What drives shariah (islamic) stock index? a case study of Malaysia

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What drives shariah (islamic) stock index? a case study of Malaysia

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Abstract

Islamic finance has been rising rapidly as an alternative investment outlet since the subprime crisis. Although there are many papers on the determinants of conventional stock prices, there is relatively much less attention paid to the determinants of Shariah (Islamic) stock indices. This paper analyses the relationship between the major macroeconomic variables and the Shariah Stock Index. Malaysia is taken as a case study. This study examines the determinants of Shariah stock exchange and to what extent each variable influences the prices of the stocks. We use the standard time series method to analyse the data. The findings tend to indicate that inflation rate is the most leading macroeconomic variable followed by Shariah stock index. All other variables are led by them. That implies that inflation rate is the most important driver of Shariah stock index in the context of Malaysia. That has a strong policy implication.

Keywords: Islamic stock index, inflation rate, money supply, interest rate, exchange rate, Malaysia

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1. OBJECTIVE AND MOTIVATION OF RESEARCH

Islamic finance has been rising rapidly as an alternative investment since the subprime crisis. Although there many papers on the determinants of conventional stock prices, there are relatively much less attention paid to the determinants of Islamic stock indices. This paper analyses the relationship between the major macroeconomic variables and the Shariah Stock Index. Malaysia is taken as a case study. This study examines the determinants of Shariah stock exchange and to what extent each variable influences the prices of the stocks. There are many factors influencing the prices of stocks and their fluctuations. In this paper, we will limit the factors to five variables. We use the standard time series method to test the data.

2. LITERATURE REVIEW

The literature review suggests that there exists a strong relationship between stock returns and some macroeconomic factors (Ibrahim and Aziz, 2003). However, there exists no economic theory to back up this relationship among variables. The most popular macroeconomic variables tested are production, the interest rate, the exchange rate and the inflation rate. Other variables such as the money supply are also used (Islam, 2003).

While empirical studies investigating the issue on developed markets are expanding, empirical analyses for emerging markets such as Malaysia are limited. The few empirical studies that focused specifically on Malaysia that may be cited include Habibullah and Baharumshah (1996) and Ibrahim (1999 and 2000). These analyses, however, are incomplete in at least two respects. Habibullah and Baharumshah (1996) only looked at the long-run relationships among the stock price, money supply and real output, ignoring the role of the exchange rate. Ibrahim (2000) focused on the interactions among the stock price, exchange rate, money supply and official reserves. Variables from the goods market, however, were not included. Although Ibrahim (1999) covered a wider range of microeconomic variables, he mainly concentrated on bivariate interactions between the stock price, on the other hand, and a macroeconomics variable of interest, on the other hand.

The papers all are in favour of a relationship between the macroeconomic variables and equity returns or equity prices. The relationships are tested for

both the short and long run and in some cases are found to hold in the short run only (Habibullah and Baharumshah, 1996) and in some cases in both periods of time (Ibrahim, 1999).

3. Research Methodology, Results and Interpretation

The data used here are the monthly macroeconomic variables starting from July,1999 . A total of 133 observations were obtained. The source of data was the Bank Negara Malaysia.

The macroeconomic indicators are the exchange rate (Ringgit against US dollar), the interest rate (ALR), Shariah stock exchange index, inflation and the money supply (M2). There are several measures for the money supply such as the M1, M2 and M3.

The variables are denoted as follows: SHARINDX (Shariah Stock price index), M2 (money supply), ALR (interest as Average Lending Rate), STKUSD (Dow Jones stock price index in US dollar), FXRUSD (exchange rate Ringgit against US dollar) and INFLATION (inflation).

The money supply is considered as an important instrument for controlling inflation by economists, since the growth in money supply will most likely lead to inflation if money demand is stable. For the purpose of this study, the Malaysian money supply is used as a determinant of the prices of stocks. M2 is the total money in circulation.

The study uses standard time series techniques. We employ the unit-root test, order of the VAR, cointegration, long run structural modelling (LRSM), vector error correction model (VECM), variance decomposition (VDC, impulse response function (IRF) and persistence profile (PP).

This time series techniques are better and favoured than the traditional regression method for several reasons.

It is by now, well established that most economic time series are non-stationary. So, conventional statistical tests such as t-ratios and F statistic are not valid.

