LINKING STOCK PRICES AND MACROECONOMIC VARIABLES IN MALAYSIA

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ABSTRACT

This study investigates the relationship between stock prices and selected macroeconomic variables from January 1980 to May 2017 using monthly data comprising 449 observations. The study employs several econometric tests such as unit root test for stationarity test, cointegration test and Granger causality test to determine the long- and short-run relationships between stock prices and macroeconomic variables. The result of the Johansen cointegration test shows that all the macroeconomic variables are cointegrated with stock prices in the long-run. Moreover, the Granger causality tests show that only exchange and inflation rates significantly Granger cause stock prices in the short-run. However, the money supply and interest rate had no causal relationship with stock prices.

Keywords: stock prices, macroeconomic variables, cointegration, Granger causality

1.0   INTRODUCTION

Investment refers to allocating funds or efforts with the expectation of some future return. Financial investment refers to funds invested to derive a rate of return that will compensate the investor for the period during which the funds are invested, for the expected rate of inflation during the investment horizon and the uncertainty involved (Reilly & Brown, 2006). Awais et al. (2016) stated that investment decision-making depends on many factors. Nevertheless, investors decide what to investment based on fundamental, technical and judgemental analyses.

The relationship between macroeconomic analysis and stock investment decisions has become a topic of interest in economic research in recent years. Stock markets are a crucial part of the economy they play a vital role in industry growth. The performance of that stock market will be affected by macroeconomic variables. Most studies focused on the relationship between macroeconomic factors and global stock markets in developed countries such the US and Europe. Many studies have also investigated the relationship between macroeconomic determinants and stock price in developing countries like Taiwan, China, India, Pakistan and Malaysia. These studies show that the relationship between the stock market and macroeconomic variables differs between developed and developing countries. Therefore, it is interesting to examine the connection between macroeconomic variables and stock market development in developing countries.

This research will focus on how changes in macroeconomic variables affect the Malaysia stock market movement. The macroeconomic factors include interest rate, consumer prices index, money supply and exchange rate as these variables have significant impacts on stock market returns. The study period is from January 1980 until May 2017. The

selected macroeconomic variables include inflation rate (CPI), exchange rate (ER), interest rate (IR), and money supply (MS). Empirical tests such as stationary test, cointegration test, and Granger causality were used to determine the short-run and long-run relationship among the variables. The results could be used by investors and bank institutions to make better investment predictions on future stock market movements based on macroeconomic trends.

The remainder of the study is structured as follows. The next section reviews the theoretical literature pertaining to stock valuation models and the empirical literature on the relationship between the macroeconomic variables and stock returns. Section three discusses the methodology. Section four presents the empirical analysis and findings, while section five concludes the study and outlines its economic and policy implications.

2.0   LITERATURE REVIEW

Several studies examined the relationships between macroeconomic news (changes in the macro-variables such as inflation rate, change in money supply, real exchange rate) and stock market development (stock return as proxies by company index and sector stock index). Change in macro news has both positive and negative effects on the country stock market performance, but may differ based on a country's economic and regulatory systems (El-Nader & Alraimony, 2012; Granger et al., 2000; Huyghebaert & Wang, 2010, Hyde, 2007; Jayasuriya, 2005; Jiranyakul, 2012; Khan et al., 2011; Rahman & Uddin, 2009; Gunasekarage et al., 2004; Schwert, 2011; Balagobei, 2017; Chang & Rajput, 2018; Khan & Khan, 2018).

Menike (2006) investigated the effects of macroeconomic variables on stock prices for selected companies in emerging Sri Lankan stock market by employing eight macroeconomic variables. Based on the regression result, inflation rate, treasury bill rate and exchange rate had a negative impact on stock prices while money supply positively influenced stock prices in the Colombo Stock Exchange. Gunasekarage et al. (2004) applied several times series analyses (unit roots, cointegration test, vector error correction models (VECM), impulse response functions (IRFs) and variance decompositions (VDCs)) to investigate the long- and short-run effects between the stock market index and economic variables. The empirical analysis showed strong support for the argument that the lagged values of macroeconomic variables such as the consumer price index, the money supply and the treasury bill rate have a significant influence on the stock market using VECM analysis. Moreover, the result showed the strong influence of the treasury bill rate on return changes compared to other variables. The share price index did not influence macroeconomic variables except for the treasury bill rate.

