International Journal of Economics and Finance; Vol. 4, No. 10; 2012
ISSN 1916-971X E-ISSN 1916-9728
Published by Canadian Center of Science and Education

Investigating Equilibrium Relationship between Macroeconomic Variables and Malaysian Stock Market Index through Bounds Tests Approach

Hussain Ali Bekhet[1] & Mohamed Ibrahim Mugableh[1]

[1] Graduate Business School, College of Graduate Studies, University Tenaga Nasional (UNITEN), Malaysia

Correspondence: Hussain Ali Bekhet, Graduate Business School, College of Graduate Studies, University Tenaga Nasional (UNITEN), 43000, Selangor, Malaysia. E-mail: profhussain@uniten.edu.my

Received: April 12, 2012 Accepted: July 30, 2012 Online Published: September 5, 2012

doi:10.5539/ijef.v4n10p69 URL: http://dx.doi.org/10.5539/ijef.v4n10p69

Abstract

The current paper conducts an empirical examination into the long-run and short-run equilibrium relationships between macroeconomic variables and the Malaysian stock market index (SMI) for the 1977-2011 period. Specifically, it employs Ng and Perron (NP) bounds statistics test to detect the boundaries of variables stationarity. Subsequently, the co-integrating relationships among variables are tested using the bounds F-statistic test. Eventually, the long-run and short-run equilibrium relationships are analyzed using Pesaran, Shin, and Smith (PSS) bounds tests Approach. The results indicate that all macroeconomic variables are co-integrated with SMI. Besides, understanding the long-run and short-run equilibrium relationships between macroeconomic variables and SMI could be highly appreciable from the perspectives of policymakers, financial economists, domestic and international investors dealing with Malaysian stock market.

Keywords: stock market index, macroeconomic variables, economic equilibrium, stationarity, bounds test, Malaysia

1. Introduction

Over the past three decades, the issue relating to macroeconomic variables and stock markets generated vast volume of literature and heated debate due to the ability of these variables to enhance stock markets and economies. Specifically, the optimal macroeconomic environment promotes business profitability and boosts economic growth (Pal and Mittal, 2011). The performance of countries' economies and stock markets are measured and determined by macroeconomic variables such as exchange rate (ER), inflation rate (INF), money supply (MS), trade balance (TB) and many other variables.

However, several studies debated the influences of macroeconomic variables on matured and emerging stock markets indices. In the US stock market, Bjornald and Leitemo (2009) examined the influences of macroeconomic variables on S&P500 using vector autoregressive (VAR) Model and monthly time series data for the 1983-2002 period. They found that macroeconomic variables influenced S&P500 positively. On the other hand, Morelli (2002) scanned if the conditional volatility of macroeconomic variables explained the volatility of FTSE100 using generalized autoregressive conditional heteroscedasticity (GARCH) Model and monthly time-series data for the 1967-1995 period. He found that the conditional volatility of the macroeconomic variables did not explain the volatility of FTSE100.

Notable studies conducted to examine the equilibrium relationships between macroeconomic variables and emerging stock market indices. Gunasekarage et al. (2004) investigated the long-run and short-run equilibrium relationships between macroeconomic variables and the Sri Lankan stock market index using vector error correction model (VECM) and monthly time-series data for the 1985-2001 period. They found that macroeconomic variables are co-integrated with the Sri Lankan stock market index. In Malaysian context, few notable studies have been found in our area of interest. Ibrahim and Aziz (2003) inspected the long-run and short-run equilibrium relationships between four macroeconomic variables (industrial production index (IP), consumer price index (CPI), the broad money supply (M2), and ER) and Malaysian stock market index using monthly time series data for the 1977-1998 period. They found positive long-run and short-run equilibrium relationships between Malaysian stock market index and both of CPI and IP. Additionally, they found negative long-run and short-run equilibrium relationships between Malaysian stock market index and both of M2 and ER.

The Malaysian stock market began its developing since the inception in 1977. Within three decades, Malaysia had one of the largest stock markets among the South East Asian countries in terms of domestic market capitalization over US$390 million in 2011 (World Federation of Exchange, 2012). Furthermore, Malaysian economy has grown continuously of 5.9% per year at the end of 2011(IMF, 2012). Therefore, it would be interesting to provide empirical evidence demonstrating the relationship between macroeconomic variables and the Malaysian stock market index.

