

The Dynamic Relations between Macroeconomic Variables and Stock Prices: Evidence from Mongolia

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Abstract

The study investigates the relationships between the Mongolian Stock Market index (MSE ALL index) and five macroeconomic variables, namely, exchange rate, money supply, interest rate, gross industrial products over the period 2004:01–2016:12. Johansen's co-integration has been applied to explore the long-run equilibrium relationship between stock market index and macroeconomic variables. The analysis reveals that macroeconomic variables and the stock market index are co-integrated and, hence, a long-run equilibrium relationship exists between them. It is observed that the stock prices positively relate to the money supply and industrial production but negatively relate to inflation. The exchange rate and the short-term interest rate are found to be insignificant in determining stock prices. In the Granger causality sense, macroeconomic variable causes the stock prices in the long-run but not in the short-run. There is bidirectional causality exists between industrial production and stock prices whereas, unidirectional causality from money supply to stock price, stock price to inflation and interest rates to stock prices are found.

Key Words: Stock market index, macroeconomic variables, co-integration test, causality test.

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1. Introduction

Stock markets play a fundamental role in growing industries and commerce of a country that eventually affect the economy. The importance of stock markets has been well acknowledged in industries and investors perspectives. The stock market avail long-term capital to the listed firms by pooling funds from different investors and allow them to expand in business and also offers investors alternative investment avenues to put their surplus funds in.

Unlike mature stock markets of advanced countries, the stock markets of emerging economies began to develop rapidly only in the last two and half decades. While there have been numerous attempts to develop and stabilize the stock markets, the emerging economies are characterized as the most volatile stock markets (Engel and Rangel, 2005). Moreover, the stock markets of emerging economies are likely to be sensitive to factors such as changes in the level of economic activities, changes in the political and international economic environment and also related to the changes in other macroeconomic factors. Investors evaluate the potential economic fundamentals and other firm specific factors/characteristics to formulate expectation about the stock markets.

The impact of economic fundamentals on stock prices or stock returns has been a long debated issue amongst the academicians and professionals. According to the efficient market hypothesis (Fama, 1970), in an efficient market, all the relevant information about the changes in macroeconomic factors are fully reflected in the current stock prices and hence, investors would not be earned abnormal profits in such markets. If the conclusion of efficient market hypothesis is to be believed; then the changes of any macroeconomic variables should not affect the stock returns much. However, conclusion drawn from efficient market hypothesis has been critically examined by subsequent studies by Fama and Schwert (1977), Nelson (1977) and many scholars which affirm that macroeconomic variables do influence the stock returns by affecting stock prices.

The arbitrage pricing theory (APT) also provides theoretical framework of the linkage between stock prices and macroeconomic fundamentals (Ross, 1976; Chen et al., 1986). In this connection, several empirical studies have shown that changes in stock prices are linked with macroeconomic fundamental. Study by Chen et al. (1986) is one of the earliest to empirically

examine the link between stock prices and macroeconomic variables in the line of APT and provides the basis to believe for the existence of a long-run relationship between them. More recently, an increasing amount of empirical studies have been focusing attention to relate the stock prices and macroeconomic factors for both developed and emerging economies (Mukherjee and Naka, 1995; Wongbampo and Sharma, 2002; Maysami et al., 2004; Ratanapakorn and Sharma, 2007; Rahman et al., 2009; Asaolu and Ogunmuyiwa, 2011). These studies conclude that stock prices do respond to the changes in macroeconomic fundamentals but the sign and causal relationship might not hold equal for all the studies.

The relationship of some macro factors could vary from market to market and may change in different sample periods and also in different frequency of the data. Thus, more in-depth studies are needed to understand the macroeconomic variables that might influence the Mongolian Stock Market. Moreover, the country like Mongolia is particular importance to study such relationship since its capital market has undergone tremendous changes up to now and it became more open to international investors. The reforming market and the significant economic potential have been attracting a large number of foreign institutional investors into the Mongolian stock market. In this end, how and at what extent the Mongolian Stock Market responds to the changes in macroeconomic factors remain an open empirical question. Understanding the macroeconomic variables that could impact the stock market index, with the recent data can be useful for investors, traders as well as the policy makers.