Saleem et al. (2013) employed the Johansen cointegration to investigate the relationship between inflation rate and stock returns. Their empirical result highlighted that inflation rate possesses a long-run correlation with the stock price and no Granger cause relationship exists between inflation rate and stock prices. Another empirical study confirmed the negative relationship of inflation on the stock market development (Al-khazali, 2003). Chang and Rajput (2018) in their study found that the interest rate has a significant and negatively influenced the stock price in the long run. This followed by inflation or Consumer Prices Index (CPI) that significant but positively influenced the stock prices. However, the study found no significant relationship between exchange rate and the stock prices. In different study on the Karachi Stock Exchange, findings show that money supply has positive impact on the stock prices. Meanwhile, exchange rate and interest rate have

negative impact on the stock prices. In addition, while Balagobei (2017) found that interest rate has negative influence on stock market return in Colombo stock exchange, inflation rate and exchange rate on the other hand have recorded positive influence on the stock market return.

Arango et al.'s (2002) empirical work suggested a nonlinear and negative relationship between the interest rate and the stock market return. On the Karachi Stock Exchange market, Zafar et al. (2008) developed a GARCH (1,1) model to investigate the response of interest rate volatility on stock return using monthly data (Karachi Stock Index and 90day T-Bill rate) from January 2002 to June 2000. The finding supports that interest rate has a negative impact on the market return and proves the strong positive predictive power of interest rates to predict stock market returns. Zhou (1996) determined the linkage between change in interest rates and stock prices movement. He proved that interest rates have a long-term impact on stock returns, but rejected the hypothesis that expected stock returns movement is affected by ex-ante interest rates. However, contrary to expectations, Mukherjee and Naka (1995) found a positive relationship between Japanese stock prices and call money rates.

3.0   METHODOLOGY

This current study examines the relationship between selected macroeconomic determinants and stock market development or growth (KLCI) in Malaysia. The selected macroeconomic variables include inflation rate (CPI), exchange rate (ER), interest rate (IR) and money supply (MS). All data were collected from DataStream and converted into logarithm (L) form. Empirical tests comprising stationary test, cointegration test and Granger causality are used to determine the long- and short-run relationships among the variables.

This present study adopts the Arbitrage Pricing Model (APM) by Ferson and Harvey (1999) as its theoretical model. A standard arbitrage model takes the following form:

$$R_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \cdots + \beta_k X_{kt} + \varepsilon_t$$

where R represents the return to an asset, X represents a set of risk factors common to a class of assets, and ε represents the random error, all at time t. α represents the constant, and β represent the sensitivity of the asset's return to each factor.

In this research, with some modifications, the empirical model is presented as:

$$LKLCL_t = \beta_0 + \beta_1 LCPI_t + \beta_2 LMS_t + \beta_3 LER_t + \beta_4 LIR_t + \varepsilon_t$$

where,

$LKLCL_t$: Natural logarithm form of Kuala Lumpur Composite Index (KLCI) at year t.
$LCPI_t$: Natural logarithm form of inflation rate at year t.
LMS_t : Natural logarithm form of money supply (M2) at year t.
LER_t : Natural logarithm form of real effective exchange rate at year t
LIR_t : Natural logarithm form of money market rate at year t
ε_i : Error term at year t.

This study will use the Johansen cointegration test and Granger causality test to determine the relationship of selected macroeconomic variables with stock price index. First,

the unit root test is applied to test the stationary of each variable. Secondly, the Johansen multivariate cointegration test is employed to determine whether the selected macroeconomic variables are cointegrated with stock price index. Trace Test and Maximum Eigen Value Test are used in Johansen cointegration test to determine the cointegration ranking. Given the variables are I(1), the cointegration hypothesis between the variables is examined to investigate the long-run relationship between the variables. The results of the cointegration tests are reported in Table 3. If the null hypothesis of no cointegrating vector ($r = 0$) are rejected, this indicates all variables are cointegrated and there is a long-run relationship among the variables.

$$\lambda_{Max} = -TIn(1 - \lambda_{r+1}), \quad r = 0, \ 1, \ 2, \dots, p-1$$

$$\lambda_{Trace} = -T \sum_{i=r+1}^{p} In(1 - \lambda_i), \quad r = 0, \ 1, \ 2, \dots, p-1$$

The error correction term will be included in the Vector Autoregressive (VAR) model if there is evidence of cointegration among the variables (Brooks, 2008). The evidence of cointegration indicates a long-run equilibrium relationship among those variables. The Vector Error Correction Model (VECM) form with the cointegration rank ($r \le k$) is written as:

$$\Delta yt = \delta + \Pi y_{t-1} + \sum_{i=1}^{p-1} \phi_i^r \Delta y_{t-i} + \varepsilon_t$$

