Treasury Bill and US Federal Fund Rate on Malaysian Shariah index after the year of 2006 to 2011 are negative. In the case of interest rate, this study shows inconsistent with the findings [38] as they found a positive relationship between share prices and short-term interest rates. This study, nevertheless, found positive effect of increases only in industrial production and money supply (M3) on Malaysian Shariah index for the period of 2007 to 2011. This findings is consistent with [22].

2) Vector Error Correction Model Results

Since the cointegration is found in the Johansen Integration tests, this study proceeds to use the Vector Error Correction Model (VECM) to test the dynamic relationship between selected variables. The null hypothesis which indicates the non-existence of the short-run relationship is tested against the existence of short-run relationship. Results from VECM tests are reported in Table II. This study did not impose restrictions; hence, default normalization that identifies all cointegrating relations is used. In the short run, impact of inflation on the KLSI is negative and insignificant however the impact is positive and significant after the period of 2006. While, in short run also, the increases in money supply has a negative but significant impact on the Malaysian Shariah indices. The negative relationship between money supply and stock index is not peculiar and has been discussed in [22] and [32]. This study also found that economic variables which are money supply and CPI emerge to have explanatory power over Malaysia Shariah Equity market returns. The effect of exchange rate is negative and significance for the

whole period (1990 to 2011). On the other hand, the effect of industrial production is positive but only significant after the period of 2006. This finding is consistent with [12] and [22]. The increase in interest rate, moreover have a negative significant impact during 1990 to 2006 while after the period is positive and significant. In the short run, furthermore, the test result shows positive but insignificant impact of US monetary policy changes on Malaysian Shariah indices for the whole period of study. The increase in interest rate has a negative significant impact during 1990 to 2006 while after the period is positive and significant. In the short run, furthermore, the test result shows positive but insignificant impact of US monetary policy changes on Malaysian Shariah indices for the whole period of study.

TABLE II. VECTOR ERROR CORRECTION MODEL TEST RESULTS

Dependent Variable	Independent Variable					
	ΔCPI_{t-1}	ΔEX_{t-1}	ΔIPI_{t-1}	$\Delta M3_{t-1}$	ΔTBR_{t-1}	$\Delta USFR_{t-1}$
KLSI (1990-2006)	-0.044 [-0.0393]	-0.011 [5.9350]*	0.114 [-5.1830]	-0.01 [2.4830] (0.00)*	-0.067 [3.8573]	0.085 [-0.3282]
FTBMEMS (2007-2011)	0.008 [10.533] (0.00)*	-0.230 [7.1492] (0.01)*	0.036 [9.3342] (0.01)*	-0.070 [-2.9701] (0.00)*	0.273 [6.6683]*	0.008 [0.5467]
FTBMHJS (2007-2011)	0.062 [5.3551] (0.00)*	-0.182 [6.0106] (0.00)*	0.0114 [8.9024] (0.00)*	-0.009 [-5.8549] (0.00)*	0.389 [5.5632]*	0.013 [-0.5461]

Note:

- a) Asterisk * denote significant at the 5% value, b) The numbers inside the bracket indicates the t-statistic, c) The numbers inside the parenthesis show the p-values for F-statistics.
- d) Decision rule: Do not reject null hypothesis if probability (p-value) is above level of significance (such as 0.05 at the 5% level of significance)

3) Granger Causality Test Results

Based on F-statistic, the results from Table III indicate that there are a unidirectional short-run causal effect running from inflation and money supply to index from the period of 1990 to 2006. Hence, this study infers that during this period monetary expansion does lead to increase investments in Shariah equities and inflation may cause investment in Shariah equities to be harmful. In addition to this, inflation also is seen to Granger cause industrial production in the whole period of study. Inflation only Granger caused TBR after the period of 2006 to 2011. In the period of 2007 to 2011, this study found that US monetary policy which proxy by its Federal Fund Rate to be statistically significant to Granger cause production, money and Malaysian interest rate over this period. This clearly support the evidence of [22]. [22] disclosed that both changes in the Malaysian monetary policy and in the US monetary policy have a significant direct impact on the Islamic stock market activities in Malaysia. This is due to the fact that Malaysia has significant relationship with United States (see [29]; [36]).

