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# Is the Islamic Unit Trust Market Efficient? *Empirical Evidence from Malaysia*

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The efficient market hypothesis (EMH) asserts that asset prices should fully incorporate all relevant information relating to their fundamental values (Fama [1965]). It is consistent with the concept of the Random Walk Hypothesis, which states that price movements of any financial asset will not follow any trends or patterns, and that past price movements cannot be used as predictors for future price movements (Kendall and Hill [1953]). In the context of the unit trust funds (UTFs) market, the EMH would mean that the price of the fund's unit should reflect all public information pertaining to them, with the result that past information becomes useless in predicting future unit price behavior. Price efficiency takes place in the funds market once the market price of the fund's unit is an unbiased estimate of the true value of the investment.

Market efficiency, however, does not require that the market price of a fund's unit be equal to its true value at every point in time; all it requires is that errors or deviations in the market price be unbiased. For example, the prices may be less than or greater than the true value, as long as these deviations are random. This randomness indicates that there is an equal chance that unit prices are under- or over-valued at any point in time, which means that no individual or group of investors can consistently beat the market using their investment strategy.

The interaction between financial markets and the macroeconomic conditions have been studied to determine whether these financial markets exhibit a weak, semi-strong, or strong form of market efficiency. The ability to understand this relationship would enable investors and fund managers to strategize their investment decisions so as to beat the market. The degree of market efficiency helps public investors shift investments to ensure suitable and sustainable returns. Investors may interpret the absence of any form of efficiency in the UTF market as an indicator of unstable financial markets, which may lead to speculative practices, decreasing UTF performance and loss of investments. Investors may then shift their investments to other markets that are more efficient than the local markets.

Against this backdrop, the present study is significant to several stakeholders. Apart from helping investors and fund managers strategize their investment decisions, findings from the study would enable relevant authorities to formulate effective macroeconomic policies to protect the market from undesirable speculative practices in short-run investments. If prices of financial securities accurately reflect the underlying fundamentals, these prices may be employed as leading indicators of future economic activity.

Unlike earlier studies, the present study offers several aspects of novelty. First, it analyzes the informational efficiency of Islamic

UTFs by examining the cause and effect relationship between major macroeconomic variables and the NAV of the funds, disaggregating fund types into equity, bond, balance, fixed, mixed, money market, and feeder funds. Second, this study includes local political stability as measured by National Political Elections (NPE) and Corruption Index (CI), in addition to considering common macroeconomic indicators.

The remaining part of this paper is organized as follows: The following section appraises the existing literature on financial market efficiency; the next describes the processes of data collection, processing, and the methodology used to investigate the market efficiency of UTFs. Then we look at the empirical results, and finally, offer a conclusion and recommendations for further research.

## INFORMATIONAL CONTENT OF THE FINANCIAL MARKET

Researchers and practitioners have examined the informational efficiency of major financial markets in developed as well as emerging markets. For example, Fama [1981], Fama [1990], Chen et al. [1986], and Chan et al. [1991] tend to focus on developed financial markets. Kwon and Shin [1999], Maysami and Koh [2000], Ibrahim and Aziz [2003], Fadhil et al. [2007], Acikalin et al. [2008], Hussain et al. [2012], and Rasool et al. [2012] focus on emerging markets. Dash and Kumar [2008] use the modified linear Granger causality test to find the relationship between NAV return/variance of the mutual fund in India and the exchange rate (USD/INR and EUR/INR), the interest rate, the inflation rate, and the global crude oil price. Their findings indicate that macroeconomic variables significantly influenced return and volatility of the mutual fund.

Maysami et al. [2004] use Engle and Granger's [1987] error correction model to find the relationship between the Stock Market Index (STI) and consumer price index, industrial production, long- and short-run interest rates, money supply (M2), and exchange rates. They found a causal relationship among the Singapore stock market, the property index, and changes in macroeconomic variables. These studies find significant causal relationships between macroeconomic fundamentals and equity market prices specifically in emerging markets including Malaysia.

Using cointegration and Granger causality tests, Ibrahim [1999] examines the dynamic interaction between macroeconomic variables and stock prices in Malaysia. He finds that informational inefficiency characterizes the Malaysian stock market, and there is evidence that stock prices in Malaysia are Granger-caused by changes in official reserves and exchange rates in the short-run. Habibullah and Baharumshah [2000] investigate the relationship between the Malaysian stock market and macroeconomic variables such as money supply, gross national product, price level (Consumer Price Index), interest rate (three-month treasury bill rate), and exchange rate (real effective exchange rate). The study utilizes Toda and Yamamoto's [1995] methodology to investigate this relationship over the period between 1981 and 1994. They found that money supply and interest rate variables lead stock prices, while stock prices lead nominal income, price level, and the exchange rate in Malaysia.

Hussain et al. [2012] apply a Vector Auto Regression (VAR) method and Granger causality test to investigate the relationship among oil price, exchange rate, and Islamic stock price in the specific context of Malaysia's Islamic financial market by using monthly data from January 2007 to December 2011. The overall results of the Granger causality test indicate that only oil price is Granger-caused by the Islamic stock return, and affects Islamic stock returns in the short and long-run in Malaysia.

Othman et al. [2015] examine the information efficiency of Islamic Equity UTFs in Malaysia using the VECM and Granger causality tests. The study specifically examines the causal relationship between equity funds NAV and macroeconomic variables (Industrial Production Index, three-month treasury bill rate, money supply [M3], foreign exchange rate, crude oil price, the 2007/2008 global financial crisis, national political elections, and the corruption index). They found that the Islamic UTF market in Malaysia is an inefficient market with respect to the Industrial Production Index, global oil prices, political elections, and financial crisis. However, the market is approaching informational efficiency with respect to at least four macroeconomic variables: money supply, treasury bill rate, foreign exchange rate, and corruption index.

While several studies examine the informational efficiency of the financial market worldwide, most of these focus on stock markets. Studies examining informational efficiency in the specific context of Islamic UTFs are rare. The present study fills this research gap

by examining the cause and effect relationship between chosen macroeconomic variables and the NAV of all types of Islamic UTFs in the Malaysian capital market.

## DATA PROCESSING AND METHOD OF ANALYSIS

The dataset for this study comprises average monthly time series frequency data covering the period from April 2006 to December 2015. We consider a total of 125 Islamic UTFs, which are further categorized as follows: equity funds (52), bond funds (21), balanced funds (23), fixed income funds (5), mixed funds (7), money market funds (14), and Feeder Funds (3), all of which are listed on the Malaysian stock market. Bursa Malaysia. Macroeconomic variables considered include the Consumer Price Index (CPI), Industrial Production Index (IPI), three-month Treasury Bill Rate (TBR), Money Supply (M3), Foreign Exchange Rate (FER), Crude Oil Price (OP), and the 2007/2008 global financial crisis (FC), which enters the models as a dummy variable.

We further enriched our models with two variables for political stability, namely, local stability as measured by National Political Elections (NPE), and Corruption Index (CI). For statistical determination, the macroeconomic variables CPI, IBI, TBR, M3, FER, and OP are defined as endogenous, while NPE and FC are exogenous (Barro [2007]).