The goal of the present study is to test whether the economic fundamentals in Mongolia explain the stock prices behavior in the market. The study uses monthly data from 2004 to 2016 to investigate the relationship between stock prices and macroeconomic variables such as the index of industrial production, inflation, GDP, money supply, exchange rate and interest rate. It is believed that the finding of this study would extend the existing literature by providing some meaningful insight to the policy makers and the practitioners of a developing country like Mongolia.

2. Mongolian Stock Exchange

Mongolian Stock Exchange was founded on 18 January 1991 as a vehicle to implement the government's plan for privatization of large state-owned enterprises. First Securities Law of Mongolia enacted on 1994 followed by establishment of Mongolian Securities Committee. Secondary market trading began on 28 August 28 1995, open to both domestic and international investors.

Mongolian Stock Exchange has two main indices which are MSE ALL Index and TOP 20 Index. The Mongolian Stock Exchange has seen rapid growth since 2006. At that time it was the world's smallest stock exchange by market capitalization (roughly US\$83 million). That grew to US\$406 million by 2008 and then quadrupled again to US\$2 billion by 2011.

In 2016, a total of 93.7 million shares of 126 Joint Stock Companies worth MNT(Mongolian Tugrik)49.1 billion. On March 2017, Mongolian Stock Exchange has 219 listed companies with a combined market capitalization of MNT1.47 trillion (US\$600.6 million).

Mongolia Stock Exchange (MSE) categories their listed companies into 3 different classifications, Classification 1, Classification 2 and Classification 3. The requirements for Joint Stock Companies on 3 different classifications are shown in Table 1.

Table 1: Requirements for Joint Stock Companies

	Requirements
Classification 1	Market capitalization of a company must be minimum of MNT 5,000,000,000 /MNT 5 billion/. 25% of total shares of company must be publically traded or semi-annual trading value of company's share must be higher than 5% of total trading value of the stock exchange. The company's share must have been traded at least two years.
Classification 2	Market capitalization of a company must be minimum of MNT 1,000,000,000 /MNT 5 billion/. 15% of total shares of company must be publically traded or semi-annual trading value of company's share must be higher than 5% of total trading value of the stock exchange.
Classification 3	There are no requirements for period of exchange's trade or business operation. It is possible that medium & small sized companies with high risk and mining exploration or operation license to list in this classification. Its stock will be only offered to institutional & professional investors.

3. Literature Review

The previous empirical works on the link between macroeconomic factors and stock returns can be divided into two broad categories. The first category is such studies which investigated the impact of macroeconomic factors on stock prices. The second category of studies focused on the relationship between the stock market volatility and volatility in the macroeconomic indicators. Since the present study is based on the first category, some of the relevant literatures on the macroeconomic determinants of stock prices have been reviewed.

Chen et al. (1986) explored a set of macroeconomic variables as systematic influence on stock market returns by modeling equity return as a function of macro variables and non-equity assets returns for US. They empirically found that the macroeconomic variables such as industrial production anticipated and unanticipated inflation, yield spread between the long and short term government bond were significantly explained the stock returns. The authors showed

that the economic state variables systematically affect the stock return via their effect on future dividends and discount rates.

Mookerjee and Yu (1997) examined the nexus between Singapore stock returns and four macroeconomic variables such as narrow money supply, broad money supply, exchange rates and foreign exchange reserves using monthly data from October 1984 to April 1993. Their analysis revealed that both narrow and broad money supply and foreign exchange reserves exhibited a long run relationship with stock prices whereas exchange rates did not.

Gan et al. (2006) investigated the relationships between New Zealand stock market index and a set of seven macroeconomic variables from January 1990 to January 2003 using co-integration and Granger causality test. The analysis revealed a long run relationship between New Zealand's stock market index and the macroeconomic variables tested. The Granger causality test results showed that the New Zealand's stock index was not a leading indicator for changes in macroeconomic variables. However, in general, their results indicated that New Zealand stock market was consistently determined by the interest rate, money supply and real GDP.