However, the current paper contributes to the existing literature in fourfold. First, it examines the long-run and short-run equilibrium relationships between macroeconomic variables [GDP, producer price index (PPI), CPI, the broadest money supply (M3) and ER] and the Malaysian stock market index (SMI) for the 1977-2011 period. Second, it incorporates the latest data for Malaysia, that comprises before and after the financial crises periods represented by Asian financial crisis (AFC) and global financial crisis (GFC). Third, this paper and to the best of researchers' knowledge, is the first that employs Pesaran, Shin, and Smith tests, PSS (2001) bounds tests Approach in matrix elements form to analyze the long-run and short-run equilibrium relationships between macroeconomic variables and SMI. Finally, it utilizes Ng and Perron, NP (2001) bounds statistics test to detect the boundaries of variables stationarity, since this test is more appropriate with small sample sizes.

The equilibrium relationships between stock markets and macroeconomic variables holds implications for investors, as well as for policy makers to recognize and to evaluate changes in economic conditions, or to forecast the future performance of the macro-economy. Besides, the results of this study based on the Malaysian stock market are likely to hold implications for other emerging stock markets.

The reminder of this paper is organized as follows: The next section provides an overview of Malaysian economy and stock market. Section 3 reviews the previous empirical studies using various equilibrium and volatility time-series models. The data selection and methodology are discussed in section 4. Section 5 analyzes the results. Section 6 draws policy implications, while conclusions, future research and limitation are presented in last section.

2. Malaysian Economy and Stock Market Overview

2.1 Malaysian Economy Overview

Since the independence in 1957, Malaysia began its economic transition from being reliant on primary sectors (mining, quarrying, agriculture, forestry and fishing) to depend more on services, construction and manufacturing to imitate the four Asian Dragons economies; China, Singapore, South Korea, and Taiwan (Ghosh and Ariff, 2004). However, during the last three decades, many emerging countries followed financial and economic liberalization by opening their economies and domestic stock markets to international investors that leaded to enhance economic growth (Ortiz et al., 2006). In 1991, the economic and financial plan was coincided with the financial and economic liberalization. This plan improved productivity and employment in various economic and financial sectors by attracting FDI in Islamic finance, high technology industries, financial services and education system (Ghosh and Ariff, 2004) which boosted Malaysian economic growth rate.

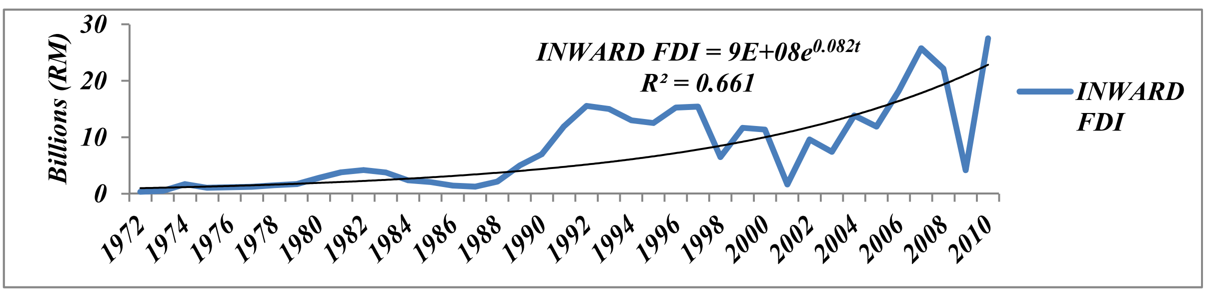

Figure 1. Malaysian inward FDI for the 1972-2010 period

Source: World Development Indicators Data Base, available at: *http://databank.worldbank.org/ddp/home.do.*

Figure 1 shows that inward FDI recorded an annual growth rate of 8.2% for the 1972-2010 period. However, the inward FDI started in 1972 with a value of RM342 million and moved steadily till the first peak in 1992 with a value of RM5,183 billion, then, declined sharply in 1998 at a value of RM2,163 billion as a result of AFC. The inward FDI climbed to reach the second peak in 2007 with a value of RM26 billion, then, declined harshly in

2009 at a value of RM4,162 billion due to GFC. Further, the inward FDI reached the highest peak in 2010 with a value of RM28 billion. A huge value of inward FDI to Malaysia leaded to enhance economic growth [real gross domestic product (RGDP)] and a decline in unemployment (UEM) rate as shown in Figures 2 and 3 respectively.