Since the different macroeconomic variables have different units of measurement, the data on the CPI, IPI, TBR, M3, FER, OP, and CI needed to be transformed into natural logarithms. However, the data of variables that contain zero and negative values such as the funds NAV and dummy variables NPE and FC were not transformed into the natural logarithm. The data of NAV of all types of Islamic UTFs and the macroeconomic variables (the CPI, the IPI, the TBR, the M3, FER, and OP) all were obtained from the *DataStream* database, while the CI variable data were collected from the Transparency International Corruption Perceptions Index website. Finally, data on the national political election and the 2007/2008 global financial crisis were applied as dummy variables in the analysis.

### Unit Root Test

The study employs the unit root test to examine the stationarity of the series for both the NAV of all types of Islamic UTFs and the chosen macroeconomic variables, by using the Augmented Dickey–Fuller (ADF) [1979] and Phillips-Perron (PP) [1988] tests, which are mathematically presented in the following:

$$\Delta Y_t = \alpha_0 + \alpha_{1t} + \gamma Y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \varepsilon_t$$

$$\Delta Y_t = \alpha_0 + \alpha_{1t} + \gamma Y_{t-1} + \varepsilon_t$$

where, $Y$ represents the variables, $\alpha_i$ and $\gamma$ are constant terms, $t$ is the time, $\alpha_{1t}$ is the intercept and time trend that may be added, $\Delta$ represents the first difference operator, $\varepsilon_t$ is the white noise residual, and $p$ is the number lagged values.

### Casualty Tests

This study used both the Engle and Granger [1987] causality test and the Granger [1969] test to examine the cause and effect relationship between the chosen macroeconomic variables and the funds' NAV of all the Islamic UTFs. The error correction technique proposed by Engle and Granger [1987] was applied to analyze the causal relationship among the endogenous variables (such as IPI, TBR, M3, FER, OP, and CI) and the funds NAV (Enders [2004]), while the Pairwise Granger [1969] test was used to analyze the causal relationship between the exogenous macroeconomic variables such as NPE and FC with the NAV of Islamic UTFs (Asteriou and Hall [2006]).

### Engle and Granger [1987] Causality Test

Engle and Granger [1987] proposed including error terms in the model to capture the long-run and short-run relationships among variables that are cointegrated in their levels. More specifically, the Engle and Granger test of cause and effect based on a VECM model where the case of a two variable $X$ and $Y$ are integrated and can be expressed by the following equations:

$$\Delta Y_t = \alpha_1 + \sum_{i=1}^{n} \beta_i \Delta X_{t-i} + \sum_{i=1}^{m} \gamma_j \Delta Y_{t-1} + \psi_1 \hat{E}_{1t-1} + \varepsilon_{1t}$$

$$\Delta X_t = \alpha_2 + \sum_{i=1}^{n} \theta_i \Delta X_{t-i} + \sum_{i=1}^{m} \delta_j \Delta Y_{t-1} + \psi_2 \hat{E}_{2t-1} + \varepsilon_{2t}$$

where, $\hat{E}_{1t-1}$ and $\hat{E}_{2t-1}$ denote the error correction terms, while $\psi_i$ stands for the long-run causal relationships

existing among the variables of interest in the system and is most likely to have an absolute value less than 1, with an expected negative sign, $\gamma_j$ measures the short-run effect of change in $Y$ on $X$, and $\theta_i$ measures the short-run effect of changes in $X$ on $Y$, and $\varepsilon_{it}$ is the standard error term. $t$ and $m$ denote time periods and the number of lags respectively for the applied model while $n$ indicates the number of observations.

If the $\psi_i$ is not statistically significant, it will be a sign that the variables involved in the system are independent in the perspective of prediction. However, if $\psi_1$ is found to be statistically significant and $\psi_2$ is insignificant, then the system recommends there is unidirectional causality from $X$ *to* $Y$, meaning that $X$ drives $Y$ toward a long-run equilibrium, but not vice versa. However, the contrary implication will be perceived when $\psi_2$ is statistically significant and $\psi_1$ is not. Furthermore, in the case where both coefficients of $\psi_1$ and $\psi_2$ are statistically significant, the bidirectional Granger causality relationships in the system will be suggested.

### The Granger [1969] Test

Granger [1969] developed the original causality method to measure the causal effect from time series observations. It examines whether predictability exists among the variables of the interested model. Formally, the $X$ Granger causes $Y$ if the past values of $X$ in the model can help to forecast $Y$ value rather than using only past information of $Y$ (Asteriou and Hall [2006]). The Granger causality test for the case of two stationary variables $Y_t$ and $X_t$ are estimated as follows:

$$Y_t = \alpha_1 + \sum_{i=1}^{n} \beta_i X_{t-i} + \sum_{i=1}^{m} \gamma_j Y_{t-1} + \varepsilon_{1t}$$

$$X_t = \alpha_2 + \sum_{i=1}^{n} \theta_i X_{t-i} + \sum_{i=1}^{m} \delta_j Y_{t-1} + \varepsilon_{2t}$$

where $Y_t$ and $X_t$ represent the variables of the time series under investigation, $\alpha_1$ and $\alpha_2$ are constant terms, and $\varepsilon_{1t}$ and $\varepsilon_{2t}$ are white-noise error terms. Also, the subscripts $t$ and $m$ represent time periods and the number of lags respectively for the applied model, while $n$ represents the number of observations. The set of the null and alternative hypotheses is expressed in the following equation:

$$H_0: \sum_{i=1}^{n} \beta_i = 0 (X_t \text{ does not cause } Y_t)$$

$$H_1: \sum_{i=1}^{n} \beta_i \neq 0 (X_t \text{ does cause } Y_t)$$

To determine the direction of the relationship between $X$ and $Y$, there are four different null hypotheses to be examined based on the OLS coefficient estimations, which are:

i. If $\Sigma_{i=1}^{m} \gamma_j$ and $\Sigma_{i=1}^{m} \delta_j = 0$, it can be established that $X$ and $Y$ do not help to predict one another or both variables are independents.
ii. If $\Sigma_{i=1}^{m} \gamma_j$ and $\Sigma_{i=1}^{m} \delta_j \neq 0$, we conclude that $X_t$ and $Y_t$ have bidirectional causality.
iii. If $\Sigma_{i=1}^{m} \gamma_j \neq 0$ and $\Sigma_{i=1}^{m} \delta_j = 0$, the conclusion will be changes in $Y$ can aid to predict future values of $X$ then again not the other way around.
iv. Finally, if $\Sigma_{i=1}^{m} \gamma_j = 0$ and $\Sigma_{i=1}^{m} \delta_j \neq 0$, the decision will be unidirectional Granger causality exist from $X$ to $Y$. In other words, changes in $X$ help to predict future values of $Y$ but not vice versa.

The above four null hypotheses are examined using an $F$-test given by the following formula reported by Asteriou and Hall [2006]:

$$F = \frac{(RSSr - RSSur)/m}{RSSur/(n-k)}$$

where $m$ represents the number of lagged terms, $n$ is denoted for the number of observations, $k$ indicates the parameters' number estimated in the unrestricted model, and *RSSr* and *RSSur* stated for residual sum of squares of both the restricted and unrestricted models respectively.

As a final point, the study performs diagnostic tests on the residual from the estimated VECM causality model to ensure that the residual is white noise which means it is normally distributed, and free from serial correlation or heteroscedasticity effect.

