

# The Relationship between Macroeconomic Variables and FTSE Bursa Malaysia Kuala Lumpur Composite Index

Nur Ainina Awang, Siti Aida Sheikh Hussin and Zalina Zahid

Department of Statistics and Decision Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia;  
aininaawang92@gmail.com, sitiaida@tmsk.uitm.edu.my, zalina@tmsk.uitm.edu.my

## Abstract

This study aims to examine the relationship between top ten constituents in FTSE Bursa Malaysia Kuala Lumpur Composite Index (FBM KLCI) with a set of macroeconomic variables and industrial production using Johansen co-integration test. This study also analyzes the respond of each macroeconomic variable on the stock indices using Impulse Response Function (IRF) and forecast error decomposition. The findings show a long-run relationship between each stock index in FBM KLCI with macroeconomic variables and that the shocks of stock indices on its own shock contribute the largest portion followed by money supply. In addition, we apply GARCH (1, 1) model to determine which macroeconomic affects volatility of stock indices. The result shows that macroeconomic volatility does not affect much on Genting and IHH Healthcare, but Public Bank Bhd, Tenaga Nasional, Malayan Banking, CIMB Group Holdings, Axiata Group Bhd, Petronas Chemicals Group Bhd are affected by the volatility of macroeconomic variables.

**Keywords:** Forecast Error Decomposition, Impulse Response Function, Johansen Co Integration Test

## 1. Introduction

Equity prices, considered as the most firmly watched prices of companies' assets, can easily fluctuate throughout trading days as they are very susceptible to changes in the stock market. Factors such as high volatility or irregular developments can cause adverse implications for the economy while uncontrolled volatility may keep the smooth working of financial market and unfavorably influence the performance of the economy<sup>7</sup>. According to<sup>10</sup>, stock market volatility rises during financial crisis and causes stock prices to plunge especially in developing markets.

Malaysian stock market under Bursa Malaysia represents the largest 30 organizations in the main market by full market capitalization which turns into the factor for the execution of the Malaysian stock market FBM KLCI.

Most of the previous researches focus on the association of various macroeconomic variables and the

Malaysian composite index, however the macroeconomic variables on stock indices may give different outcomes as compared to the broader market index. Thus, this is the motivation to perform this research where the interrelation between macroeconomic variables that are exchange rate, interest rate, inflation rate, money supply and industrial production and the stock indices in FBM KLCI. This paper also analyses the respond of each of the stock indices in FBM KLCI to each of selected macroeconomic variables and determine the volatility of macroeconomic variables that influenced volatility in the stock indices in Malaysia.

## 2. Literature Review

Many research reported contradicting results on the link between macroeconomic variables and stock market. <sup>17</sup>Applied Vector Error Correction Model (VECM) to see the repercussion of four macroeconomic variables that are consumer price index, industrial production

interest rates and inflation rates on New York stock exchange (NYSE) for the duration from March 1964 to June 2010. The outcomes show that size has a concussion on equities returns, while interest rate and inflation has an unfavorable interrelation with stock prices. This study shows that macroeconomic activities predominance the equities positively.

<sup>14</sup>Investigated the interrelationships between BSE Sensex index which is the Indian stock market indicator with a set of macroeconomic variables comprising of industrial production index, exchange rate, money supply, treasury bills rate, and wholesale price index by applying Johansen's co-integration and VECM. The results reveal that the stock prices are changing in the same direction to the amount of money supply and industrial production macroeconomic variables.

Granger causality test shows no evidence in the short-run analysis or in other words macroeconomic variables cause the equities prices only in long-run. However, there is a two directional influences that exist between equity prices and industrial production, while one directional influence between interest rates to stock prices, money supply to stock price, and stock price to inflation.

<sup>7</sup>Applied the exact model as<sup>14</sup> in order to inspect and analyses the long term dynamic interrelationship among equity prices and monetary variables (money supply, Treasury bill rates, foreign exchange rates and the consumer price index) in Pakistan. The results reveal that there is a long-term dynamic relationship between the Pakistani equity market and monetary variables and this is consistent with the results reported by<sup>14</sup>.