The Granger causality test is then applied to examine the causal relations between the selected macroeconomic variables and the stock price index (either unidirectional, bidirectional or no causality). The causality is distinguished into unidirectional causality among the variables such as X_t (Y_t) causes Y_t (X_t), but Y_t (X_t) does not causes X_t (Y_t), and bilateral causality between X_t and Y_t.

$$\Delta Y_t = \alpha_{10} + \sum_{j=1}^{k} \alpha_{1j} \Delta X_{t-j} \sum_{j=1}^{k} \beta_{1j} \Delta Y_{t-j} + \varepsilon_{1t}$$

$$\Delta X_t = \alpha_{20} + \sum_{j=1}^{k} \alpha_{2j} \Delta X_{t-j} \sum_{j=1}^{k} \beta_{2j} \Delta Y_{t-j} + \varepsilon_{2t}$$

Under this test, the null and alternative hypotheses are as follows:

$$H_0: \Delta X \text{ does not Granger cause } \Delta Y$$
$$H_1: \Delta X \text{ does Granger cause } \Delta Y$$

and

$$H_0: \Delta Y \text{ does not Granger cause } \Delta X$$
$$H_1: \Delta Y \text{ does Granger cause } \Delta X$$

4.0   EMPIRICAL ANALYSIS

4.1   Descriptive Statistics

Table 1: Descriptive Statistics

	LKLCI	LMS	LIR	LCPI	LER
Mean	6.598939	10.97524	1.410214	4.294189	4.736283
Median	6,658370	11.01181	1.252763	4.350794	4.630155
Standard division	0.610209	1.171765	0.505224	0.297806	0.211327
Skewness	-0.264130	-0.044812	0.368752	-0.198251	0.803620
Kurtosis	2.025629	1.853829	1.966977	1.935942	2.496803
Jarque-Bera	22.98237	24.72755	30.14002	53.06486	24.12315

For data overview, Table 1 indicates the result of descriptive statistics on the four macroeconomic variables and Kuala Lumpur Stock Composite Index. Money supply (LMS) recorded the highest mean (10.98) with the interest rate recording the lowest (1.41) among the variables under study. Furthermore, the interest rate, inflation and exchange rate recorded the lowest in terms of standard deviation (0.51, 0.30, and 0.21). All variables show negative skewness except for the interest rate and exchange rate. For kurtosis, the exchange rate has the highest kurtosis (2.50) while money supply has the lower kurtosis. However, all variables are normally distributed as indicated by insignificant Jarque-Bera statistics.

4.2 Unit Root Test

Table 2 presents the results of unit root for the five variables, LMS, LCPI, LER, LIR and LKLCI. The ADF tests were used at level and first difference under the assumption of constancy and without trend. The ADF test results indicate all variables are stationary at the first difference, I(1). This means that the null hypothesis is rejected, which indicates that all variables contain one unit root. These results are consistent with previous literature that found most macroeconomic variables and stock prices are non-stationary and non-mean reverting. Thus, all macroeconomic variables and stock prices are regarded as I(1) in the subsequent tests.

Table 2: ADF Unit Root Test

Variables	ADF Unit Root Test	
	Level	First Difference
LKLCI	-1.669604	-12.07417***
LCPI	-1.47186	-14.40778***
LER	-1.176364	-19.49512***
LIR	-2.599365	-25.77181***
LMS	-0.293595	-15.78397***

Notes: The null hypothesis is that the series is non-stationary. The rejection of the null hypothesis for ADF tests is based on the MacKinnon critical values. *** denotes that a test statistic is significant at the 1% significance level, respectively.

4.3 Johansen Cointegration Test

Since the unit root tests confirmed that all variables are I(1), Johansen cointegration test is employed to test the long-run relationship between the stock prices and macroeconomic variables.