Robert (2008) examined the effect of two macroeconomic variables (exchange rate and oil price) on stock market returns for four emerging economies, namely, Brazil, Russia, India and China using monthly data from March 1999 to June 2006. He affirmed that there was no significant relationship between present and past market returns with macroeconomic variables, suggesting that the markets of Brazil, Russia, India and China exhibit weak form of market efficiency. Furthermore, no significant relationship was found between respective exchange rate and oil price on the stock market index of the four countries studied.

Abugri (2008) investigated the link between macroeconomic variables and the stock return for Argentina, Brazil, Chile, and Mexico using monthly dataset from January 1986 to August 2001. His estimated results showed that the MSCI world index and the U.S. T-bills were consistently 6 significant for all the four markets he examined. Interest rates and exchange rates were significant three out of the four markets in explaining stock returns. However, it can be observed from his analysis that, the relationship between the macroeconomic variables and the stock return varied from country to country.

Asaolu and Ogunmuyiwa (2011) investigated the impact of macroeconomic variables on Average Share Price for Nigeria for the period of 1986 to 2007. The results from their causality

test indicated that average share price does not Granger cause any of the nine macroeconomic variables in Nigeria in the sample period. Only exchange rate Granger causes average share price. However, the Johansen Co- integration test affirmed that a long run relationship exists between average share price and the macroeconomic variables.

Akbar et al. (2012) examined the relationship between the Karachi stock exchange index and macroeconomic variables for the period of January 1999 to June 2008. Employing a co-integration and VECM, they found that there is a long-run equilibrium relationship exists between the stock market index and the set of macroeconomic variables. Their results indicated that stock prices were positively related with money supply and short-term interest rates and negatively related with inflation and foreign exchange reserve.

However, studies like Ray and Vani (2003) employed a VAR model and an artificial neural network to examine the linkage between the stock market movements and real economic factors in the Indian stock market using the monthly data ranging from April 1994 to March 2003. The results revealed that, interest rate, industrial production, money supply, inflation rate and exchange rate have a significant influence on equity prices, while no significant results were discovered for fiscal deficit and foreign investment in explaining stock market movement.

Ahmed (2008) employed the Johansen's approach of co-integration and Toda-Yamamoto Granger causality test to investigate the relationship between stock prices and the macroeconomic variables using quarterly data for the period of March, 1995 to March 2007. The results indicated that there was an existence of a long-run relationship between stock price and FDI, money supply, index of industrial production. His study also revealed that movement in stock price caused movement in industrial production.

Pal and Mittal (2011) investigated the relationship between the Indian stock markets and macroeconomic variables using quarterly data for the period January 1995 to December 2008 with the Johansen's co-integration framework. Their analysis revealed that there was a long-run relationship exists between the stock market index and set of macroeconomic variables. The results also showed that inflation and exchange rate have a significant impact on BSE Sensex but interest rate and gross domestic saving (GDS) were insignificant.

4. Methodology

3.1 Data

The MSE-all-index which is a stock market index for the Mongolian Stock Exchange is considered as stock price index (SPI1) in this study. The MSE-all-index is the market value weighted index of the 219 stocks that have trading volume on the Mongolian Stock Exchange. On the other hand, based on previous studies, four macro-economic variables namely Exchange rate (ER), Money Supply (MS), Interest rate (INT) and Gross Industrial Output (GIO) are used as macro-economic variables.

The study examines monthly data for all the variables under study covering the period from January 2004 to December 2016 (168 monthly observations) which are collected from the Mongolian Stock Exchange and Bank of Mongolia. All variables are converted into natural logarithmic form. The present study employs the time series data analysis technique to study the relationship between the MSE ALL INDEX (SPI1) and EX, MS, INT and GIO.

3.2 Empirical Models

In a time series analysis, the results might provide a spurious if the data series are non-stationary. Thus, the data series must obey the time series properties i.e. the time series data should be stationary, meaning that, the mean and variance should be constant over time and the value of covariance between two time periods depends only on the distance between the two time period and not the actual time at which the covariance is computed.