If the variables are non-stationary but cointegrated, the ordinary regression without the error correction terms derived from the cointegrating vectors is mis-specified. However, if the variables are non-stationary but not cointegrated, then an ordinary regression with differenced variables can be estimated but the conclusions drawn from such analysis will only be valid only for the short run and no conclusions can be made about the long run theoretical relationship among the variables since the theory has typically nothing to say about the short run relationship.

If the variables taken are non-stationary at their original level forms, the conventional statistical tests are not valid because variances of these variables are changing and the relationship estimated will be spurious. On the other hand, if the variables taken are turned stationary by first-differencing, the long term information contained in the trend element in each variable has been removed and the estimated relationship gives only the short run relationship between the variables and hence the regression does not test any theory.

In traditional time series, the endogeneity and exogeneity of variables is based only on assumption. Whereas in time series, data will determine which variables are exogenous and which are endogenous.

3.1. TESTING STATIONARITY OF VARIABLES

We started our empirical testing by testing the unit roots of all the variables and found that they could be taken as I(1) on the basis of ADF and PP tests. I(1) means that the variables are non-stationary in their original form and stationary in their differenced form. All the 'level' form of the variables were transformed into the logarithm scale except for the inflation which was originally in percentage form. The differenced form for each variable used is created by taking the difference of their log forms. A variable is stationary when its mean, variance and covariance are constant over time. The table below summarizes the results from the unit root tests.

Variable	Test Statistic	Critical Value	Implication
Variables in Level Form			
LSHARINDX	-3.2223(AIC) -2.8800(SBC)	-3.4455	Variable is non-stationary
LM2	-2.6070(AIC) -2.3886(SBC)	-3.4455	Variable is non-stationary
LALR	-2.3466	-3.4455	Variable is non-stationary
LSTUKSD	-3.1454(AIC) -2.7090(SBC)	-3.4455	Variable is non-stationary
LFXRUSD	-3.1307(AIC) -2.4947(SBC)	-3.4455	Variable is non-stationary
LINFLAT	-2.2026	-3.4455	Variable is non-stationary
Variables in Differenced Form			
DSHARINDX	-5.0780 (AIC) -7.6325(SBC)	-2.8844	Variable is stationary
DM2	-9.0874	-2.8844	Variable is stationary
DALR	-3.5177(AIC)	-2.8844	Variable is stationary
	-4.6692(SBC)		Variable is stationary
DSTKUSD	-5.1004(AIC) -8.0007(SBC)	-2.8844	Variable is stationary
DFXRUSD	-3.6890(AIC) -4.7317(SBC)	-2.8844	Variable is stationary
DINFLAT	-4.1997	-2.8844	Variable is stationary

We can conclude, relying on the AIC and SBC criteria, that all the variables we are using are I(1). We have selected the ADF regression order based on the highest computed value for AIC and SBC at 95% critical value. Some AIC and SBC give different order and in that case, we have taken different orders and compared both. This will not raise any issue, so the implications are consistent. Based on the results, we can proceed to the next step, which is test of order of VAR[1].

3.2. DETERMINATION OF THE ORDER OF THE VAR MODEL

We need to determine the order of the VAR (number of lags to be used) before proceeding with test of cointegration.

[1] The null hypothesis for the ADF test is that the variable is non-stationary. In all cases of the variable in level form, the test statistic is lower than the critical value and hence we cannot reject the null. Conversely, in all cases of the variable in differenced form, the test statistic is higher than the critical value and thus we can reject the null and conclude that the variable is stationary (in its differenced form).

The table below shows that AIC recommends order of 1, whereas SBC favours zero lag (see Appendix 2A for details).[2]

	Choice Criteria	
	AIC	SBC
Optimal order	1	0

CHECK FOR AUTOCORRELATION

Based on the conflict between recommendation of AIC and SBC, we need to check for serial autocorrelation for each variable and obtained the following results.