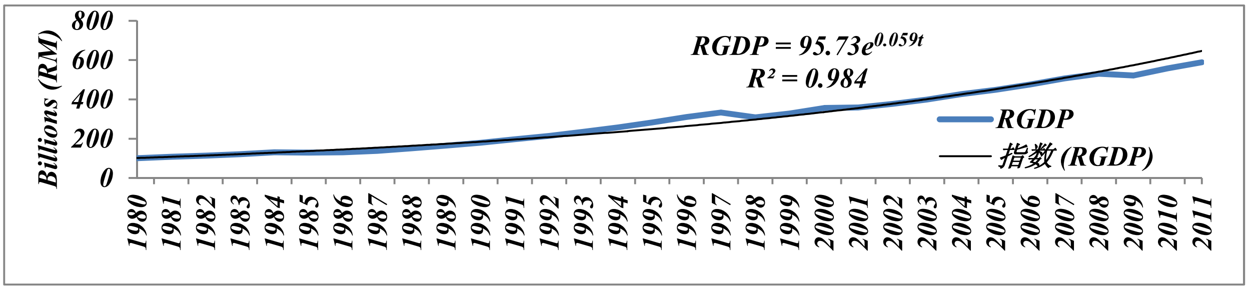

Figure 2. Real Gross Domestic Product for the 1980-2011 period.

Source: International Monetary Fund (2010), World Economic Outlook Databases, available on line at: *http://www.imf.org/external/pups/ft/weo/2010/01/weodata/download.aspx*

Figure 2 reveals that RDGP achieved an annual growth rate of 5.9% for the 1980-2011 period as a result of high levels of foreign and domestic private investments flowed into Malaysia. RGDP decreased dramatically in 1998 with a value of RM309 billion due to AFC, since it was RM334 billion in1997. Furthermore, RGDP decreased steadily from RM530 billion in 2008 to RM521 billion in 2009 due to GFC. Figure 3 demonstrates that UEM rate decreased dramatically as a result of a huge FDI flows into Malaysia which leaded to create jobs and increase employment in economic and financial sectors.

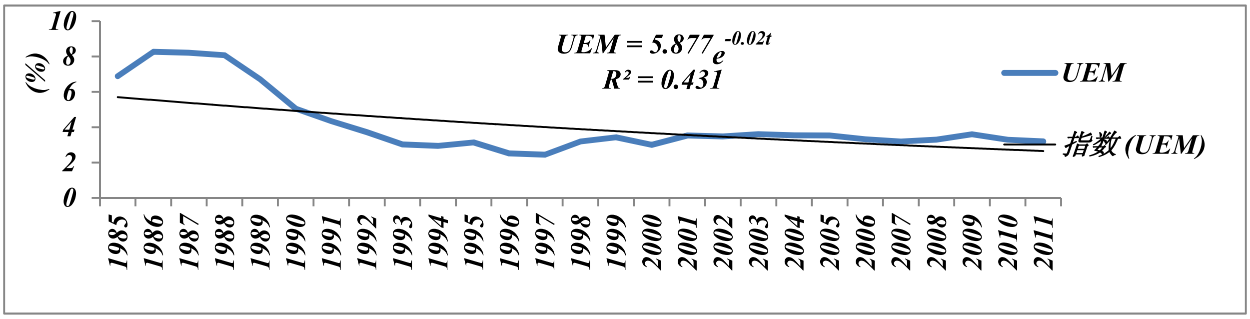

Figure 3. Unemployment Rate for the 1985-2011 period

Source: International Monetary Fund (2010), World Economic Outlook Databases, available on line at: *http://www.imf.org/external/pups/ft/weo/2010/01/weodata/download.aspx*

UEM rate (Figure 3) shows an inverse growth rate of -2% for the 1985-2011 period. However, UEM rate started at 6.9% in 1985 and decreased sharply until the year 1996 with a rate of 2.5% and remained stable from 1994 till 2011.