The most popular and widely used test for stationary is the unit root test. The presence of unit root indicates that the data series is non-stationary. The standard procedures of unit root test namely the Augmented Dickey Fuller (ADF) is performed to check the stationary nature of the series. Assuming that the series follows an AR (p) process the ADF test makes a parametric correction and controls for the higher order correlation by adding the lagged difference terms of the dependent variable to the right hand side of the regression equation. In the ADF test null hypothesis is that data set being tested has unit root. This provides a robustness check for

stationary. The unit root tests also provide the order of integration of the time series variables. In a multivariate context if the variable under consideration are found to be $I(1)$ (i.e. they are non-stationary at level but stationary at first difference), but the linear combination of the integrated variables is $I(0)$, then the variables are said to be co-integrated (Enders, 2004). The ADF is performed to check the stationary nature of the series. The complete model with deterministic terms such as intercepts and trends is shown in equation (1).

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \dots + \delta_1 \Delta y_{t-1} + \dots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t, \quad (1)$$

where, α is a constant, β is the coefficient on a time trend and P is the lag order of the autoregressive process. Lag length for VAR system is, selected based on minimum sequential modified LR test statistic (each test at 5% level) (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ). The estimation of co-integration using this method, involves estimation of following unrestricted VAR model.

$$Y_t = A_0 + \sum_{i=1}^n A_i Y_{t-1} + \varepsilon_t, \quad (2)$$

where, Y_t is $n \times 1$ vector of non-stationary $I(1)$ variables, A_0 is an $n \times 1$ vector of constants, n is no of lags. A_i is an $n \times n$ matrix of estimated parameters. ε_t is $n \times 1$ vector independent error term.

With the non-stationary series, co-integration analysis has been used to examine whether there is any long run relationship exists. However, a necessary condition for the use of co-integration technique is that the variable under consideration must be integrated in the same order and the linear combinations of the integrated variables are free from unit root. According to Engel and Granger (1987), if the variables are found to be co-integrated, they would not drift apart over time and the long run combination amongst the non-stationary variables can be established. To conduct the co-integration test, the Engel and Granger (1987) or the Johansen and Juselius (1990) or the Johansen (1991) approach can be used. The Engel-Granger two step

approaches can only deal with one linear combination of variables that is stationary. In a multivariate practice, however, more than one stable linear combination may exist. The Johansen's co-integration method is regarded as full information maximum likelihood method that allows for testing co-integration in a whole system of equations.

The Granger causality test (Engel and Granger, 1987) has been used to find out the direction of causality between the variables. To test for Granger causality, the following bi-variate regression model can be used.

$$y_t = \alpha_0 + \sum_{i=1} \alpha_i Y_{t-i} + \sum_{j=1} \beta_j X_{t-1} + \varepsilon_t \quad (3)$$

$$X_t = \omega_0 + \sum_{i=1} \gamma_i Y_{t-i} + \sum_{j=1} \theta_j X_{t-1} + \varepsilon_t \quad (4)$$

If all the coefficients of X in the first regression equation of Y , i.e. β_i for $i = 1, \dots, n$ are significant, then the null hypothesis that X does not cause Y is rejected.

5. Empirical Results

4.1 Unit root test

When dealing with time series data, it is important to examine the existence of unit root in the data series. If the variable is not stationary, we can obtain a high although there is no meaningful relation between variables. A non-stationary process generates the problem of spurious regression between unrelated variables. Before running our Granger causality test, we need to test for Unit root and make sure that we are dealing with stationary data before using it.

Table 2: Unit Root Test Result

ADF	level	1st difference
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		t-Statistic	Prob.*	t-Statistic	Prob.*
LNSP1	Constant	-2.553	0.105	-4.357	0.001
	Constant & Linear Trend	-1.618	0.782	-4.800	0.001
LNER	Constant	1.089	0.997	-10.294	0.000
	Constant & Linear Trend	-1.037	0.935	-10.541	0.000
LNMS	Constant	-2.053	0.264	-6.890	0.000
	Constant & Linear Trend	-2.887	0.170	-7.056	0.000
LNINT	Constant	-1.950	0.309	-10.780	0.000
	Constant & Linear Trend	-1.200	0.906	-10.933	0.000
LNGIO	Constant	-0.796	0.817	-3.832	0.003
	Constant & Linear Trend	-2.552	0.303	-3.799	0.019

Table 2 is the result of unit root test to determine whether the variables used in this study are stable. The unit root analysis showed that the unit root exists as a result of the analysis of the level variable. However, the after first difference variables showed that the unit root did not exist, confirming that the time variables are stationary.