Similarly, <sup>1</sup>Also used multivariate Johansen co-integration test to study the character of macroeconomic variables that are inward foreign direct investment, Treasury bill rate, the consumer price index and exchange rate on equity prices development in Ghana. Their investigations revealed co-integration exist between macroeconomic variables and equity prices in Ghana in long-term relationship. Besides, the study reveals that inflation rate is certainly representative to the equity prices.

<sup>12</sup>Examined the relationship between stock indices of the Bombay Stock Exchange against industrial production, balance of trade, foreign exchange reserves, money supply and exchange rate. They found that industrial production, exchange rate, foreign exchange reserves has significantly contradict towards the sector indices of The Bombay Stock Exchange while significantly positive on money supply.

### 3. Methodology

#### 3.1 Data

The dependent variables are the top ten constituents in FBM KLCI while the independent variables chosen are interest rate, money supply, exchange rate, inflation rate, and industrial production. The monthly data of the variables were obtained from Data Stream for the period from July 2012 to December 2015.

Basically there are ten models. Model 1 represents Public Bank Bhd, Model 2 for Tenaga Nasional, Malayan Banking is represented by Model 3. Model 4, Model 5, Model 6, Model 7, Model 8, Model 9 and Model 10 represent Sime Darby Bhd, CIMB Group Holdings, Axiata Group Bhd, PETRONAS Chemicals Group Bhd, Genting, IHH Healthcare and PETRONAS Gas respectively.

#### 3.2 Analysis on the Relationship between Macroeconomic Variables and Stock Indices

We apply Johansen and Juselius co-integration test to estimate the long-run relationship among the variables, with reference to the methodology by<sup>7</sup>.

#### 3.3 Analysis on the Measures for Volatility

According to<sup>18</sup>, most of the existing studies on volatility used GARCH model as the model is capable to capture not only volatility clustering but also unconditional return distribution with heavy tails.

The conditional mean equation that adopted AR (1) is as follows:

$$y_t = \lambda_0 + \lambda_1 AR(1) + \varepsilon_t$$

$y_t$  denotes the monthly return of top constituents in FBM KLCI, AR (1) represents the pure autoregressive components. The conditional variances in stock prices is hypothesized and determine by the chosen macroeconomic variables that are money supply, exchange rate, inflation rate, interest rate, and industrial production. Therefore, the conditional variance equation applied in this study is as follow:

$$\sigma_t^2 = \varphi + \alpha_1 \varepsilon_{t-i}^2 + \beta_1 \sigma_{t-j}^2 + \omega_2 LNEX + \omega_3 LNBLR + \omega_4 LNMS + \omega_5 LNCPI + \omega_6 LNIP$$

Where  $\varphi$  denotes the constant,  $\alpha_1$  is the coefficient of the lagged squared residuals based on ARCH terms,  $\beta_1$  is the coefficient for the GARCH terms and  $\omega_i$

where  $i = 2, 3, 4, 5$  and  $6$  is the coefficient for the selected macroeconomic variables.

### 4. Findings and Discussions

Table 1 displays the results of the descriptive statistic. All the variables have positive mean return value. Based on the standard deviation values, the table shows that Tenaga Nasional (TNB) and IHH Healthcare (IHH) are more volatile compared to Public Bank BHD (PB), CIMB Group Holdings (CIMB) and Genting (GENT). The rest of sector indices show a low volatility. Besides, Table 1 also shows that all the stock indices except Sime Darby Bhd (SIME) are skewed to the left and has an excess kurtosis since they deviated from three<sup>2</sup>.

Table 2 shows the summary of co-integration test results for all models. Based on Table 2, all models show that there is a co-integration relationship between stock indices and macroeconomic variables. This demonstrates co-movement between rate of returns of Public Bank BHD (PB), Tenaga Nasional (TNB), Malayan Banking (MYB), Sime Darby Bhd (SIME), CIMB Group Holdings (CIMB), Axiata Group Bhd (AXT), PETRONAS

Chemicals Group Bhd (PETC), Genting (GENT), IHH Healthcare (IHH) and PETRONAS Gas (PETG) and macroeconomic variables in a long-run equilibrium. The results on the long run relationship in this study are consistent with most of the existing studies such as<sup>1,4,5,9,14</sup> Afzal and Hossain (2011), Ali and Akujuobi (2014).