Table 3: Johansen Cointegration Test

Hypothesised No. of CE	Trace Statistic	Critical Values (5%)
r = 0	146.1049	69.81889
r ≤ 1	48.05923	47.85613
r ≤ 2	16.63499	29.79707
r ≤ 3	6.043209	15.49471
r ≤ 4	0.498862	3.841466

Hypothesised No. of CE	Max-Eigen Statistic	Critical Values (5%)
r = 0	98.04568	33.87687
r = 1	31.42424	27.58434
r = 2	10.59178	21.13162
r = 3	5.544347	14.26460
r = 4	0.498862	3.841466

Table 3 shows the results of the cointegration relationship between macroeconomic variables and stock prices. The trace statistic is 146.10 (48.06) and greater than the critical value 69.82 (47.86). The null hypothesis that r = 0 (r ≤ 1) is rejected at 5% significance level. The result is similar to the max-eigenvalue test statistic which is 98.05 (31.42) and larger than the critical value 33.88 (27.58). Thus, the null hypothesis is rejected at the 5% significance level. In sum, both tests (trace and max-eigenvalue) indicated that there are two cointegration ranks. Therefore, there is sufficient evidence to conclude that the null hypothesis is rejected which confirms that the stock prices (LKLCI) have a long-run equilibrium with interest rate (LIR), exchange rate (LER), inflation rate (LCPI) and money supply (LMS), and that they would not move away from each other over time.

Table 4: Regression Coefficient

Variable	Coefficient
LMS	-3.091082***
LIR	-0.248793**
LER	0.423222**
LCPI	10.52845***
C	-19.54210***

Notes: *** and ** denote significant at 1% and 5% levels respectively.

Table 4 shows the regression coefficients of LMS, LIR, LER and LCPI. The cointegrating vector equation indicates a positive long-run relationship between the exchange rate (LER) and stock price movement. The regression results show that the development of stock price positive affected by the change in the exchange rate. Ceteris paribus, the regression coefficient suggests that a 1% increase in the LER will increase stock prices (LKLCI) by 0.42%. This positive impact shows that currency depreciation seems to be associated with the growth of stock price. Based on economic theory, for exporting countries, currency depreciation might increase the net-export of the domestic product to become more competitive in the world market. Hence the increase in the firm's profitability will be reflected in the stock price performance. The results show that positive net effects are more dominant, hence creating upward pressure on stock price which is consistent with Ibrahim (1999).

The coefficient of inflation rate is 10.53 and significant at 5% level. This indicates that there is a long-run relationship between inflation rate and stock market development. The positive impact of inflation rate on stock price is indicated by its coefficient. Ceteris paribus, when the LCPI increases by 1%, the LKLCI will increase about 10.53%. For money supply (LMS) and interest rate (LIR), the t-statistic shows that it is significant at the 5% level. The coefficient of the money supply is -3.09 which means that a 1% increase in the money supply, the LKLCI will decrease by 3.09%. On the other hand, id the interest rate's coefficient increases by 1%, LKLCI decrease by 0.25%. Based on past studies, several authors found that money supply has a negative effect on stock price in the long-run (Mukhrejeee and Naka, 1995).

4.4   Granger Causality Test

The Granger causality test was conducted to study the short-run connection between macroeconomic variables (LMS, LER, LIR, and LCPI) and the Malaysian stock index (LKLCI). The selected macroeconomic variables are the most important variables in determining the KLCI return when they were considered in pairs with the KLCI under Granger causality test. Table 5 shows the result of the Granger causality test. This estimation has been carried out on the stationary variables (first differenced data has been used for all the variables series), and the appropriate lag length is selected based on the information criterion. The results indicate that the LKLCI does not Granger cause any macroeconomic variables in this sample period. This means that KLCI is not a leading indicator for the selected macroeconomic variables. The result is consistent with empirical results for stock markets in other small open economies. For example, Kwon and Shin (1999) found that the KSE stock index is not the leading indicator of the macroeconomic variable in Korea. This conforms to Kwon and Shin's (1999) findings that there is no Granger causality between the stocks exchange market and macroeconomic variables.

On the other hand, the result is inconsistent with the empirical result in developed stock markets such as the US (Fama, 1990) and Japan (Geske & Roll, 1983). A rational explanation is that the ratio of capitalisation of the stock to GDP in Malaysia, compared with other international stock markets, is relatively small. This implies that the stock market cannot be used as a leading indicator for future growth in the money supply and interest rate in Malaysia.

Table 5: Short-Run Granger Causality Test

Null Hypothesis	P-Value	Result	Result
Inflation rate does not Granger cause stock price	0.0000***	Rejected	Unidirectional
	0.6110	Accepted	
Stock price does not Granger cause inflation rate			No causality
Money supply does not Granger cause stock price	0.3578	Accepted	No causality
	0.6454	Accepted	No causality
Stock price does not Granger cause money supply			
Exchange rate does not Granger cause stock price	0.0001***	Rejected	Unidirectional
		Accepted	
Stock price does not Granger cause exchange rate	0.5521		
			No causality
Interest rate does not Granger cause stock price	0.3557	Accepted	No causality
		Accepted	
Stock price does not Granger cause interest rate	0.9962		No causality

Note: *** show the variables significant at 1% level.