## EMPIRICAL RESULTS

The empirical results of the study comprise correlation matrix results, unit root test results, choosing the optimal lag lengths results, VECM causality tests results, and Granger [1969] causality tests results.

## EXHIBIT 1
**Pairwise Correlation Matrix of the Macroeconomic Variables**

| | CPI | IPI | TBR | M3 | FER | OP | CI | NPE | FC |
|---|---|---|---|---|---|---|---|---|---|
| CPI | 1 | | | | | | | | |
| IPI | 0.73** | 1 | | | | | | | |
| TBR | –0.07 | 0.34** | 1 | | | | | | |
| M3 | 0.98*** | 0.74** | –0.04 | 1 | | | | | |
| FER | 0.06 | 0.27** | 0.01 | 0.00 | 1 | | | | |
| OP | 0.22* | 0.11* | 0.20* | 0.23* | –0.77** | 1 | | | |
| CI | 0.12* | 0.51** | 0.66** | 0.17 | 0.26* | 0.02 | 1 | | |
| NPE | –0.27* | –0.07 | 0.36** | –0.16 | –0.30** | 0.22* | 0.35** | 1 | |
| FC | –0.39** | –0.38** | –0.21* | –0.46** | 0.11* | –0.16* | –0.01 | 0.04 | 1 |

*Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.*

### Pearson Correlation Matrix Results

The study applied the Pearson coefficient matrix test to examine the degree of relationship among the independent variables as well as to detect the multicollinearity problem among them. A multicollinearity problem may occur among the independent variables if the relationship between any two variables is more than 0.90% (Asteriou and Hall [2006]). Exhibit 1 shows the results of the Pairwise Correlation Matrix, which indicate that there is a satisfactory degree of relationship among all the macroeconomic variables in the study. However, there is a highly correlated relationship between CPI and M3 of 0.98. Thus, it can be concluded that there is a serious multicollinearity issue between CPI and M3. Given this, we exclude the CPI variable from the estimating models, considering only the M3 for further analysis of the relationships.

The values of the correlation coefficients in Exhibit 1 confirm the positive correlation between IPI and the TBR, M3, FER, OP, and CI. However, IPI has a negative correlation with NPE and FC. The values for money supply with TBR suggest a slightly negative correlation, which is consistent with the economic, monetary system theory, as the money supply increases as the interest rate decreases. Further, there is a slightly negative correlation between CPI and TBR. Given the resulting values, a negative correlation exists between NPE and the CPI, IPI, M3, and FER. Similarly, the financial crisis exposed a negative correlation with the CPI, IPI, TBR, M3, OP, and CI; however, it has a positive insignificant relationship with NPE. Also, the OP has a positive correlation with all the macroeconomic indicators in Malaysia except for the FER.

### Unit Root Test Results

The results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests in Exhibit 2 clearly show that none of the series of all variables under study is stationary in the level. However, they are stationary in the first difference, namely $I$ (1). This suggests that the UTF market in Malaysia does not exhibit any form of efficient market. This also suggests that the series of all variables does not follow the random walk model and the NAV of the Islamic UTFs may display predictable behavior.

### Selecting the Optimal Lag-Length Results

To select the optimal lag lengths, the study used a statistical technique based on the residual of the VECM model. The various lag-lengths were imposed on the VECM restricted model until all the residuals of the correlograms were uncorrelated. Based on this technique, the optimal lag length are (10) for equity model, (11) for bond model, (9) for balance funds mode, (2) for fixed funds model, (12) for mixed funds model, (10) for money market model, and (9) feeder funds model. Exhibit 3 reports the result of the LM test and its P-value of each selected lag for every model, which indicates that the estimated residuals generated from each VAR model are free from serial correlation.

## EXHIBIT 2
### Results of Unit Root Tests

| | On Levels Intercept and Trend | | On First Differences Intercept and No Trend | |
|---|---|---|---|---|
| **Variable Names** | **ADF** | **PP** | **ADF** | **PP** |
| Equity | –1.681225 | –2.172347 | –9.33549*** | –9.504105*** |
| Bond | –1.558563 | –2.018471 | –8.461078*** | –8.689705*** |
| Balance | –1.872923 | –2.366389 | –10.0249*** | –10.18474*** |
| Fixed | –1.327088 | –1.304857 | –10.85601*** | –10.85667*** |
| Mixed | –1.633383 | –2.027255 | –10.27999*** | –10.48332*** |
| Money | –1.751435 | –1.853113 | –2.98034** | –10.65174*** |
| Feeder | –2.307894 | –2.639454 | –10.20171*** | –10.23553*** |
| CPI | –0.480164 | –2.751928 | –6.957961*** | –6.400279*** |
| IPI | –1.495056 | –2.153024 | –3.189779** | –28.47288*** |
| TBR | –2.77278 | –2.104549 | –6.286893*** | –9.600675*** |
| M3 | –1.006637 | –1.10952 | –9.66394*** | –9.660731*** |
| FXR | 0.040461 | 0.171168 | –9.625332*** | –9.631223*** |
| OP | –1.810628 | –1.742907 | –7.857376*** | –7.946036*** |
| CI | –1.531339 | –1.551788 | –10.63015*** | –10.63015*** |
| NPE | –2.377088 | –2.480558 | –10.63015*** | –10.63015*** |
| FC | –2.176821 | –2.209538 | –10.63015*** | –10.63015*** |

*Notes: 1. The critical values for unit root tests at 1% and 5% significance levels are −4.07 and −3.46 (with trend) and 3.51, −2.89 (without trend), respectively, for both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. 2. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. The critical values of Phillips, Schmidt, and Shin (KPSS) test at 1% and 5% levels of significance are 0.216 and 0.146 (with the trend), respectively. 3. Lag-length are selected automatically, based on SIC, max lag = (11) for Augmented Dickey-Fuller (ADF) and Bandwidth: 0.889 (Andrews automatic) using Bartlett kernel for Phillips-Perron (PP) tests.*