Variable	Chi-Sq p-value	Implication (at 10%)
DSHARINDX	0.835	There is no serial correlation
DM2	0.391	There is no serial correlation
DALR	0.088	There is serial correlation
DSTKUSD	0.203	There is no serial correlation
DINFLAT	0.650	There is no serial correlation
DFXRUSD	0.016	There is serial correlation

From the above results, there is only 2 autocorrelation out of 6 variables. Relevant to that mater, if we chose a lower order, we may face the effects off autocorrelation. The disadvantage of taking a higher order is that we risk over-parameterization. However, in our case, given that we have a long time series (133 observations), this is a lesser concern. After considering the issue of lower and higher orders, we decided to choose the VAR order of 2.

3.3. COINTEGRATION TEST

After confirmation that the variables are I(1) and the determined optimal VAR order as 2, we can proceed with the cointegration test. As shown in the table below, the maximal Eigenvalue, Trace and HQC indicate that there is one cointegrating vector, whereas according to AIC and SBC, there are 6 and zero cointegrating vectors respectively.

Criteria	Number of cointegrating vectors
Maximal Eigenvalue	1
Trace	1
AIC	6
SBC	0
HQC	1

[2] Based on highest computed values for AIC and SBC, after stipulating an arbitrary relatively high VAR order of 6.

We are inclined to believe that there is one cointegrating vectors as intuition and as well based on the previous studies that have been done to find the relationship of macroeconomic variables and changes in stock returns, that there relationship between them. we ***shall assume that there is one cointegrating vector***, or relationship.
The economic interpretation, in our view, is that the macroeconomic variables, conventional stock and Shariah stock are theoretically related, meaning they tend to move together in the long run. This conclusion has as important implication for investors and policy makers. Given that these stock markets are cointegrated, the possibility of gaining abnormal profit in the long run term through diversification is very limited. From the macroeconomic side, it has implications for the extent of effectiveness of a government's short run monetary and fiscal and exchange rate stabilization policies.

3.4. LONG RUN STRUCTURAL MODELING (LRSM)

LRSM try to prove the theoretically meaningful long run relationship among the variables. We do exact identifying, that is by normalizing our variable of interest, the Shariah Index, we obtained the following results as in the table below. After calculating the t-ratios manually, we found all the variables are significant except FXRUSD.

EXACT IDENTIFYING

Variable	Coefficient	Standard Error	t-ratio	Implication
LSHARINDX	-	-	-	-
LM2	0.48185	0.21356	2.256	***Variable is significant***
LALR	0.87733	0.32457	2.703	***Variable is significant***
LSTKUSD	-0.99980	-0.11224	-8.907	***Variable is significant***
LINFLAT	-0.54513	0.013991	-38.962	***Variable is significant***
LFXRUSD	0.94732	0.58597	1.616	Variable is insignificant

These initial results were in line as our intuition has suspected.

OVER IDENTIFYING

Variable	Chi-Sq p-value	Implication
LSHARINDX	-	-
LM2	0.028	***Variable is significant***
LALR	0.000	***Variable is significant***
LSTKUSD	0.001	***Variable is significant***
LINFLAT	0.000	Variable is significant
LFXRUSD	0.057	Variable is insignificant

After doing the over identifying for all the variables (making one over-identifying restrictions at a time), the results confirmed earlier findings.

From the above analysis, we arrive at the following cointegrating equation (numbers in parentheses are standard deviations):

$$\underset{}{SHARINDX} + \underset{(0.21)}{0.48LM2} + \underset{(0.32)}{0.88LALR} - \underset{(-0.11)}{0.99LSTKUSD} - \underset{(0.014)}{0.55LINFLAT} \rightarrow I(0)$$

3.5. VECTOR ERROR CORRECTION MODEL

From our analysis, we have established that at least five variables are cointegrated to a significant degree – SHARINDX, M2, ALR, STKUSD and INFLATION. However the evidence of cointegration cannot tell us which variable is leading (exogenous) and which variable is lagging (endogenous). An investor or a policy maker would be interested to know which variable is exogenous because they would closely monitor that exogenous variable, as any change in that variable would have significant effect on other variables. However, the VECM cannot tell us the relative exogeneity and endogeneity (which variable is the strongest leader and which variable is the weakest follower).

Variable	ECM(-1) t-ratio p-value	Implication
SHARINDX	0.024	Variable is endogenous
LM2	0.110	Variable is exogenous
LALR	0.005	Variable is endogenous
LSTKUSD	0.001	Variable is endogenous
LINFLAT	0.006	Variable is endogenous
LFXRUSD	0.000	Variable is endogenous

After examining the error correction term, e_{t-1}, for each variable, and checking whether it is significant, we found that there is only one exogenous variable, M2, as shown in the table above.