2.2 Malaysian Stock Market Overview

Malaysian stock market is known as Bursa Malaysia, and considered one of the largest stock markets in South East Asia with 829 listed companies offering a wide range of investment opportunities to domestic and international investors (Bursa Malaysia, 2012). On July 6, 2009 Malaysian stock market followed the latest FTSE Bursa Malaysia index methodology that calculated and disseminated on a real time basis every 15 seconds instead of 60 second to insure that Malaysian stock market reflects the changes in national and global economy (Bursa Malaysia, 2012). However, Malaysian stock market is considered the second among the largest South East Asian stock markets according to its domestic market capitalization. Figure 4 reveals that the annual growth rate of domestic market capitalization for Indonesia, Singapore, Philippines, Thailand and Malaysia are 14.5%, 11%, 8.4%, 7.5% and 6.1% for the 1990-2011 period respectively

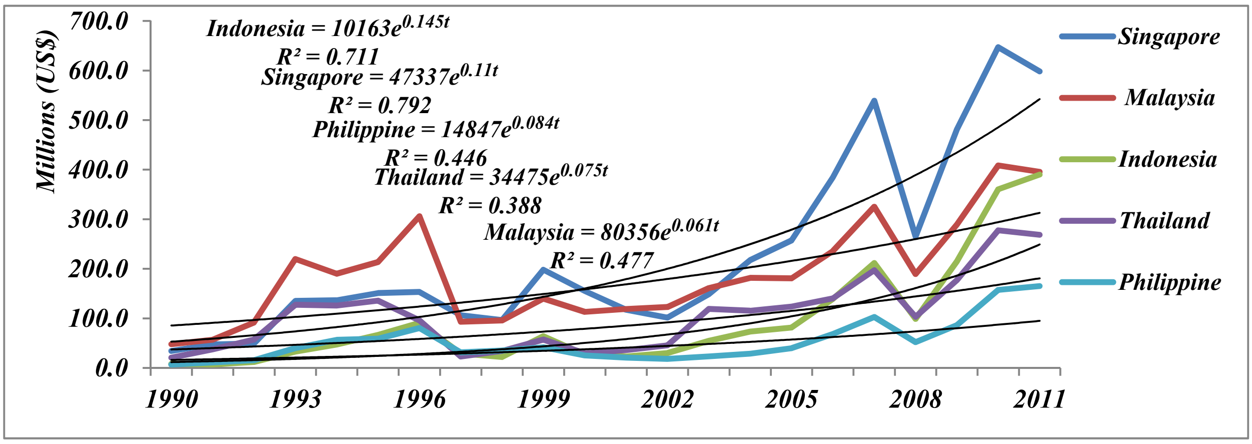

Figure 4. Domestic Market Capitalization for the 1990-2011 period

Source: World Federation of Exchange (2012), available on line at: *http://www.world-exchanges.org/statistics/time- series/value-share- trading.*

Furthermore, Figure 5 reveals that SMI recorded an annual growth rate of 5.7% for the 1977-2011 period.

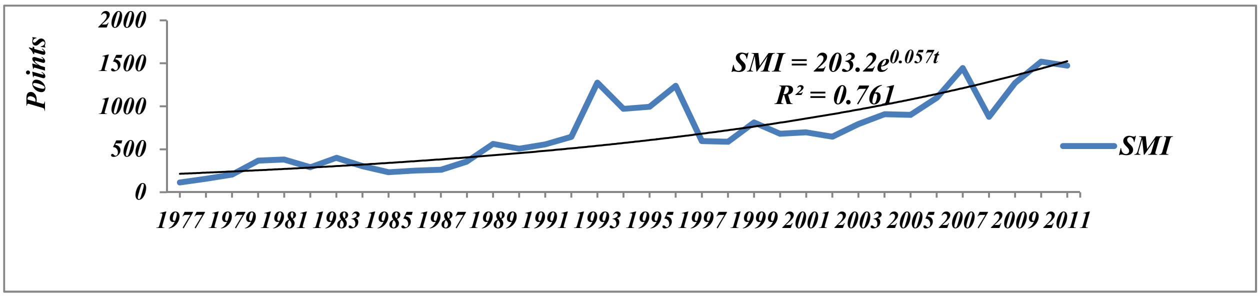

Figure 5. Stock Market Index for the 1977-2011 period

Source: Bursa Malaysia, available on line at: *www.bursamalaysia.com.*

Before the onslaught of AFC in 1997-98, the performance of SMI rose sharply to reach the first peak in 1993 and the second peak in 1996 with 1275 points and 1238 points respectively. The weakness of SMI in the year 2008 was due to the GFC, whilst SMI declined from 1445 points in 2007 to 877 points in 2008. However, SMI achieved more than 1400 points at the end of 2011. Besides, Figure 3 shows that the trading volume of shares in Malaysian stock market was vivid that achieved a growth rate of 6.7% for the 1993-2011 period.