4.2 Granger Causality Test

Table 3 shows the results from Granger causality test. In Table 3, the results only the significant results are marked as bold. First, in the analysis the lags is set to 4, MS (Money Supply) granger causes SPI1 (Stock Price Index). GIO (Gross Industrial Output) is also seen as granger causes to SPI1 (Stock Price Index). On the other hand, SPI1 (Stock Price Index) is affecting INT (Interest Rate) among macroeconomic variables.

At lag of 6 among the macroeconomic variables, MS (Money Supply) shows granger causes SPI1 (Stock Price Index). On the other hand, SPI1 (Stock Price Index) is affecting INT (Interest Rate).

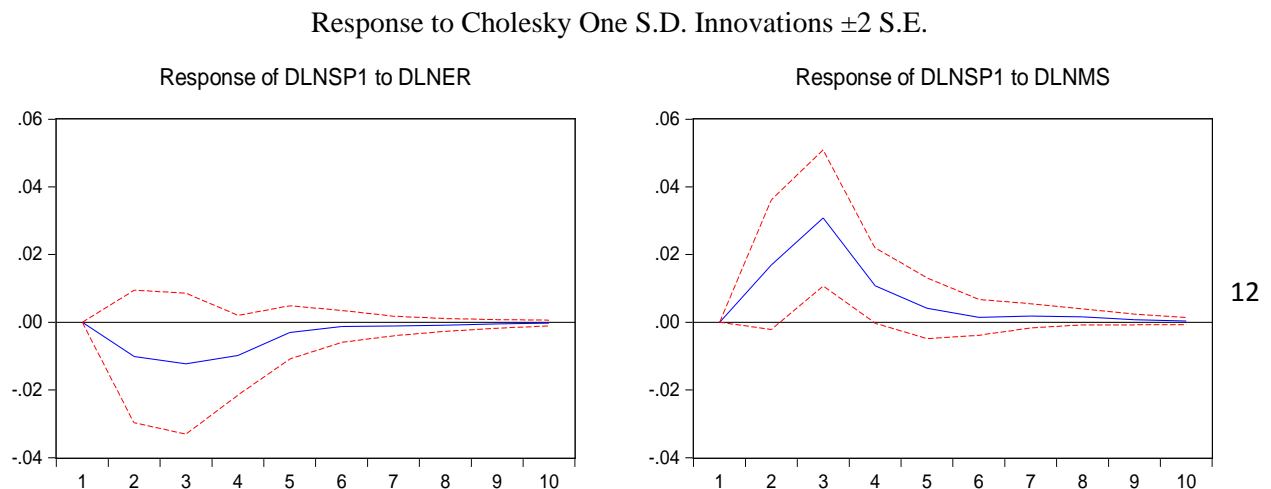
At lag of 12, SPI1 (Stock Price Index) shows granger causes to INT (Interest rate) and SPI1 (Stock Price Index) shows granger causes to GIO (Gross Industrial Output)

Table 3: Granger Causality Test Result

lag	lag 4		lag 6		lag 12	
	F-Sta	Prob.	F-Sta	Prob.	F-Sta	Prob.
DLNER → DLNSP1	1.046	0.386	1.153	0.335	0.878	0.572
DLNSP1 → DLNER	1.113	0.353	1.107	0.361	0.871	0.578
DLNMS → DLNSP1	3.748	0.006	2.548	0.023	1.596	0.102
DLNSP1 → DLNMS	1.625	0.171	1.639	0.141	1.056	0.404
DLNINT → DLNSP1	0.495	0.740	0.557	0.764	0.792	0.657
DLNSP1 → DLNINT	3.250	0.014	4.128	0.001	1.971	0.033
DLNGIO → DLNSP1	2.556	0.041	1.547	0.168	1.234	0.269
DLNSP1 → DLNGIO	0.376	0.825	0.803	0.569	2.197	0.016

4.3 Impulse Response Analysis

The following is the result of Impulse Response Analysis. MS (Money Supply) shock was positive in the direction of positive reaching the peak then disappearing after about 9 months. The SPI1 (Stock Price Index) to the GIO (Gross Industrial Output) shock was negative (-) from 1 month to 2 months and positive (+) after 3 months and then disappears after about 9 months.