The implication of this result is that, the index of interest to investors and policy makers would be the M2. This index being the exogenous variable, would receive shocks and transmit the effects of those shocks to other variables. An investor who invests, say in Shariah stock, would be interested

to monitor movements in the M2, as changes to that variable is likely to affect his investment in a significant way. Likewise, news and information that are likely to affect M2 would be of interest to that investor.

The coefficient of e_{t-1} tells us how long it will take to get back to long term equilibrium if that variable is shocked. The coefficient represents proportion of imbalance corrected in each period. For instance, in the case of the Shariah index, the coefficient is 0.12. this implies that, when there is a shock applied to this index, it would take on average, 1.2 months for the index to get back into equilibrium with the other variables.

3.6. VARIANCE DECOMPOSITION (VDC)

We have indicated that M2 is the exogenous variable but we have not been able to say about the relative endogeneity of the other variables. VECM is not able to help us in this problem, so we now use VDC. Relative endogeneity can be ascertained in the following way. VDC decomposes the variance of forecast error of each variable into proportions attributable to shocks from each variable in the system, including its own. The most exogenous variable is thus the variable whose variation is explained mostly by its own past variations.

We started out applying orthogonalized VDCs and obtained the following results

Forecast at horizon = 12 (months)

	SHARINDX	M2	ALR	STKUSD	INFLAT	FXRUSD
SHARINDX	6.84%	0.33%	0.07%	6.89%	-2.03%	-0.31%
M2	14.63%	14.37%	-0.03%	1.75%	7.00%	0.002%
ALR	-0.18%	0.37%	1.67%	0.16%	20.24%	-0.23%
STKUSD	-0.64%	-0.34%	0.11%	1.11%	-37.41%	-0.23%
INFLAT	-3.99%	-0.13%	0.72%	-5.40%	60.46%	1.37%
FXRUSD	0.36%	-0.03%	-0.37%	0.65%	2.58%	0.82%

Forecast at horizon = 24(months)

	SHARINDX	M2	ALR	STKUSD	INFLAT	FXRUSD
SHARINDX	6.85%	0.33%	0.07%	6.89%	-2.00%	-0.31%
M2	1.46%	1.44%	-0.03%	1.75%	7.00%	0.03%
ALR	-0.18%	0.37%	1.68%	0.15%	20.15%	-0.23%
STKUSD	-0.64%	-0.34%	0.11%	1.11%	-37.38%	-0.23%
INFLAT	-4.01%	-0.13%	0.72%	-5.42%	60.29%	1.38%
FXRUSD	0.36%	-0.03%	-0.37%	0.65%	2.61%	0.81%

For the above two tables, rows read as the percentage of the variance of forecast error of each variable into proportions attributable to shocks from other variables (in columns), including its own. The columns read as the percentage in which that variable contributes to other variables in explaining observed changes. The diagonal line of the matrix (highlighted) represents the relative exogeneity. According to these results, the ranking of indices by degree of exogeneity (extent to which variation is explained by its own past variations) is as per the table below:

No	Index
1	INFLAT
2	SHARINDX
3	ALR
4	M2
5	STKUSD
6	FXRUSD

Generalized

Forecast at horizon = 12 (months)

	SHARINDX	M2	ALR	STKUSD	INFLAT	FXRUSD
SHARINDX	6.84%	0.33%	0.07%	6.89%	-2.03%	-0.31%
M2	2.28%	1.47%	-0.02%	2.57%	6.71%	-0.03%
ALR	0.03%	0.22%	1.67%	0.34%	19.19%	-0.25%
STKUSD	5.89%	0.15%	0.23%	6.67%	-16.23%	-0.39%
INFLAT	-4.17%	-0.13%	0.62%	-5.85%	64.61%	1.41%
FXRUSD	-0.34%	0.11%	-0.68%	-1.32%	22.04%	0.81%

Forecast at horizon = 24(months)