The result for inflation rate shows that the p-value of LCPI is less than 1%. Thus, the null hypothesis is rejected and accepted that inflation does Granger cause to LKLCI in short-run. The previous causality test on the short-run relationship on inflation and stock price by Zakaria and Shamsuddin (2012) shows that inflation affects the change of KLCI in the short-run. These results indicate that inflation will affect the stock market development in the short-run. When the inflation rate increases, investment and saving will reduce due to higher holding cost.

On the other hand, investment will increase when the inflation rate increases. When the inflation rate is high, this will reduce the expansion speed for most companies because more cost is needed. This will slow economic activity and indirectly slows stock market development. For exchange rate, its p-value is smaller than 1% indicating the rejection of the null hypothesis that the exchange rate does not Granger cause stock prices. This result indicates that exchange rate leads the movement of KLCI in the short-run.

5.0 CONCLUSION

This study investigated the impacts of macroeconomic variables on Malaysia's stock market development from 1980 to 2017 using monthly data. This study shows that the inflation rate and exchange rate demonstrate significant positive relationships with Malaysia's stock market development. On the other hand, the money supply and interest rate have a significant negative relationship with stock returns. Both the long- and short-run dynamics in Malaysia are examined by applying the cointegration test and Granger causality test. From the results of the Johansen cointegration test, all the macroeconomic variables had a significant long-run relationship with KLCI. Moreover, in the Granger causality test, only LER and LCPI significantly Granger cause the KLCI in the short-run. The money supply (LMS) and interest rate (LIR) had no relationship with KLCI in the short-run.

For policymakers, these findings could support decision making to enhance stock market efficiency and financial stability. Policy makers play a role in enhancing economic growth hence stimulate the stock market development. Through this research, the money supply has a significant relationship with the stock market development. Moreover, policymakers should focus on the effect of inflation on the stock market development. Past studies suggest that the growth of the stock market will enhance when the inflation rate is stable at a reasonable level together with other macroeconomic variables. Also, the information regarding the short- and long-run effects of these macroeconomic variables on the stock market can help them maintain stable economic growth and stock market development.

Future research on the subject is encouraged to compare the findings from other developing countries. The effective policies implemented in other developing countries may apply in other countries including Malaysia. This is also useful to provide financial information to the investor for making efficient investment decisions. Moreover, other macroeconomic factors can affect the stock market movement. Therefore, future research could include other macroeconomic variables.

REFERENCES

Al-Khazali, O.M. 2003. Stock prices, inflation, and output: evidence from the emerging markets. Journal of Emerging Market Finance, 2(3), pp. 287-314.

Anari, A. & Kolari, J. 2001. Stock prices and inflation. The Journal of Financial Research, 24(4), pp. 587-602.

Arango, L.E., Gonzalez, A. & Posada, C.E. 2002. Returns and the interest rate: a nonlinear relationship in the Bogota' stock market. Applied Financial Economics, 12(11), pp. 835-42.

Awais, M., Laber, M.F., Rasheed, N. & Khursheed, A. 2016. Impact of financial literacy and investment experience on risk tolerance and investment decisions: empirical evidence from Pakistan. International Journal of Economics and Financial Issues, 6(1): 73-79.

Balagobei, S. 2017. Macroeconomic variables and stock market returns in Sri Lanka. Asian Journal of Finance & Accounting, 9(2), pp. 206-218.

Brooks, C. 2008. Introductory econometrics for finance, 2nd Ed. Cambridge: Cambridge University Press.

Chang, B.H. & Rajput, S.K.O. 2018. Do the changes in macroeconomic variables have a symmetric or asymmetric effect on stock prices? Evidence from Pakistan. South Asian Journal of Business Studies, 7(3), pp. 312-331.

El-Nader, H.M. & Alraimony, A.D. 2012. The impact of macroeconomic factors on Amman stock market returns. International Journal of Economics and Finance, 4(12), pp. 202-213.

Fama, E.F. 1990. Stock returns, expected returns, and real activity. The Journal of Finance, 45(4), pp. 1089-1108.