## EXHIBIT 3
### Residual Serial Correlation LM Tests for the VECM Models

| **Model** | **Equity Funds** | | **Bond Funds** | | **Balance Funds** | | **Fixed Funds** | | **Mixed Funds** | | **Money Market Funds** | | **Feeder Funds** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stat-test** | **LM-Stat** | **Prob** | **LM-Stat** | **Prob** | **LM-Stat** | **Prob** | **LM-Stat** | **Prob** | **LM-Stat** | **Prob** | **LM-Stat** | **Prob** | **LM-Stat** | **Prob** |
| **Lags** | **10** | | **11** | | **9** | | **2** | | **12** | | **10** | | **9** | |
| 1 | 43.3636 | 0.7001 | 38.7888 | 0.8519 | 64.7778 | 0.0649 | 38.6573 | 0.8555 | 61.5138 | 0.1082 | 40.2382 | 0.8094 | 62.1043 | 0.0990 |
| 2 | 65.1645 | 0.0609 | 47.6507 | 0.5279 | 53.2857 | 0.3128 | 58.6487 | 0.1627 | 55.2092 | 0.2517 | 33.6463 | 0.9537 | 45.3497 | 0.6219 |
| 3 | 61.9786 | 0.1009 | 57.4982 | 0.1895 | 53.1907 | 0.3161 | 47.5875 | 0.5305 | 53.8653 | 0.2936 | 49.1494 | 0.4671 | 55.7930 | 0.2347 |
| 4 | 45.3004 | 0.6239 | 33.4845 | 0.9557 | 53.7598 | 0.2970 | 45.3554 | 0.6217 | 44.5126 | 0.6554 | 52.1222 | 0.3535 | 36.4522 | 0.9077 |
| 5 | 49.2919 | 0.4614 | 52.6601 | 0.3344 | 57.3744 | 0.1925 | 44.3570 | 0.6616 | 40.9254 | 0.7873 | 54.7239 | 0.2664 | 57.7848 | 0.1825 |
| 6 | 24.2134 | 0.9989 | 57.9309 | 0.1791 | 42.5897 | 0.7291 | 55.3598 | 0.2472 | 64.2420 | 0.0708 | 52.8125 | 0.3290 | 37.1818 | 0.8920 |
| 7 | 63.3017 | 0.0823 | 44.9074 | 0.6397 | 58.4386 | 0.1673 | 51.6231 | 0.3716 | 57.2342 | 0.1961 | 44.2706 | 0.6650 | 50.7683 | 0.4037 |
| 8 | 47.7520 | 0.5238 | 58.1668 | 0.1735 | 60.4237 | 0.1269 | 34.2905 | 0.9450 | 45.5758 | 0.6127 | 50.2870 | 0.4222 | 38.1379 | 0.8691 |
| 9 | 42.3274 | 0.7386 | 44.1650 | 0.6691 | 34.5404 | 0.9414 | 47.4987 | 0.5341 | 51.0910 | 0.3915 | 53.4034 | 0.3089 | 56.4375 | 0.2168 |
| 10 | 56.8040 | 0.2071 | 42.7307 | 0.7239 | 31.5906 | 0.9747 | 55.0066 | 0.2577 | 53.4450 | 0.3075 | 47.3521 | 0.5401 | 30.8663 | 0.9800 |
| 11 | 45.1876 | 0.6284 | 53.7814 | 0.2963 | 43.2529 | 0.7043 | 59.1438 | 0.1520 | 54.2917 | 0.2799 | 54.8275 | 0.2632 | 49.7413 | 0.4436 |
| 12 | 50.8544 | 0.4004 | 51.5707 | 0.3736 | 45.2519 | 0.6258 | 54.9740 | 0.2587 | 44.9227 | 0.6391 | 56.9712 | 0.2028 | 42.9224 | 0.7167 |
| 13 | 50.3677 | 0.4191 | 39.2026 | 0.8404 | 39.5345 | 0.8308 | 61.4669 | 0.1089 | 57.8760 | 0.1804 | 39.8775 | 0.8205 | 36.5727 | 0.9052 |

*Notes: Probs from chi-square with 49 df.*

## EXHIBIT 4

**Multivariate Causality Tests Results among the NAV of Islamic Equity UTFs and Macroeconomic Variables**

| Dependent Variables | Independent Variables: X2 Statistic of Lagged 1st Difference Term [P-Value] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | NAV-EQUITY | IPI | TBR | M3 | FER | OP | CI | ECT |
| **NAV-EQUITY** | **1** | **13.329** | **16.577** | **18.768** | **7.279** | **18.216** | **10.508** | **0.0977** |
| | | [0.206] | [0.084] | [0.043] | [0.699] | [0.051] | [0.397] | [ 2.230] |
| **IPI** | **10.594** | 1 | 27.222 | 19.834 | 18.445 | 28.090 | 6.996 | –2.0175 |
| | [0.3900] | | [0.002] | [0.031] | [0.048] | [0.002] | [0.726] | [–3.971] |
| **TBR** | **50.549** | 62.171 | 1 | 62.237 | 43.884 | 29.719 | 37.429 | –0.4705 |
| | [0.000] | [0.000] | | [0.000] | [0.000] | [0.001] | [0.000] | [–5.472] |
| **M3** | **39.854** | 38.971 | 13.365 | 1 | 9.774 | 13.491 | 14.528 | 0.0857 |
| | [0.000] | [0.000] | [0.204] | | [0.461] | [0.198] | [0.150] | [ 3.645] |
| **FER** | **6.967** | 14.017 | 9.175 | 15.095 | 1 | 10.743 | 12.217 | –0.0002 |
| | [0.729] | [0.172] | [0.516] | [0.129] | | [0.378] | [0.271] | [–0.1488] |
| **OP** | **18.065** | 12.503 | 11.627 | 12.509 | 5.920 | 1 | 1.519 | –0.0382 |
| | [0.054] | [0.253] | [0.311] | [0.252] | [0.822] | | [0.999] | [–0.310] |
| **CI** | **22.579** | 16.333 | 10.692 | 17.889 | 13.280 | 7.268 | 1 | –0.1170 |
| | [0.012] | [0.091] | [0.382] | [0.057] | [0.208] | [0.700] | | [–1.793] |

### VECM Causality Tests Results (Engle and Granger [1987])

Exhibit 4 reports the cause and effect relationship between macroeconomic variables, namely IPI, TBR, M3, FER, OP, and CI, with the NAV of Islamic Equity UTFs. In particular, the P-values reported in the first row of Exhibit 4 indicate significant bidirectional causal effects of M3 on the NAV of Islamic Equity UTFs at a significant level of 5%. Also, the results in the first column show that the NAV of Islamic Equity UTFs plays as a predictor in the Malaysian capital market for the monetary system (TBR, and M3) and CI at the 1% and 5% level of significance, respectively. However, the IPI, FER, and OP do not show any significant causal relationship with the NAV of Islamic Equity UTFs in Malaysia at a significance level of 5%. Furthermore, the CI does not show any significant cause and effect impact on NAV of Islamic Equity UTFs in the short run. This may be because Islamic Equity UTFs run their business operations based on the *Sariah* principle that prohibits corruption, which in the end has the beneficial effect of steering the Islamic funds away from a corrupt environment.

The overall results suggest that the Islamic Equity UTF market in Malaysia is inefficient with respect to the available information of the monetary system (i.e., M3) at a 5% level of significance. However, the Islamic Equity UTFs is an efficient market with respect to the IPI, TBR, FER, and OP, as the NAV of Islamic Equity UTFs cannot be predicted using the available information about these variables in the short-run investment.

Exhibit 5 reports the cause and effect relationship between the chosen macroeconomic variables and NAV of Islamic Bond UTFs in Malaysia. The first row results in Exhibit 5 show that none of the macroeconomic variables has a causal effect relationship on the changes of the NAV of Islamic Bond UTFs in Malaysia. In other words, the macroeconomic variables do not have the ability to predict the price behavior of Islamic bond NAV in the Malaysian capital market in the short run. The findings indicate that the Malaysian Islamic bond market is informationally efficient since the P-values of all macroeconomic variable are more than the significance level of 5%. Also, the results of VECM causality test in the first column of Exhibit 5 reveal that the NAV of the Islamic Bond UTFs can be considered a predictor for the TBR and the OP variables. This is because the estimation coefficient of NAV for both variables is statically significant at the 1% level of significance.

