Determinants of Macroeconomic Variables on Islamic Stock Index: Evidence from Frontier Market

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Abstract **- This paper provides useful insights on the determinants of macroeconomic variables on Islamic stock index evidence from frontier market. The aims of this study is to examine the effect of macroeconomic variables namely gross domestic product (GDP), inflation (consumer price index), exchange rate (USD exchange rate), oil price (crude palm oil) and money supply (M2) on frontier market Islamic index (FMII). This study employs Fixed Effect (FE) model of 17 countries listed under FMII. The study cover a ten (10) years period from 2008 until 2017. The study have shown significant relationship between inflation, money supply and exchange rate with FMII and managed to reject null hypotheses for the three variables. Inflation and exchange rate is negatively related with FMII while money supply, gross domestic product and oil price is positively related to FMII. However, the study fails to find any significant relationship between gross domestic product and oil price with FMII. The findings of this study will provide better understanding on the frontier market and helps to improve their performance. Therefore, it can encourage countries in frontier market to be able to compete and achieve similar advancement as countries in developed and emerging market did.**

Keywords **-** *Macroeconomic Variables, Frontier Market Islamic Index, Growth Domestic Product, Crude Palm Oil, Consumer Price Index, Money Supply, Foreign Exchange Rate*

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I. Introduction

Stock either conventional or Islamic is one of the most sensitive assets to economic condition and performance. Any aggressive change in stock prices can have negative implications for an economy, which makes the causal relationship between macroeconomic variables and stock returns (Ozbay, 2009). This paper explores the possible factors of macroeconomic variables on the Islamic index by focusing on countries in the frontier market. Islamic stock market is considered to have a stable structure as compared to the conventional stock market as they are restricted from any transaction prohibited in Islam such as Riba (interest), Maysir (gambling) and Gharar (uncertainty). Although many studies have been conducted related to issues on the conventional stock index there are still limited studies on Islamic stock index, especially in a frontier market.

The frontier market can be defined as a group of developing countries that show characteristics alike to emerging markets. However, the market is in the earlier stages of macroeconomic and capital markets development. Thus, these markets are excluded from the major emerging markets and global equity indices. Many developed markets and emerging markets started their market capitalization similar to the frontier market. This is due to a worthy investment opportunity provided by the frontier market as evidence by Morgan Stanley Capital International (MSCI) and Standard & Poor's (S&P). Both MSCI and S&P facilitated the construction of their benchmark indices in frontier market. MSCI classified 17 countries which are listed to have Islamic stock indexes as shown in Table 1.

Table 1. 17 Countries Islamic Index Listed in Frontier Market

CONTINUANT	**COUNTRY**		
America	Argentina		
Middle East	Bahrain	Lebanon	Oman
	Jordan	Kuwait	
Asia	Bangladesh	Sri Lanka	Vietnam
Africa	Kenya	Morocco	Nigeria
Europe	Croatia	Romania	Serbia
	Kazakhstan	Ukraine	

Source: Morgan Stanley Capital International (MSCI)

However, country-specific data are used in this study to determine the relationship between macroeconomic factors and frontier market Islamic index (FMII) because it is acknowledged that the determinants of frontier market will provide high risk and high return. Thus, country-specific data is used in this study to determine the relationship between macroeconomic factors and the frontier market Islamic index (FMII). Macroeconomic factors chosen are inflation rate (CPI), oil price (CPO), exchange rate (USD exchange rate), gross domestic product (GDP) and money supply (M2).

II. Literature Review

Inflation Rate

According to McConnell et al. (2012) inflation can be defined as increase in the cost of living as the price of goods and services rise in a country and any unexpected rise of inflation may also directly affect the performance of stock market index and expected to have negative relationship. This also supported by Malkiel (1982) which indicated that the reason for negative relationship is due to an increase in inflation rate may squeeze profit margins for a special groups of companies and contributed to a decrease in stock prices and index. However, the relationship between inflation and stock market can be either positively or negatively related (Talla, 2013). This is due to the direction of the relationship between stock market and inflation that can be unexpected and expected depends on how investor reacts.

Oil Price

Oil price is used in this study since the price will determining the performance of FMII. For example, Sadorsky (2001) stated that any increase in oil price will increase the market return of Canadian stock more than decreases in oil prices. Also supported by Park and Ratti (2008) that showed increasing in oil price have a significant effect on stock returns in the same month or within one month. However, Cong et al. (2008) stated that oil price volatility has no statistically significant effect on the real stock returns of most Chinese stock market indices. While a different study conducted by Nandha and Faff (2008) revealed that when there is an increase in oil price, it will cause the result to have an adverse relationship on stock return in market indices.