Figure 1: Impulse Response Analysis Result

4.4 Variance Decomposition

In econometrics and other applications of multivariate time series analysis, a variance decomposition is used to aid in the interpretation of a VAR model once it has been fitted. The variance decomposition indicates the amount of information each variable contributes to the other variables in the VAR model. The variance decomposition determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables.

Table 4: Variance Decomposition of Stock Price (DLNSP1)

Period	S.E.	DLNSP1	DLNER	DLNMS	DLNINT	DLNGIO
1	0.115	100.000	0.000	0.000	0.000	0.000
2	0.122	94.898	0.685	1.923	0.229	2.264
3	0.127	88.259	1.575	7.674	0.228	2.264
4	0.128	86.887	2.133	8.254	0.274	2.452

5	0.128	86.713	2.182	8.333	0.282	2.490
6	0.128	86.707	2.189	8.335	0.283	2.487
7	0.128	86.684	2.196	8.352	0.283	2.486
8	0.128	86.667	2.199	8.365	0.283	2.485
9	0.128	86.662	2.201	8.368	0.283	2.486
10	0.128	86.661	2.201	8.369	0.283	2.486

Table 4 shows the variance decomposition of stock price. The result in Table 3 indicates that short run dynamics in stock price are explained mostly by its own fluctuations, followed by money supply, gross industrial output, exchange rate, and interest rate.

Money supply shocks account for about 8.4 percent of variations in stock price within the ten months. Innovations in gross industrial output accounts for about 2.5 percent within the same period, whereas exchange rate explain about 2.2 percent. Interest rate shocks account for about 0.3 percent of the variance.

6. Conclusion

Many theories have been given in the literature discussing the relation between the stock market and the economic activity. This study examines the relationships between stock price and macroeconomic variables in Mongolia by using the VAR model approach. We used monthly data of the stock price and macroeconomic variables such as exchange rate, money supply, interest rate, gross industrial output from 2004:01 to 2016:12. We employed unit root test, Granger causality test, impulse response analysis, and variance decomposition analysis. We found the followings:

First, the unit root analysis showed that the unit root exists as a result of the analysis of the level variable. However, the after first difference variables showed that the unit root did not exist, confirming that the time variables are stationary.

Second, in the Granger causality test when the lags is set to 4 MS (Money Supply) granger causes SPI1 (Stock Price Index). Also GIO (Gross Industrial Output) is also seen as granger causes to SPI1 (Stock Price Index). On the other hand, SPI1 (Stock Price Index) is affecting INT (Interest Rate) among macroeconomic variables.

Third, in the Impulse responses of the stock price to economic shocks are negative till about 5 or 8 months after first month and the shocks are lasting for about 9 months in impulse response analysis.

Lastly, the variance decomposition of stock price indicates that short run dynamics in stock price are explained mostly by its own fluctuations, followed by money supply, gross industrial output, exchange rate, and interest rate. Money supply shocks account for about 8.4 percent of variations in stock price within the ten months. Innovations in gross industrial output accounts for about 2.5 percent within the same period, whereas exchange rate explain about 2.2 percent. Interest rate shocks account for about 0.3 percent of the variance.

The results of this study indicate some of macroeconomic variables systematically affect stock price through future dividends and discount rates. Our results can be used for important information by managers, investors, and practitioners who are involved in stock market and economy in Mongolia.

References

- Abugri, B. A. (2008). Empirical Relationship between Macroeconomic Volatility and Stock Return: Evidence from Latin American Markets, *International Review of Financial Analysis*, 17, 396-410.
- Ahmed, S. (2008). Aggregate Economic Variables and Stock Market in India, *International Research Journal of Finance and Economics*, 64, 14-64.
- Ahmed, S. (2008). Aggregate Economic Variables and Stock Markets in India, *International Research Journal of Finance and Economics*, 14.
- Akbar, M., Ali, S. & Khan, M.F. (2012). The Relationship of Stock Prices and Macroeconomic Variables revisited: Evidence from Karachi Stock Exchange, *African Journal of Business management*, 6 (4), 1315-1322.