TABLE III. GRANGER CAUSALITY TEST RESULTS

Period	Unidirectional	Bidirectional
(1990-2006)	CPI → KLSI M3 → KLSI M3 → IPI CPI → EX	CPI → IPI IPI → TBR TBR → EX
(2007-2011)	FTBMHJS → CPI FTBMHJS → IPI CPI → IPI CPI → TBR CPI → USFR	EX → IPI USFR → IPI USFR → M3 USFR → TBR
(2007-2011)	FTBMEMS → CPI FTBMEMS → IPI CPI → TBR	IPI → TBR TBR ← IPI EX → IPI USFR → IPI USFR → M3 USFR → TBR

Note: Contents portray Y Granger Cause X, and vice versa.

V. CONCLUSIONS

The results reveal that in both long and short run, there is a relationship between the six chosen macroeconomic variables and Malaysia available Shariah indices. In the long run, the impacts of all selected variables on Kuala Lumpur Shariah index for the period of 1990 to 2006 are positive. However, the effect of increases in consumer price index, exchange rate, Treasury Bill and US Federal Fund Rate on Malaysian Shariah index after the period till 2011 are negative. The negative result on the relationship between interest rate and Shariah index provide signal to investors to shift their investment decision from Shariah compliance stock to other Shariah-compliant products, or vice versa. Many financial products such as iREITS, Sukuk and etcetera have been created to serve as alternative investments. Besides, our study found positive effect of increases only in industrial production and money supply on FTSE Bursa Malaysia EMAS Shariah Index and FTSE Bursa Malaysia Hijrah Shariah Index. In the short run, mix results were found during 1990 to 2011. With regard to this result, the inflation on the KLSI (before the period of 2007) is negative and insignificant however the impact is positive and significant on FTSE Bursa Malaysia Emas Shariah Index and FTSE Bursa Malaysia Hijrah Index (after the period of 2006). The effect of exchange rate is negative and significance for the whole period (1990 to 2011). On the other hand, the effect of industrial production is positive but only significant after the period of 2006. The increases in money supply however a negative but significant impact has on the Malaysia available Shariah indices. The increase in interest rate moreover has a negative significant impact during 1990 to 2006 while after the period of 2006 is positive and significant. Furthermore, in the short run shows positive but insignificant impact of US monetary policy changes on Malaysia Shariah indices for the whole period of study.

With increased knowledge of the discussed relationships, foreign investors are able to enhance their short and long-term investment decisions-makings to invest in Malaysia since they have the necessary information on the trends and prospects of economies especially the potential of Malaysia to become an attractive Islamic Capital Market (ICM) investment destination. The evidence of cointegration between the Malaysia Shariah indices and the macroeconomic variables in our sample suggests that the existence of long run relationship provide a useful benchmark to investors who seek to invest in Malaysia Shariah equity markets. Apart from that, as noted in our previous discussion, the FTSE Bursa Malaysia Hijrah

Shariah Index is designed for the creation of derivatives, index tracking funds, ETFs and performance benchmarks. For asset managers, a great structured of ETF, where the underlying is an index representing index based unit trust fund, may helps increase the attractiveness in Malaysia Islamic investment environment.

This paper also examines the Granger causal relationship among selected macroeconomic variables and the available Malaysia Shariah indices. The result of this paper shows that in overall, the variables have unidirectional short run causal effect during the study period. The findings and significance of this study are limited to Granger causality test to detect any influences among selected macroeconomic variables and also their influence in Malaysia Islamic Capital Market. Hence, in future research, it is good to enhance the study in examining on how the economy reacts over time through the use of other approaches in providing a better overview of Malaysia's macroeconomic system in Islamic setting. It is also recommended in future study to test on the structural break such as pre- and post-Asian crisis.

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