Exchange Rate

According to Geske and Roll (1983) exchange rates is the most influential in determining stock prices because any drop of domestic currency can cause export volume to rise and at the same times can increase the demand for export of goods. This phenomena will creates a higher cash flow and causes stock price to increase. Thus, Vejzagic and Zarafat (2013) found that changes in exchange rates would result a negative significant implication toward price adjustment in stock market. However, Abdalla and Murinde (1997) stated that

unidirectional relationship found between exchange rate and stock prices in India, Korea and Pakistan except for Philipines that have directional relationship.

Gross Domestic Product

Frontier market is demonstrating with low gross domestic product (GDP) among other classification of market. Hence, any increase in GDP of a country will improve the performance of a particular country. Raising GDP in frontier market will show the ability to open new opportunity for domestic business to go worldwide. Kim (2003) and Ewing and Thompson (2007) stated that there is a positive relationship between GDP proxies by industrial production with stock price. There also have a positive linkage between industrial productions with the performance of stock market (Geske and Roll, 1983).

Money Supply

Monetary aggregates is being used to measure money stock of any nations where M1 is known to be monetary aggregate and checkable deposited while M2 is wider than M1 as it includes all the components of M1 and lastly M3 comprises sum of M2 and large time deposits (Walter, 1989). Sirucek (2012) used M2 as a proxy of money supply and stated that there is a strong relationship between money supply (M2) and stock price. It is predictable that increase in money supply will affect the performance of frontier market Islamic index in a positive mode.

III. Data and Methodology

This paper aims to determine the relationship between macroeconomic variables and the movement of the frontier market Islamic index (FMII). The sample consists of 17 countries listed under frontier market Islamic index for 10 years period from 2008 until 2017. The unbalanced panel data comprises of 170 observations of FMII countries. The model includes the five variables chosen inflation rate, oil price, exchange rate, gross domestic product and money supply. All data were obtained from Thomson Reuters Eikon database, World Bank, and IMF website. Table 2 shows a list of dependent and independent variables together with their proxy and sources of data used in this study.

Table 2. List of Variables

Variables	Proxy	Sources of Data
Dependent Variable:		
Stock Index	Frontier Market Islamic Index (FMII)	Morgan Stanley Capital International (MSCI)
Independent Variables:		
Inflation Rate	Consumer Price Index (CPI)	Thomson Reuters Eikon
Oil Price	Crude Palm Oil (CPO)	International Monetary Fund (IMF)
Exchange Rate	United State Dollar (USD)	World Bank
Gross Domestic Product	Final Value Good and Services Produced of Country	World Bank
Money Supply	M2	Thomson Reuters Eikon

This study used Panel Specification Test, F-Test, Breusch and Pagan Lagrange Multiplier test (BPLM), Diagnostic Test, Multicollinearity test, serial corellation and Heteroscedasticity test by using Statistic/Data Analysis (STATA) software application version 14. The study employs a Fixed Effect (FE) model as the best fit model. The panel data estimation with interaction effect presented in Eq. (1).

$$FMII_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 CPI_{it} + \beta_3 CPO_{it} + \beta_4 M2_{it} + \beta_4 EXR_{it} + \varepsilon_{it} \quad (1)$$

Where, frontier market Islamic index (FMII) is the dependent variable while GDP, CPI, CPO, M2 and EXR representing the gross domestic product, consumer price index (proxy for inflation), crude palm oil, money supply and exchange rate acts as independent variables. The main aim of this study is to determine the

relationship between macroeconomic variables with the movement of Frontier Market Islamic Index. Following hypothesis are developed in achieving the objectives of the study.

H1: There is a significant relationship between inflation rate and FMII
H2: There is a significant relationship between oil price and FMII
H3: There is a significant relationship between exchange rate and FMII
H4: There is a significant relationship between gross domestic product and FMII
H5: There is a significant relationship between money supply and FMII

IV. Findings dan Analysis

Panel Specification Test

Fixed Effect (FE) Model, Random Effect (RE) Model and Pooled Ordinary Lest Squares (POLS) Model are three different model determined in static panel approach. Initially, F-Test and Breusch and Pagan Lagrangian Multiplier (BP-LM) test are used to identify between FE or RE model. Then, F-test is used to measure whether appropriate model is POLS and FE model or POLS and RE model. Finally, the Hausman test is conducted to test the final result between RE or FE model. The result for panel specification test is shown in Table 3.

Table 3. Panel Specification Tests

Panel Specification Tests			
F-Test	BP-LM Test	Hausman Test	Appropriate Model
0.0000	0.0000	0.0239	Fixed Effect

The decision rule for panel specification tests shown that F-test is 0.0000 which is less than 0.05. Thus, FE model is appropriate to choose but under BP-LM test result shown also less than 0.05 which at 0.0000 and RE model is chosen. To determine between FE or RE model, Hausman test must be done and the result for the test is 0.0239 which is less than 0.05. Hence, FE model is suggested as the most appropriate model.