	SHARINDX	M2	ALR	STKUSD	INFLAT	FXRUSD
SHARINDX	6.85%	0.33%	0.0001%	6.89%	-2.00%	-0.31%
M2	2.28%	1.47%	-0.02%	2.57%	6.71%	-0.03%
ALR	0.02%	0.22%	1.67%	0.32%	19.10%	-0.24%
STKUSD	5.89%	0.15%	0.23%	6.68%	-16.20%	-0.39%
INFLAT	-4.18%	-0.13%	0.62%	-5.89%	64.44%	1.42%
FXRUSD	-0.34%	0.11%	-0.68%	-1.32%	22.06%	0.81%

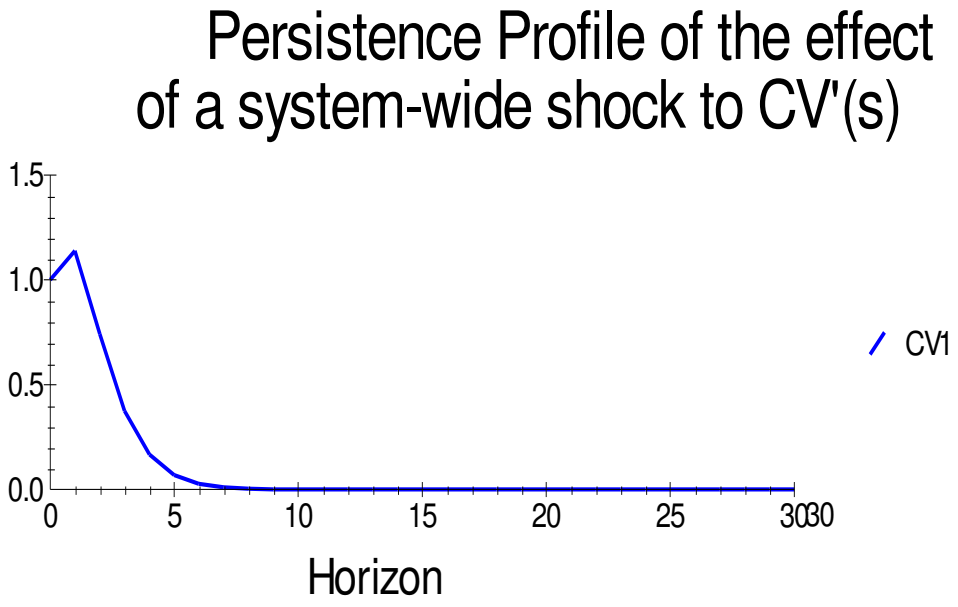
No	Index
1	INFLAT
2	SHARINDX
3	STKUSD
4	ALR
5	M2
6	FXRUSD

3.7. IMPULSE RESPONSE FUNCTIONS (IRF)

The impulse response function (IRFs) gives the same information as given by VDC but in graphical form, whereas VDC is in numerical form.

3.8. PERSISTENCE PROFILE

The persistence profile shows the scenario when the entire cointegrating equation is shocked, and the time it would take for the relationship to get back to equilibrium. The focus here is the effect of system wide-shock on the long-run relationship. Whereas in IRF, we only shock one variable and see its effect on other variables. The chart below shows the persistence profile for the cointegrating equation of this study.



The chart indicates that it would take approximately 8 months for the cointegrating relationship to return to equilibrium following a system-wide shock.

4. CONCLUDING REMARKS

The study shows that there is evidence of long run relationship between Shariah stock index and the Malaysian macroeconomic variables. This study quantifies the macroeconomic variable's influence on the Shariah stock index. Shariah stock index and Dow Jones stock index are shown in this study to have a theoretical long run relationship. Nonetheless, macroeconomic variables of Malaysia have a stronger relationship with the Shariah stock index.

5. LIMITATIONS AND SUGGESTIONS

- Some important variables such as monthly GDP are difficult to find.

- As Islamic stock markets are considered very young as compared to conventional stocks markets, so collecting ample data are difficult.

For future study, we would recommend using other macroeconomic variables to see their different effects on the Shariah index. Other Shariah indices should also be considered as research on Islamic finance is still young and needs better quality studies using the most recent econometric techniques such as panel data. Further studies can also use other conventional indices as comparison.

Underlying theory and framework are essential for this study. Otherwise, studies using econometrics maybe accused of only number crunching. Developing better and higher quality of research will help us promote and build Islamic finance.

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