Based on the results shown in Table 3, exchange rate (LNEX) shows a negative relationship with all stock indices in FBM KLCI except with PETRONAS Chemicals Group Bhd (Model 7) and IHH Healthcare (Model 9). The negative link between exchange rate and stock indices can be explained because the depreciation in Malaysian Ringgit (MYR) would cause more investors do not interested to invest in Malaysian market.

Meanwhile, inflation rate has a positive relationship only Public Bank BHD (Model 1), Tenaga Nasional (Model 2), CIMB Group Bhd (Model 5) and PETRONAS Gas (Model 10) in a long-run. According to<sup>1</sup>, the positive relationship between inflation and stock market implies that investors are made up for inflationary increment. The inflation rate might impact negatively on the rest of sectors indices due to the increases of cost living led to the decreases of volume stock traded<sup>1</sup>.

**Table 1.** Descriptive statistic for variables

	PB	TNB	MYB	SIME	CIMB
Mean	2.8618	2.345478	2.238172	2.214938	1.894376
Median	2.9025	2.479053	2.234306	2.240177	1.974775
Std. Dev.	0.1047	0.269040	0.058804	0.068629	0.180227
Skewness	-0.7786	-0.47611	-0.34093	-1.57242	-0.94770
Kurtosis	2.7504	1.691861	2.323912	4.613957	2.654371
Jarque-Bera	4.3530	4.581383	1.613550	21.86599	6.496033
Probability	0.1134	0.101196	0.446295	0.000018	0.038851
	AXT	PETC	GENT	IHH	PETG
Mean	1.8898	1.851590	2.216930	1.487611	3.078294
Median	1.9013	1.863290	2.249184	1.415850	3.099191
Std. Dev.	0.0560	0.074714	0.112462	0.223337	0.088638
Skewness	-0.6904	-0.98869	-1.02310	0.23151	-0.57055
Kurtosis	2.7202	3.828994	3.278168	1.772862	2.110130
Jarque-Bera	3.4737	8.045198	7.462561	3.010458	3.664421
Probability	0.1760	0.017906	0.023962	0.221966	0.160059
	LNEX	LNBLR	LNCPPI	LNMS	LNIP
Mean	1.2205	1.528999	4.694970	14.19153	4.741339
Median	1.1841	1.528228	4.699571	14.19718	4.741429
Std. Dev.	0.1079	0.020709	0.027432	0.062933	0.057481
Skewness	1.2227	0.034815	0.066093	-0.25938	-0.30363
Kurtosis	3.3883	1.823033	1.878147	1.882431	2.820619
Jarque-Bera	10.729	2.432674	2.233049	2.656629	0.701659
Probability	0.0046	0.296314	0.327416	0.264923	0.704104

<sup>14</sup>Also support this normal sign subsequent to the positive impact of larger inflation rate on the production cost, which unfavorably affect the chances and actual level of economic movement.

**Table 2.** Summary of co integration test results

Co-integration Test for	No. of lags	Trace test no. of vectors	Max eigen values	Co-integration Relationship (Yes/No)
Model 1	3	3	3	Yes
Model 2	3	4	2	Yes
Model 3	3	3	2	Yes
Model 4	3	4	4	Yes
Model 5	3	4	3	Yes
Model 6	3	4	4	Yes
Model 7	3	3	3	Yes
Model 8	3	6	2	Yes
Model 9	3	3	3	Yes
Model 10	3	5	5	Yes

Interest rate also shows a negative relationship towards all stock indices except for PETRONAS Chemicals Group Bhd (Model 7). The negative sign of connection between interest rate (LNBLR) and stock market return is not surprising because the higher the spread between the lending rate and deposit rates the higher the expense of capital which decreases returns from investment and hence growth (Jalloh, 2015). However, <sup>9</sup>stated that the link between interest rate and stock markets is direct which an increase in rate of interest will raise the stock prices.