Moreover, as shown in Exhibit 6, the VECM causality test results indicate that the NAV of Islamic Balance UTFs is sensitive toward the changing behavior

## EXHIBIT 5
**Multivariate Causality Tests among the NAV of Islamic Bond UTFs and Macroeconomic Variables**

| | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | X2 Statistic of Lagged 1st Difference Term [P-Value] | | | | | | | |
| Dependent Variables | NAV-BOND | IPI | TBR | M3 | FER | OP | CI | ECT |
| **NAV-BOND** | **1** | **9.997** | **12.643** | **5.320** | **9.748** | **8.843** | **16.660** | **–0.016** |
| | | [0.531] | [0.317] | [0.915] | [0.553] | [0.636] | [0.118] | [–0.522] |
| **IPI** | **5.082** | 1 | 15.030 | 12.799 | 8.174 | 16.661 | 13.005 | **–0.667** |
| | [0.927] | | [0.181] | [0.307] | [0.698] | [0.118] | [0.293] | [–2.1441] |
| **TBR** | **25.104** | 40.337 | 1 | 28.778 | 31.240 | 7.596 | 24.948 | –0.294 |
| | [0.009] | [0.000] | | [0.003] | [0.001] | [0.749] | [0.009] | [–2.901] |
| **M3** | **16.086** | 26.339 | 8.929 | 1 | 12.710 | 15.282 | 13.689 | –0.012 |
| | [0.138] | [0.006] | [0.629] | | [0.313] | [0.170] | [0.251] | [–0.638] |
| **FER** | **18.577** | 13.678 | 16.008 | 28.330 | 1 | 15.108 | 19.574 | 0.054 |
| | [0.069] | [0.251] | [0.141] | [0.003] | | [0.178] | [0.052] | [1.0485] |
| **OP** | **28.138** | 28.570 | 54.700 | 27.678 | 33.238 | 1 | 25.399 | –0.822 |
| | [0.003] | [0.003] | [0.000] | [0.004] | [0.001] | | [0.008] | [–4.234] |
| **CI** | **5.685** | 8.530 | 4.770 | 10.546 | 5.756 | 7.671 | 1 | 0.014 |
| | [0.894] | [0.665] | [0.942] | [0.482] | [0.889] | [0.742] | | [1.800] |

## EXHIBIT 6
**Multivariate Causality Tests among the NAV of Islamic Balance UTFs and Macroeconomic Variables**

| | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | X2 Statistic of Lagged 1st Difference Term [P-Value] | | | | | | | |
| Dependent Variables | NAV-BALANCE | IPI | TBR | M3 | FER | OP | CI | ECT |
| **NAV-BALANCE** | **1** | **20.321** | **18.535** | **13.361** | **9.051** | **23.614** | **5.776** | **–0.013** |
| | | [0.016] | [0.030] | [0.147] | [0.433] | [0.005] | [0.762] | [–2.204] |
| **IPI** | **16.782** | 1 | 22.328 | 16.031 | 12.462 | 18.981 | 9.004 | –0.778 |
| | [0.052] | | [0.008] | [0.066] | [0.189] | [0.025] | [0.437] | [–2.506] |
| **TBR** | **42.249** | 46.736 | 1 | 51.832 | 57.075 | 35.299 | 31.392 | –0.331 |
| | [0.000] | [0.000] | | [0.000] | [0.000] | [0.000] | [0.000] | [–5.579] |
| **M3** | **19.669** | 18.212 | 9.035 | 1 | 4.926 | 8.106 | 3.761 | 0.037 |
| | [0.020] | [0.033] | [0.434] | | [0.841] | [0.524] | [0.926] | [ 2.053] |
| **FER** | **8.099** | 10.866 | 7.527 | 9.595 | 1 | 6.089 | 10.922 | –0.013 |
| | [0.524] | [0.285] | [0.583] | [0.384] | | [0.731] | [0.281] | [–0.131] |
| **OP** | **19.530** | 10.261 | 7.759 | 9.243 | 5.323 | 1 | 6.078 | –0.003 |
| | [0.021] | [0.330] | [0.559] | [0.415] | [0.805] | | [0.732] | [–0.0148] |
| **CI** | **30.391** | 18.556 | 8.790 | 14.767 | 3.797 | 7.647 | 1 | –0.198 |
| | [0.000] | [0.029] | [0.457] | [0.098] | [0.924] | [0.570] | | [–3.228] |

of the IPI, TBR, and global OP in the economy at the 1%, 5%, and 1% significance levels, respectively, and they can be used to predict the fluctuations of NAV of Islamic Balance funds in the short-run investment. These causal effects suggest that the Islamic Balance UTFs in Malaysia violate the Efficient Market Hypothesis with respect to the variables IPI and TBR, and the OP. This implies that the sensible unit-holder (investor) can achieve abnormal returns using historical data of Islamic Balance funds units' prices and macroeconomic

## EXHIBIT 7

**Multivariate Causality Tests among the NAV of Islamic fixed UTFs and Macroeconomic Variables**

| | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | X2 Statistic of Lagged 1st Difference Term [P-Value] | | | | | | | |
| **Dependent Variables** | **NAV-FIXED** | **IPI** | **TBR** | **M3** | **FER** | **OP** | **CI** | **ECT** |
| **NAV-FIXED** | **1** | **6.650** | **0.349** | **0.971** | **4.596** | **0.207** | **4.787** | **–0.008** |
| | | [0.036] | [0.840] | [0.615] | [0.100] | [0.902] | [0.091] | [–1.604] |
| **IPI** | **5.337** | 1 | 0.373 | 3.462 | 0.993 | 13.795 | 0.324 | 0.072 |
| | [0.069] | | [0.830] | [0.177] | [0.609] | [0.001] | [0.851] | [ 0.886] |
| **TBR** | **1.708** | 2.528 | 1 | 3.317 | 6.913 | 11.322 | 13.194 | –0.032 |
| | [0.426] | [0.283] | | [0.190] | [0.032] | [0.004] | [0.001] | [–3.278] |
| **M3** | **0.070** | 2.127 | 3.141 | 1 | 1.171 | 4.579 | 1.368 | –0.009 |
| | [0.966] | [0.345] | [0.208] | | [0.557] | [0.101] | [0.505] | [–2.864] |
| **FER** | **1.186** | 5.949 | 0.006 | 7.856 | 1 | 3.274 | 1.036 | –0.033 |
| | [0.553] | [0.051] | [0.997] | [0.020] | | [0.195] | [0.596] | [–3.1667] |
| **OP** | **0.336** | 0.385 | 0.953 | 0.486 | 9.268 | 1 | 3.645 | 0.000 |
| | [0.845] | [0.825] | [0.621] | [0.784] | [0.010] | | [0.162] | [–0.016] |
| **CI** | **0.012** | 0.231 | 1.742 | 0.183 | 4.828 | 11.353 | 1 | 0.001 |
| | [0.994] | [0.891] | [0.418] | [0.912] | [0.089] | [0.003] | | [ 0.1258] |