- Asaolu, T.O. & Ogunmuyiwa, M.S. (2011). An Econometric Analysis of the Impact of Macroeconomic Variables on Stock Market Movement in Nigeria, *Asian Journal of Business Management*, 3 (1), 72-78.
- Bhattacharyya, B. & Mukherjee, J. (2006). Indian Stock Price Movement and the Macroeconomic context – A Time Series Analysis, *Journal of International Business and Economics*, 5 (1), 167-181.
- Brooks, C. (2002). *Introductory Econometrics for Finance* (2nd ed.). Cambridge University Press.
- Chen, N., Roll, R. & Ross, S. (1986). *Economic forces and the Stock Market*, *Journal of Business*, 59, 383-403.
- Chen, N., Roll, R. & Ross, S. (1986). Economic forces and the Stock Market, *Journal of Business*, 59, pp: 383-403.
- Dickey, D.A. & Fuller, W.A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root, *Journal of American Statistical Association*, 74 (366), 427-431.
- Dickey, D.A. & Fuller, W.A. (1981). Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root, *Econometrica: Journal of the Econometric Society*, 49 (4), 1057-1072.
- Enders, W. (2004). *Applied Econometric Time Series* (2nd ed.). Wiley Series in Probability and Statistics.
- Engel, R.F. & Granger, W.J. (1987). Co-Integration and Error Correction: Representation, Estimation and Testing, *Econometrica*, 55 (2), 251-276.
- Engle, R.F. & Rangel, J.G. (2005). The Spline GARCH model for Unconditional Volatility and its Global Macroeconomic Causes, *CNB Working Papers Series*, 13, 1-28.
- Fama, E.F. (1970). Efficient Capital Markets: A review of theory and empirical work, *Journal of Finance*, 25, 383-417.
- Fama, E.F. & Schwert, W.G. (1977). Asset Returns and Inflation, *Journal of Financial Economics*, 5, 115-146.
- Gan, C., Lee, M., Yong, H. & Zhang, J. (2006). Macroeconomic Variables and Stock Market Interactions: New Zealand Evidence, *Investment Management and Financial Innovations*, 3(4), 89-101.

- Johansen, S. (1991). Estimation and Hypothesis testing of Cointegration Vector in Gaussian Vector Autoregressive Models, *Econometrica*, 59, 1551-1581.
- Johansen, S. & Juselius, K. (1990). Maximum Likelihood Estimation and inference on Cointegration with application to the Demand for Money, *Oxford Bulletin of Economics and Statistics*, 52(2), 169-210.
- Mookerjee, R. & Yu, Q. (1997). Macroeconomic Variables and Stock Prices in small Open Economy: The case of Singapore, *Pacific-Basin Finance Journal*, 5, 377-788.
- 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*, 2, 223-237.
- Nelson, C.R. (1976). Inflation and rates of return on Common Stocks, *Journal of Finance*, 31 (2), 471-483.
- Pal, K. & Mittal, R. (2011). Impact of Macroeconomic Indicators on Indian Capital Markets, *Journal of Risk Finance*, 12 (2), 84-97.
- Rahman, A., Abdul, Noor, Z., Mohd, S., & Fauziah, H. T. (2009). Macroeconomic Determinants of Malaysian Stock Market, *African Journal of Business Management*, 3 (3), 95-106.
- Ratanapakorn, O. & Sharma, C. S. (2007). Dynamics analysis between the US Stock Return and the Macroeconomics Variables, *Applied Financial Economics*, 17 (4), 369-377.
- Ray, P. & Vani, V. (2003). What moves Indian Stock Market: A study on a linkage with Real Economy in the post reform era, Working Paper, *National Institute of Management*, 1-19.
- Robert, D.G. (2008). Effect of Macroeconomic Variables on Stock Market Returns for four Emerging Economies: Brazil, Russia, India and China, *International Business & Economics Research Journal*, 7 (3), 1-8.
- Ross, S. A. (1976). The Arbitrage Theory of Capital Asset Pricing, *Journal of Economic Theory*, 13, 341-360.
- Wongbampo, P. & Sharma, S.C. (2002). Stock Market and Macroeconomic Fundamental Dynamic Interactions: ASEAN-5 Countries, *Journal of Asian Economics*, 13, 27-51.