Ferson, W.E. & Harvey, C.R. 1999. Conditioning variables and the cross section of stock returns. The Journal of Finance, 54(4), pp. 1325-1360.

Gan, C., Lee, M., Yong, H.H.A. & Zhang, J. 2006. Macroeconomic variables and stock market interactions: New Zealand evidence. Investment Management and Financial Innovations, 3(4), pp.89-101.

Geske, R. & Roll, R. 1983. The fiscal and monetary linkage between stock returns and inflation. The Journal of Finance, 38(1), pp. 1-38.

Granger, C.W.J., Huang, B.N. & Yang, C.-W. 2000. A bivariate causality between stock prices and exchange rates: Evidence from recent Asian flu. The Quarterly Review of Economics and Finance, 40(3), pp. 337-354.

Gunasekarage, A., Pisedtasalasai, A. & Power, D.M. 2004. Macroeconomic influence on the stock market: evidence from an emerging market in South Asia. Journal of Emerging Market Finance, 3(3), pp. 285-304.

Huyghebaert, N. & Wang, L. 2010. The co-movement of stock markets in East Asia: did the 1997–1998 Asian financial crisis really strengthen stock market integration? China Economic Review, 21(1), pp. 98-112.

Hyde, S. 2007. The response of industry stock returns to market, exchange rate and interest rate risks. Managerial Finance, 33(9), pp. 693-709.

Ibrahim, M. 1999. Macroeconomics variables and stock price in Malaysia: an empirical analysis. Asian Economic Journal, 13(2), pp. 219-231.

Jayasuriya, S. 2005. Stock market liberalization and volatility in the presence of favorable market characteristics and institutions. Emerging Markets Review, 6(2), pp. 170-191.

Jiranyakul, K. 2012. Linkages between Thai stock and foreign exchange markets under the floating regime. Journal of Financial Economic policy, 4(4), pp. 305-319.

Johansen, S. & Juselius K. 1990. Maximum likelihood estimation and inference on co-integration with applications to the demand for money. Oxford Bulletin of Economics and Statistics, 52(2), pp. 169-210.

Khan, A., Ahmad, H. & Abbas, Z. 2011. Impact of macro-economic factors on stock prices. Journal of Contemporary Research in Business, 3(1), pp. 472-483.

Khan. J. & Khan, I. 2018. The impact of macroeconomic variables on stock prices: a case study of Karachi stock exchange. Business and Economics Journal, 9(3): 365. DOI: 10.4172/2151-6219.1000365.

Kwon, C.S. & Shin, T.S. 1999. Co-integration and causality between macroeconomic variables and stock market returns. Global Finance Journal, 10(1), pp. 71-81.

Menike, L.M.C.S. 2006. The effect of macroeconomic variables on stock prices in emerging Sri Lankan stock market. Sabaragamuwa University Journal, 6(1), pp. 50-67.

Mukherjee, T.K. & Naka, A. 1995. Dynamic relations between macroeconomic variables and The Japanese stock market: an application of a vector error correction model. The Journal of Financial Research, 18(2), pp. 223-237.

Rahman, A.A., Sidek, N.Z.M. & Tafri, F.H. 2009. Macroeconomic determinants of Malaysian stock market. African Journal of Business Management, 3(3), pp. 95-106.

Rahman, M.L. & Uddin, J. 2009. Dynamic relationship between stock prices and exchange rates: evidence from three South Asian countries. International Business Research, 2(2), pp. 167-174.

Reilly, F.K. & Brown, K.C. 2006. Investment analysis and portfolio management, 8th Ed. Mason, Ohio: Thomson/South-Western.

Saleem, F., Zafar, L. & Rafique, B. 2013. Long run relationship between inflation and stock return: evidence from Pakistan. Academic Research International, 4(2), pp. 407-415.

Schwert, G.W. 2011. Stock volatility during recent financial crisis. European Financial Management, 17(5), pp. 789-805.

Zafar, N., Urooj, S.F. & Durrani, T.K. 2008. Interest rate volatility and stock returns and volatility. European Journal of Economics, Finance and Administrative Sciences, 14, pp. 135-140.

Zakaria, Z. & Shamsuddin, S. 2012. Empirical evidence on the relationship between stock market volatility and macroeconomics volatility in Malaysia. Journal of Business Studies Quarterly, 4(2), pp. 61-71.

Zhou, C. 1996. Stock market fluctuations and the term structure. Board of Governors of the Federal Reserve System Finance and Economics Discussion Series FEDS Paper Number: 96-3.