## EXHIBIT 8

**Multivariate Causality Tests among the NAV of Islamic Mixed UTFs and Macroeconomic Variables**

| | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | X2 Statistic of Lagged 1st Difference Term [P-Value] | | | | | | | |
| **Dependent Variables** | **NAV-MIXED** | **IPI** | **TBR** | **M3** | **FER** | **OP** | **CI** | **ECT** |
| **NAV-MIXED** | **1** | **9.878** | **7.436** | **7.513** | **3.779** | **11.426** | **7.985** | **–0.416** |
| | | [0.627] | [0.828] | [0.822] | [0.987] | [0.493] | [0.786] | [–1.0507] |
| **IPI** | **10.034** | 1 | 15.751 | 14.798 | 16.800 | 16.499 | 5.349 | 2.223 |
| | [0.613] | | [0.203] | [0.253] | [0.157] | [0.169] | [0.945] | [ 1.964] |
| **TBR** | **35.693** | 50.000 | 1 | 66.686 | 68.304 | 38.679 | 36.357 | –0.661 |
| | [0.000] | [0.000] | | [0.000] | [0.000] | [0.000] | [0.000] | [–2.878] |
| **M3** | **10.302** | 8.280 | 9.189 | 1 | 7.211 | 8.820 | 9.331 | –0.015 |
| | [0.590] | [0.763] | [0.687] | | [0.843] | [0.718] | [0.674] | [–0.2834] |
| **FER** | **18.410** | 23.239 | 13.662 | 33.271 | 1 | 16.534 | 19.952 | 0.065 |
| | [0.104] | [0.026] | [0.323] | [0.001] | | [0.168] | [0.068] | [ 0.745] |
| **OP** | **10.402** | 20.786 | 26.170 | 11.608 | 17.472 | 1 | 11.184 | –0.025 |
| | [0.581] | [0.054] | [0.010] | [0.478] | [0.133] | | [0.513] | [–0.095] |
| **CI** | **14.374** | 14.201 | 10.081 | 8.148 | 12.628 | 10.996 | 1 | –0.370 |
| | [0.277] | [0.288] | [0.609] | [0.773] | [0.397] | [0.529] | | [–1.589] |

indicators (i.e., IPI, TBR, and OP) in Malaysia's UTF markets. This may enable the fund managers or investors to work out a profitable strategy for trading or making investment decisions. Additionally, the first column results in Exhibit 6 show that NAV of the Balance UTFs plays a significant role in predicting the behavior of TBR, M3, OP, and CI at significance levels of 1%, 5%, 5%, and 1%, respectively.

The results of the VECM causality tests between selected macroeconomic variables and the NAV of

## EXHIBIT 9

**Multivariate Causality Tests among the NAV of Islamic Money Market UTFs and Macroeconomic Variables**

| | Independent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | X2 Statistic of Lagged 1st Difference Term [P-Value] | | | | | | | |
| **Dependent Variables** | **NAV-MONEY MARKET** | **IPI** | **TBR** | **M3** | **FER** | **OP** | **CI** | **ECT** |
| **NAV-MONEY MARKET** | **1** | **9.078** | **3.605** | **12.825** | **10.019** | **15.628** | **9.458** | **–0.002** |
| | | [0.525] | [0.963] | [0.234] | [0.439] | [0.111] | [0.489] | [–0.4209] |
| **IPI** | **13.018** | 1 | 41.530 | 20.052 | 29.804 | 23.302 | 20.273 | –1.153 |
| | [0.223] | | [0.000] | [0.029] | [0.001] | [0.010] | [0.027] | [–5.112] |
| **TBR** | **14.448** | 21.161 | 1 | 34.915 | 20.219 | 9.413 | 23.267 | –0.378 |
| | [0.154] | [0.020] | | [0.000] | [0.027] | [0.493] | [0.010] | [–3.897] |
| **M3** | **34.240** | 42.024 | 22.980 | 1 | 23.194 | 16.560 | 10.297 | 0.063 |
| | [0.000] | [0.000] | [0.011] | | [0.010] | [0.085] | [0.415] | [ 6.141] |
| **FER** | **2.862** | 9.376 | 7.936 | 14.752 | 1 | 3.946 | 8.905 | –0.070 |
| | [0.985] | [0.497] | [0.635] | [0.141] | | [0.950] | [0.541] | [–1.189] |
| **OP** | **3.286** | 4.205 | 8.012 | 4.195 | 11.706 | 1 | 7.104 | –0.001 |
| | [0.974] | [0.938] | [0.628] | [0.938] | [0.305] | | [0.716] | [–0.036] |
| **CI** | **4.913** | 8.487 | 6.071 | 7.356 | 12.772 | 8.032 | 1 | 0.004 |
| | [0.897] | [0.581] | [0.809] | [0.691] | [0.237] | [0.626] | | [ 1.027] |

Islamic Fixed funds are provided in Exhibit 7. There are some cause and effect relationships among the chosen variables under consideration. First, there is a unidirectional significant causal effect of IPI on the fluctuating of NAV of Islamic Fixed UTFs at a significance level of 5%. This suggests that the Islamic Fixed funds market is an informationally inefficient market with respect to the IPI index, since the funds' unit price behaviors can be predicted using the information available on the IPI index. These findings suggest that the fixed fund market in Malaysia is not an efficient market for short-term investment, where this inefficiency statue presented arbitrage opportunities for investors.

However, the Islamic fixed fund shows informational efficiency regarding other macroeconomic variables, such as TBR, M3, FER, OP, and CI. Further, the results in the first column of Exhibit 7 indicate the NAV of Islamic Fixed UTFs does not have any causal effect on the macroeconomic indicators in the Malaysian economy, which means that the Fixed Funds market does not have good predictors to draw the macroeconomic policy in Malaysia within a short time frame. This implies that the fixed fund market cannot be used as a leading indicator for future growth in the Malaysian economy.

Exhibit 8 reports the results of the Engle and Granger Causality Test between the selected macroeconomic variables and the NAV of Mixed UTFs. The results showed that none of the macroeconomic variables Granger cause changes in the NAV of Islamic Mixed UTFs in the short term. This suggests that the mixed UTFs market in Malaysia represented an information efficient market. Thus, there is no chance for speculative trading practices in the mixed UTF market to bet the market and attain up-normal profit in the short-run investment. This is due to the fact that the changes in the funds' unit price behaviors are reflected in the availability of new information pertaining to the funds' market. Rational investors always look to invest their money in an efficient market. This result suggests that public investors are encouraged to shift their saving investments into the mixed UTF market to ensure a suitable and sustainable return compared to other inefficient funds markets or free risk investment.