Diagnostic Test

The objective of diagnostic tests is to identify the existence of severe multicollinearity, heteroskedasticity and serial correlation problem.

Table 4. Multicollinearity Test (Variance Inflation Factors – VIF)

Model		
Variables	**VIF**	**1/VIF**
EXR	8.48	0.11
M2	8.38	0.11
GDP	1.07	0.93
CPI	1.03	0.96
CPO	1.01	0.98
Mean VIF	4	

Table 4 shows the multicollinearity test of the model. Based on the model, there is no multicollinearity problem since VIF value is less than 10. It means that these variables are not highly correlated due to VIF amount is 4.

Table 5. Heteroskedasticity Test

Heteroskedasticity Test	
Chi2 (17)	Prob > chi2
274.52	0.0000

Heteroskedasticity test is important if FE model is chosen under panel specification test. The result in table 5 shows that there is a heteroskedasticity problem in this model because p-value is less than 0.05. Thus, this means variance is not constant.

Table 6. Serial Correlation Test

Serial Correlation	
F(1,17)	Prob > F
64.664	0.0000

Table 6 indicates the result for serial correlation test to check the existence of serial correlation problem. The rule of this test shows that there is a serial correlation problem if the p-value is less than 0.05. Thus, this model tested have serial correlation problem.

Multiple Linear Regressions

Multiple linear regression is used to foresee the value of a dependent variable based on the value of two or more independent variables. Multiple regression also allow determining the overall fit of the model and the relative contribution of each of the independent variables to the total variance explained. The result for multiple regression under Fixed Effects (FE) model estimation is shown in Table 7.

Table 7. Fixed Effects (FE) Model Estimation for FMII

	Coefficient	**Relationship**
GDP	0.0010951	Positive Insignificant
	(1.08)	
CPI	-0.00002010*	Negative Significant
	(-1.92)	
M2	0.00004431***	Positive Significant
	(3.17)	
CPO	0.1286283	Positive Insignificant
	(0.77)	
EXR	-0.0138155***	Negative Significant
	(_3.13)	
Constant	82.77271***	
	(3.24)	
N	170	
R-square	0.5548	
Adjusted R-square	0.4916	
R-square (within)	0.1025	
R-square (between)	0.1283	
R-square (overall)	0.0190	

*Notes: Number in parenthesis represents the p-value for the coefficient ***p-value is significant at 1%, **p-value is significant at 5% and * p-value is significant at 10%*

Table 7 presents the fixed effects model estimation for frontier market Islamic index (FMII). The results can be summarized as in Eq. (2).

$$FMII_{it} = 82.77271 + 0.0010951GDP_{it} - 0.00002010CPI_{it} + 0.1286283CPO_{it} + 0.00004431M2_{it} - 0.0138155EXRit \quad (2)$$

The Fixed Effect (FE) model estimation reveals that inflation is statistically significant at 10 percent level while both money supply and exchange rate are significant at 1 percent level. The study managed to reject the null hypotheses for the three variables which are inflation, money supply, and exchange rate and alternate hypotheses are therefore accepted. Inflation and exchange rate shows a negative relationship with FMII. Other variables remaining constant. The increase in inflation and exchange rate cause to decrease in FMII while increase in gross domestic product, money supply and oil prices leads to better performance in frontier market Islamic index. However, this study fails to reject the null hypotheses for gross domestic product (GDP) and oil

price (CPO) for FMII. Hence, this study is unable to find any significant relationships between GDP and oil price with frontier market Islamic index.

V. Conclusion

This study aims to identify and investigate the determinants of macroeconomic variables towards frontier market Islamic index (FMII). The objectives are to investigate the relationship between oil prices (CPO), inflation (CPI), gross domestic product (GDP), money supply (M2) and exchange rate with frontier market Islamic index (FMII). The finding reveals that there is a negative relationship between inflation and FMII (Golam Mohammad, 2007; Su Dinh Thanh, 2016; Nalin, 2014). It is common that an increase in inflation will leads to volatility in stock market and makes investors to have no incentives to participate in stock market. Exchange rate also shows a negative relationship with FMII (Gay, 2016; Sezgin, 2008). Depreciation in exchange rate may depress the performance of stock market and investors' loss their confidence thus investing in frontier market may look unattractive to them. There are positive significant relationship between money supply and FMII (Tuwajri, 2014; Alraimony, 2013; Sirucek, 2012). As expected any increase in money supply will make the frontier market index to reacts more actively in a positive direction.