Based on Table 3, all the stock indices in FBM KLCI have a negative relationship with money supply (LNMS) in a long-run except for Public Bank BHD (Model 1). As per<sup>14</sup>, the positive relationship show that cash supply brings the economic stimulus and therefore the stock costs increment.

However, industrial production (LNIP) shows a consistent positive relationship towards the stock indices in FBM KLCI. This result is consistent with<sup>12</sup>. This indicates that the changes in industrial production index are consistent with the changes in the corporate earnings.

The findings on Impulse Response Function (IRF) show that all models are not statistically significant in a long-run except for interest rate and inflation rate that indicate a long-run relationship with Tenaga Nasional and exchange rate that is significant in a long-run with Axiata Group Bhd. Meanwhile, Forecast Error Variance Decomposition (FEVD) shows that the shocks of stock

indices on its own shock contribute the largest portion followed by money supply. Money supply shock shows a biggest influencer towards the fluctuation of Malayan Banking, CIMB Group Holdings and IHH Healthcare. Meanwhile, the shocks of other macroeconomic variables show the less contribution towards the variation of stock indices in Malaysian market.

**Table 3.** Normalized co integrating coefficient of the models

	LNEX	LNCPI	LNBLR	LNMS	LNIP
1	-0.742 (0.067)	4.4778 (0.501)	-2.136 (0.198)	0.080 (0.146)	0.3845 (0.157)
2	-1.304 (0.418)	7.5198 (3.103)	-7.750 (1.342)	-2.820 (1.039)	6.9579 (1.134)
3	-1.231 (0.124)	-2.516 (0.958)	-3.983 (0.403)	-2.033 (0.332)	6.0648 (0.562)
4	-0.610 (0.111)	-1.521 (0.821)	-2.592 (0.319)	-1.074 (0.262)	2.4056 (0.272)
5	-2.888 (0.208)	4.9130 (1.522)	-2.483 (0.554)	-5.935 (0.603)	7.1472 (0.692)
6	-0.508 (0.178)	-2.748 (1.352)	-3.106 (0.502)	-0.593 (0.455)	2.9807 (0.477)
7	8.0740 (1.378)	-1.795 (0.227)	4.0709 (0.596)	-4.552 (0.601)	-0.185 (0.114)
8	-1.334 (0.103)	-1.031 (0.774)	-3.810 (0.276)	-0.042 (0.250)	1.2517 (0.284)
9	0.8693 (0.205)	-1.681 (1.718)	-3.882 (0.645)	-2.057 (0.578)	5.9256 (0.615)
10	-3.011 (0.9124)	41.634 (6.299)	-1.991 (2.569)	-17.03 (2.013)	8.822 (2.123)

And lastly, according to the GARCH (1,1) model, there is no significant impact is found on macroeconomic variables towards stock indices returns except interest rate that is significant towards PETRONAS Chemicals Group. The results from GARCH (1,1) model shows that macroeconomic volatility does not affect much on Genting and IHH Healthcare, while, Public Bank BHD, Tenaga Nasional, Malayan Banking, CIMB Group Holdings, Axiata Group Bhd, PETRONAS Chemicals Group Bhd and PETRONAS Gas do affected by the volatility of macroeconomic variables.

## 5. Conclusion

The three objectives of this study are achieved. All models show that there exist long-run relationships between all the models using Johansen co integration test since

the vectors in all models are co integrated. In addition, exchange rate and money supply show a consistent negative sign of coefficients in most of the stock indices except in PETRONAS Chemicals Group and IHH Healthcare for exchange rate and Public Bank BHD for money supply.

Besides, the findings on IRF and forecast error variance decomposition showed that the shocks of stock indices on its own shock contribute the largest portion followed by money supply. Money supply shock shows a biggest influencer towards the fluctuation of Malayan Banking, CIMB Group Holdings and IHH Healthcare. The last objective which is to determine which macroeconomic volatility that affects volatility of stock indices in FBM KLCI using GARCH (1,1) found that macroeconomic volatility does not affect much on Genting and IHH Healthcare, while, Public Bank BHD, Tenaga Nasional, Malayan Banking, CIMB Group Holdings, Axiata Group Bhd, PETRONAS Chemicals Group Bhd and PETRONAS Gas do affected by the volatility of macroeconomic variables.