On the other hand, the findings reported in the first column in Exhibit 8 reveal that reverse Granger causality was evident in the short run, where the NAV of mixed UTFs causes changes in the TBR at the 1% level of significance. This indicates that the NAV of Islamic mixed UTFs is a predictor for changes in TBR in the

## EXHIBIT 10

**Multivariate Causality Tests among the NAV of Islamic Feeder UTFs and Macroeconomic Variables**

| Dependent Variables | Independent Variables: X2 Statistic of Lagged 1st Difference Term [P-Value] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | NAV-FEEDER | IPI | TBR | M3 | FER | OP | CI | ECT |
| **NAV-FEEDER** | 1 | **11.227** | **12.541** | **19.550** | **5.379** | **7.293** | **11.688** | **0.071** |
| | | [0.261] | [0.185] | [0.021] | [0.800] | [0.607] | [0.232] | [ 1.506] |
| **IPI** | **6.730** | 1 | 16.367 | 5.936 | 6.053 | 10.129 | 2.115 | –0.265 |
| | [0.665] | | [0.060] | [0.746] | [0.735] | [0.340] | [0.990] | [–1.143] |
| **TBR** | **20.406** | 28.696 | 1 | 13.531 | 51.111 | 22.085 | 29.384 | –0.110 |
| | [0.016] | [0.001] | | [0.140] | [0.000] | [0.009] | [0.001] | [–5.072] |
| **M3** | **3.587** | 6.610 | 4.467 | 1 | 4.644 | 6.149 | 3.085 | –0.013 |
| | [0.936] | [0.678] | [0.878] | | [0.864] | [0.725] | [0.961] | [–0.942] |
| **FER** | **17.004** | 18.873 | 11.517 | 22.780 | 1 | 12.753 | 8.680 | 0.070 |
| | [0.049] | [0.026] | [0.242] | [0.007] | | [0.174] | [0.467] | [ 0.794] |
| **OP** | **21.913** | 1.420 | 3.755 | 3.508 | 7.499 | 1 | 5.546 | –0.046 |
| | [0.009] | [0.998] | [0.927] | [0.941] | [0.585] | | [0.784] | [–0.452] |
| **CI** | **18.675** | 2.791 | 4.916 | 5.950 | 7.097 | 5.228 | 1 | –0.031 |
| | [0.028] | [0.972] | [0.842] | [0.745] | [0.627] | [0.814] | | [–0.466] |

Malaysian capital market in the short run, but it does not show any Granger causal effect on the other macroeconomic indicators, such as IPI, M3, FER, OP, and CI.

Exhibit 9 displays the causal relationship between the chosen macroeconomic variables and NAV of Islamic Money Market UTFs in Malaysia. The major findings in the first row reveal that none of the macroeconomic variables (IPI, TBR, M3, FER, OP, and CI) has a Granger causal effect on the changing of the NAV of Islamic Money Market UTFs in Malaysia. This means that the Islamic Money Market UTF market in Malaysia is a weak efficient market, and the funds' unit price behavior follows the random walk theory. In other words, the future funds NAV cannot be predicted using the available information on the macroeconomic indicators in the Malaysian capital market within short-run investment for speculative practices. These findings suggest that short-run investors are encouraged to invest their wealth in the Money Market of UTFs to attain suitable returns within a short period of investment.

On the other hand, the results reported in the first column of Exhibit 9 show that there is a unidirectional causal effect from the NAV of Islamic Money Market UTFs to the changes in money supply at the 1% level of significance. This result is not surprising, since the main function of Money Market UTFs is to control the money supply and its demand in economic circulation, as well as to offer investors a chance to invest in low-risk assets that provide high liquidity for short-term investments. This result is consistent with Kydland and Prescott [1982] and Long and Plosser [1983], who found that in real-business-cycle models, money is related to output, because it reacts to the same real shocks to which output responds. This implies a unidirectional causality between output growth and money growth, running from output to money supply (Majid and Zulkhibri [2007]).

Exhibit 10 reports the multivariate causality rests between selected macroeconomic variables and the NAV of Islamic Feeder UTFs in Malaysia. The main findings indicate that the NAV of Islamic Feeder UTFs exhibited predictable behavior in the short-term investment. This is due to the fact that a unidirectional causal relationship exists between the M3 variable and the NAV of Islamic Feeder UTFs, running from Money Supply to Funds NAV at a 5% level of significance. This finding suggests that the Islamic Feeder Funds violated the Efficient Market Hypothesis with respect to the macroeconomic variable of the M3. However, the Islamic Feeder UTFs show informational efficiency corresponding to the others macroeconomic variables such as are IPI, TBR, FER, OP, and CI.

## EXHIBIT 11

**Pairwise Granger Causality Tests Between NPE and All Islamic Funds' NAV**

| Lags | Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|---|
| 12 | NPE does not Granger Cause NAV of EQUITY | 105 | 0.627 | 0.813 |
| | NAV of EQUITY does not Granger Cause NPE | | 1.509 | 0.138 |
| 1 | NPE does not Granger Cause NAV of BOND | 116 | 5.658 | 0.019** |
| | NAV of BOND does not Granger Cause NPE | | 0.058 | 0.810 |
| 12 | NPE does not Granger Cause NAV of BALANCE | 105 | 1.185 | 0.308 |
| | NAV of BALANCE does not Granger Cause NPE | | 1.730 | 0.076* |
| 10 | NPE does not Granger Cause NAV of FIXED | 107 | 2.553 | 0.010*** |
| | NAV of FIXED does not Granger Cause NPE | | 0.137 | 0.999 |
| 11 | NPE does not Granger Cause NAV of MIXED | 106 | 1.956 | 0.044** |
| | NAV of MIXED does not Granger Cause NPE | | 1.697 | 0.088 |
| 10 | NPE does not Granger Cause NAV of MONEY | 107 | 1.867 | 0.061* |
| | NAV of MONEY does not Granger Cause NPE | | 0.369 | 0.957 |
| 5 | NPE does not Granger Cause NAV of FEEDER | 112 | 1.923 | 0.097* |
| | NAV of FEEDER does not Granger Cause NPE | | 1.197 | 0.316 |

*Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.*

Nevertheless, the findings exposed in the first column of Exhibit 10 reveal that the NAV of Islamic Feeder UTFs has a unidirectional causal effect with TBR, FER, OP, and CI at a significance level of 5%, 5%, 1%, and 5%, respectively. This means the NAV of Islamic Feeder Funds serves as a predictor to draw the macroeconomic variables resulting in contributing to a country's economic growth.

### Granger [1969] Causality Tests Results

The study utilized the Granger [1969] causality test to examine the cause-and-effect relationships between dummy variables NPE and 2007/2008 Global FC with the all Islamic Funds NAV, since dummy variables would not be expected to share a long-run causal relationship in the Multivariate VECM causality system.

Exhibits 11 and 12 report the results of the Granger causality test between the NAV of all Islamic UTFs (Equity, Bond, Balance, Fixed, Mixed, Money Market and Feeder Funds) and the chosen macroeconomic variables, which are NPE and FC. In particular, Exhibit 11 indicates that NPE has a Granger causal effect on the NAV of Islamic Fixed funds at a 1% level of significance, Bond and Mixed Funds at a 5% level of significance, and Money Market and Feeder Funds at a 10% level of significance. The results are perhaps due to the role of the Malaysian Government-Linked Companies (GLCs) in supporting the financial market during the period leading to the general election, in which the GLCs accounted for 36% of the market capitalization of the Malaysian stock market (Mokhtar [2005]). The support took different forms, such as investing large funds in different sectors before elections to handle the financial market prices, which may influence the perception of the country's economic performance. All these indexes build trust among the financial market participants to continue investing their funds in the local financial market. As a result, the NAV of Islamic UTFs will fluctuate in favor of the government and the market participants. On the other hand, the Granger causality test result shows that there is a reverse causal effect from the NAV of Islamic Balance Funds to the NPE variables at a 10% significance level. Exhibit 11 summarizes the Pairwise Granger Causality Tests between NPE and Islamic Funds NAV.