This study has achieved its objectives to identify the relationship of macroeconomic variables with the movement of Islamic index in frontier market. Even though the frontier market is known as high risk market due to less participation of investors whose willing to take opportunity to enter into the market but its believe that more research should be conducted in this. This will provide better understanding on the market and help to improve the market performance and to be able to compete and achieve similar advancement and development as countries in developed and emerging market.

It is suggested for future studies to extend the investigation of this topic by incorporating conventional stock index and makes some comparison between the performance of conventional and Islamic index. Besides that, variables such as interest rate, foreign direct investment and return on investment can be added to provide better understanding on the possible factors that related with the frontier market.

References

Abdalla, I.S.A. & Murinde, V. (1997). Exchange Rate and Stock Price Interaction in Emerging Financial Markets: Evidence on India, Korea, Pakistan and the Philippines. *Applied Financial Economics Journal*, 7(1): 25-35.

Alraimony, H. M. N. (2013). The Macroeconomic Determinants of Stock Market Development in Jordan.

Cong, R.G., Wei, Y.M., Jiao, J.L., & Fan, Y. (2008). Relationships between Oil Price Shocks and Stock Market: An Empirical Analysis from China. *Energy Policy Journal*, 36(9), 3544-3553.

Ewing, B. T., & Thompson, M. A. (2007). Dynamic Cyclical Co-Movements of Oil Prices with Industrial Production, Consumer Prices, Unemployment and Stock Prices. *Energy Policy Journal,* 35(11), 5535-5540.

Gay, R. D. (2016). Effect of Macroeconomic Variables on Stock Market Returns for Four Emerging Economies: Brazil, Russia, Indian and China.

Geske, R. & Roll, R. (1983). The Fiscal and Monetary Linkage between Stock Returns and Inflation. *Journal of Finance*, 38, 1-33.

Golam Mohammad, W. U. (2017). Effect of Macroeconomic Variables on Stock Market. *Asian Economic and Financial Review*, 7(8), 770-779.

Kim, K. (2003). Dollar Exchange Rate and Stock Price: Evidence from Multivariate Cointegration and Error Correction Model. *Review of Financial Economics, 12*, 301-313.

Malkiel, B. G. (1982). Risk and Return: A New Look, *National Bureau of Economic Research,* Cambridge, Mass., USA.

Nalin, D. S. (2014). The Macroeconomic Determinants of Stock Market Development in Selected European Countries: Dynamic Panel Data Analysis.

Nandha, M., & Faff, R. (2008). Does Oil Move Equity Prices? A Global View. *Energy Economics Journal*, 30(3), 986-997.

Ozbay, E. (2009). The Relationship between Stock Returns and Macroeconomic Factors: Evidence for Turkey. Devon, University of Exeter, Financial Analysis and Fund Management, Yayınlanmamış Yüksek Lisans Tezi, Master of Science Thesis.

Park, J., & Ratti, R. A. (2008). Oil Price Shocks and Stock Markets in the U.S. and 13 European Countries. *Energy Economics Journal*, 30(5), 2587-2608.

Ratti, M. A. (2009). *Oil Prices and Stock Markets*. Retrieved from International Monetary Fund website: http://www.imf.org/external/pubs/ft/weo/2010/01/weodata/download.aspx

Sadorsky, P. (2001). Risk Factors in Stock Returns of Canadian Oil and Gas Companies. *Energy Economics Journal*, 23(1), 17-28.

Sadorsky, P. (2008). Assessing the Impact of Oil Prices on Firms of Different Sizes: Its Tough being in the Middle. *Energy Policy Journal,* 36(10), 3854-3861.

Sezgin Acikalin, R. A. (2008). Relationship between Stock Markets and Macroeconomic Variables: An Empirical Analysis of the Istanbul Stock Exchange. *Investment Management and Financial Innovations Journal,* 5(1), 8-16

Sirucek, M. (2012). Macroeconomic Variables and Stock Market: US Review Forthcoming. *International Journal of Computer Science and Management Studies*.

Su Dinh Thanh, B. T. (2016). Determinants of Stock Market Development: The Case of Developing Countries and Vietnam.

Talla, J. T. (2013). Impact of Macroeconomic Variables on the Stock Market Prices of the Stockholm Stock Exchange (OMXS30). Jonkoping International Business School. Master of Science Thesis.

Tuwajri, L. A. (2014). Macroeconomic Forces and Stock Prices: Some Empirical Evidence from Saudi Arabia.

Vejzagic, M., & Zarafat, H. (2013). Relationship between Macroeconomic Variables and Stock Market Index: Cointegration evidence from FTSE Bursa Malaysia Hijrah Shariah Index. *Asian Journal of Management Sciences & Education, 2*(4), 94-108.

Walter, J. R. (1989). Monetary Aggregates: A User's Guide. *FRB Richmond Economic Review*, 75(1), 20-28.