In conclusion, the results from this study would empower investors in making decisions since the findings which show that macroeconomic variables have differing effects and significance on stock indices may prove it helpful for portfolio diversification strategies and in addition accomplishing better risk-return tradeoffs.

## 6. References

1. Adam AM, Tweneboah G. Macroeconomic factors and stock market movement: evidence from Ghana. *Munich Personal RePEc Archive*. 2008 Oct; 11256(26):1–17.
2. Al-Zararee AN, Ananzeh IE. The relationship between macroeconomic variables and stock market returns: a case of Jordan for the period 1993-2013. *International Journal of Business and Social Science*. 2014; 5 (1):186–94.
3. Awang NA. The relationship between macroeconomic variables and FTSE Bursa Malaysia Kuala Lumpur composite index [Masters in Quantitative Sciences Thesis]. Malaysia, Universiti Teknologi MARA;
4. Bekhet HA, Matar A. Co-integration and causality analysis between stock market prices and their detremينات in Jordan. *Economic Modelling*. 2013 Sep; 35:508–14. Crossref
5. Bekhet HA, Othman NS. Examining the co-integration and causal relationship analysis between fiscal policy and financial market in Malaysia. *Prosiding Perkem*. 2013; 2:1011–21.
6. Bollerslev T. Generalized autoregressive conditional heteroskedasticity. *Journal of Econometrics*. 1986 Apr; 31(3):307–27. Crossref
7. Hasan A, Javed MT. An empirical investigation of the causal relationship among monetary variables and equity market returns. *The Lahore Journal of Economics*. 2009; 14(1):115–37.
8. Herve DBG, Chanmalai B, Shen Y. The study of causal relationship between stock market indices and macroeconomic variables in Cote d'Ivoire: evidence from error correction models and granger causality test. *International Journal of Business and Management*. 2011; 6(12):146–69. Crossref
9. Jha AK, Singh NK. Predicting the volatility of stock markets and measuring its interaction with macroeconomic variables: Indian evidence, case study of NIFTY and SENSEX. *International Journal of Sciences: Basic and Applied Research*. 2014; 13(1):371–93.
10. Karim BA, Sea LP, Karim ZA. The impact of macroeconomic volatility on the Indonesian stock market volatility. *International Journal of Business and Technopreneurship*. 2014; 4(3):467–76.
11. Kirui E, Wawire NHW, Onono PO. Macroeconomic variables, volatility and stock market returns: a case of Nairobi securities exchange, Kenya. *International Journal of Economics and Finance*. 2014; 6(8):214–28. Crossref
12. Maheshwari Y, Rao KV. The long run relationship between stock indices and macroeconomic variables. *The International Journal of Banking and Finance*. 2014; 11:81–96.
13. Asmy MTTM, Wisam R, Aris H, Fouad AMD. Effects of macroeconomic variables on stock prices in Malaysia: an approach of error correction model. *The Global Journal of Finance and Economics*. 2010; 7(2):149–68.
14. Naik PK, Padhi P. The impact of macroeconomic fundamentals on stock prices revisited: evidence from Indian data. *Eurasian Journal of Business and Economics*. 2012; 5(10):22–44.
15. Nasseh A, Strauss J. Stock prices and domestic and international macroeconomic activity: a co-integration approach. *The Quarterly Review on Economics and Finance*. 2000; 40(2000):229–45.
16. Nawawi AH, Radzali NH, Hussin SAS, Mohd MA. Gold hedging strategies in the Asian Markets. *Jurnal Teknologi*. 2016; 78(4-4):89–98.
17. Shubita MF, Al-Sharkas AA. A study of size effect and macroeconomic factors in New York stock exchange stock returns. *Applied Econometrics and International Development*. 2010; 10-2(2010):137–51.
18. Zakaria Z, Shamsuddin S. Empirical evidence on the relationship between stock market volatility and macroeconomics volatility in Malaysia. *Journal of Business Studies Quarterly*. 2012; 4(2):61–71.