In addition, the results displayed in Exhibit 12 reveal that the 2007/2008 Global Financial Crisis variable has a positive Granger causal effect on the changes of NAV of all Islamic funds with two exceptions, the NAV of Fixed and of Feeder Funds. This is perhaps because Islamic funds run their portfolio investment operations according to the *Sharī`ah* principles; these prohibit dealing with interest-based products or selling debts, which were the main reasons behind the 2007–2008 Global Financial Crisis (Chapra [2008]).

## EXHIBIT 12
**Pairwise Granger Causality Tests between FC and All Islamic Funds NAV**

| Lags | Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|---|
| 2 | FC does not Granger Cause NAV of EQUITY | 115 | 6.194 | 0.003*** |
| | NAV of EQUITY does not Granger Cause FC | | 3.382 | 0.038** |
| 2 | FC does not Granger Cause NAV of BOND | 115 | 3.222 | 0.044** |
| | NAV of BOND does not Granger Cause FC | | 3.433 | 0.036** |
| 2 | FC does not Granger Cause NAV of BALANCE | 115 | 5.009 | 0.008*** |
| | NAV of BALANCE does not Granger Cause FC | | 4.569 | 0.012** |
| 12 | FC does not Granger Cause NAV of FIXED | 105 | 0.214 | 0.997 |
| | NAV of FIXED does not Granger Cause FC | | 0.059 | 1.000 |
| 1 | FC does not Granger Cause NAV of MIXED | 116 | 7.884 | 0.006*** |
| | NAV of MIXED does not Granger Cause FC | | 0.236 | 0.628 |
| 8 | FC does not Granger Cause NAV of MONEY | 109 | 2.158 | 0.038** |
| | NAV of MONEY does not Granger Cause FC | | 2.317 | 0.026** |
| 12 | FC does not Granger Cause NAV of FEEDER | 105 | 1.178 | 0.313 |
| | NAV of FEEDER does not Granger Cause FC | | 1.196 | 0.301 |

*Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.*

## EXHIBIT 13
**Diagnostic Tests Results**

| | A: Serial Correlation | B: Normally | C: Heteroscedasticity | D: Heteroscedasticity |
|---|---|---|---|---|
| | Breusch-Godfrey | Jarque-Bera Test | Breusch-Pagan-Godfrey | ARCH |
| Test Statistics | F-statistic [P-value] | F-statistic [P-value] | F-statistic [P-value] | F-statistic [P-value] |
| Equity Funds | F- (12,21) = 1.414081 [0.2350] | 1.548023 [0.461159] | F-F (79,26) = 0.844021 [0.722] | F- (1,103) = 1.777064 [0.1855] |
| Bond Funds | F- (12,13) = 0.614809 [0.7961] | 3.920378 [0.140832] | F-F (86,18) = 0.764775 [0.7963] | F- (1,102) = 0.297109 [0.5869] |
| Balance Funds | F- (12,29) = 1.083564 [0.4084] | 5.019923 [0.101271] | F-F (72,34) = 0.691271 [0.9046] | F- (9,88) = 1.06396 [0.3973] |
| Fixed Funds | F- (2,95) = 0.555565 [0.2163] | 8.7723 [0.095828] | F-F (23,90) = 1.04809 [0.4178] | F- (1,111) = 0.023229 [0.8791] |
| Mixed Funds | F- (12,5) = 1.556112 [0.8126] | 0.498635 [0.779333] | F-F (93,10) = 1.376922 [0.3021] | F- (1,101) = 0.673384 [0.4138] |
| Money Funds | F- (2,31) = 0.457272 [0.6372] | 8.687348 [0.812989] | F-F (79,26) = 1.025259 [0.4906] | F- (1,103) = 0.041863 [0.8383] |
| Feeder Funds | F- (12,29) = 1.39165 [0.2255] | 2.417438 [0.298579] | F-F (72,34) = 1.298176 [0.2026] | F- (1,104) = 1.757717 [0.1878] |

Thus, the fund managers' following the *Sharī`ah* principles had the beneficial effect of steering the Islamic funds away from highly leveraged companies (Salah [2010]). In particular, there is a bidirectional causal relationship between the FC and NAV of Islamic Equity UTFs at a 5% level of significance. Similarly, the 2007/2008 Global Financial Crisis and the NAV of Islamic Bond UTFs have bidirectional causal association at a 5% level of significance.

Further, a bidirectional causal association existed between the FC and NAV of balance funds at the 1% and 5% levels of significance. There is the unidirectional causal effect of FC on the NAV of Islamic Mixed UTFs at the 1% level of significance. Finally, a bidirectional

Granger causal relationship existed between the FC and NAV of Money Market UTFs at the 5% level of significance. This result is consistent with the results of Abdullah et al. [2007] and Dewi and Ferdian [2008], who found that the Islamic UTFs outperformed the market during the global financial crisis.

### Diagnostic Tests

The findings of the diagnostic tests are reported in Exhibit 13. All seven models in our study passed all the diagnostic tests against serial correlation, non-normal errors, and heteroscedasticity problem. This is because the null hypothesis of all tests could not be rejected at the 5% level of significance, since the P-values of all tests are more than the selected significance levels. In other words, residuals from the estimated VECM models are white noise. This means that the error term for each estimated VECM model is free of serial correlation, heteroskedasticity, or autoregressive conditional heteroscedasticity, and the error term is normally distributed.

## CONCLUSION

This study applied the Engle and Granger [1987] causality test and the Granger [1969] test to examine the cause and effect relationship between the chosen macroeconomic variables and the NAV of all the Islamic UTFs in Malaysia. The findings reveal that all the UTFs' markets are informationally inefficient with three exceptions: the Bond, Mixed, and Money Market Funds. Thus, unit-holders are advised to invest in these three markets for short-term investment, since they show the forms of weak efficient markets during the study period.

Meanwhile, the Equity, Balance, Fixed, and Feeder Funds market were informationally inefficient markets. In other words, the weak efficient market hypothesis does not hold with respect to the Equity, Balance, Fixed, and Feeder Funds market, suggesting that investors are not advised to invest short-term investment money in these funds.

The results also indicate that TBR is an important macroeconomic indicator in explaining the changings of the NAV of Islamic Equity and Balance UTFs, while the M3 is a good predictor of changes in the NAV of Islamic Equity and Feeder UTFs. We also found that the IPI index served as a good predictor of the changes in NAV of Islamic Balance and Fixed Funds for short-run investments in Malaysia. Further, we found that the fluctuation of NAV of Islamic Balance UTFs is predicted using the available information of the OP index for short-term investment in Malaysia. Also, the findings of dummy variables of NPE and FC have shown a Granger causal relationship with most Islamic UTF markets in Malaysia. This indicates that investors must consider the effects of these variables when making investment decisions, especially during national political elections or in times of economic crisis.

One limitation that should not be ignored is that this study focuses only on Islamic UTFs in Malaysia, and so its results should not be used to generalize the Malaysian unit trust market as a whole. However, its expansion to include other types of listed conventional UTFs will go a long way toward determining the degree of market price efficiency in the Malaysian UTF market as a whole. In addition, for further research, the present study can be expanded to investigate the legal and regulatory framework as well as the level of the current transparency system that may improve the efficiency of the UTF market, resulting in much faster price discovery.

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