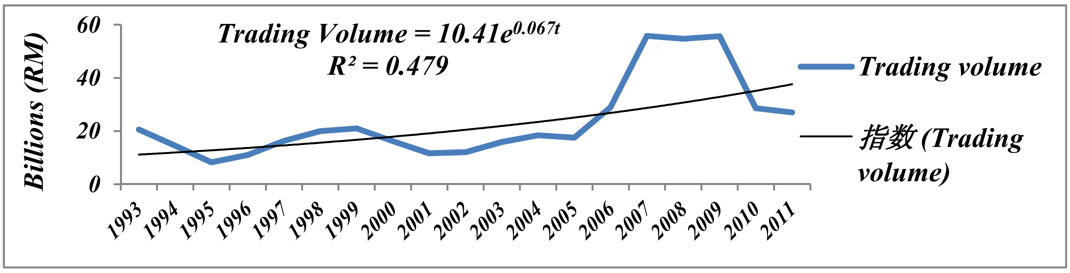

Figure 6. Trading Volume for the 1993-2011 period

Source: Bursa Malaysia, available on line at: *www.bursamalaysia.com*.

The trading volume started at RM20.6 billion and fell gradually to reach the first sharp decline in 1995 at a value of RM8.24 billion, then, increased slowly to reach the first peak in 2007 with a value of RM55.8 billion. The trading volume remained stable over 2007-2009 period. However, the trading volume declined harshly from RM28.6 billion in 2010 to RM27 billion in 2011.

3. Review of Previous Empirical Studies

Past studies have been widely enriched by various empirical studies that explored the relationships between macroeconomic variables and stock market indices (Aburgi, 2008; Adjasi, 2009; Beltratti and Morano, 2006; Hassapis and Kalyvitis, 2002; Hatemi-J and Morgan, 2009; Humpe and Macmillan, 2009; Kizys and Pierdzioch, 2009; Liu and Shrestha, 2008; Pal and Mittal, 2011). As such, they noticeably argued that macroeconomic variables [GDP, IP, PPI, CPI, ER, M1, M2, M3, gross domestic saving (GDS), gold prices (GP), oil prices (OP), federal funds rate (FFR) and INT] influence stock market indices, and implied that macroeconomic variables affect investors' investment decisions.

Nonetheless, several empirical studies debated the relationships between macroeconomic variables and stock market indices using equilibrium time-series models. The VAR equilibrium time-series model employed by many researchers (Araugo, 2009; Black et al., 2003; Buyuksalvarci and Abdioglu, 2010; Dritsaki, 2005; Li et al., 2010; Muradoglu et al., 2000; Ratanapakom and Sharma, 2007; Tsoukalas, 2003; Verma and Ozuna, 2005; Wongbangpo and Sharma, 2002) to examine the short-run equilibrium relationships between macroeconomic variables and stock market indices. The results found that macroeconomic variables significantly influence stock market indices. However, the VEC equilibrium time-series model applied by others (Adeleke and Gbadebo, 2012; Agrawalla and Tuteja, 2008; Chaudhuri and Smiles, 2004; Filis, 2010; Herve et al., 2011; Hess, 2004; Hosseini et al., 2011; Karacaer and Kapusuzoglu, 2010; Kyereboah and Agyire, 2008; Maysami and Koh, 2000; Muradoglu et al., 2001; Nasseh and Strauss, 2000; Patra and Poshakwale, 2006; Wong et al., 2006) to explore the long-run and short-run equilibrium relationships between macroeconomic variables and stock market indices. These studies revealed that macroeconomic variables significantly change stock market indices.

At the same time, numerous studies analyzed the relationships between macroeconomic variables and stock market indices using GARCH volatility time-series models (Bhar and Malliaris, 2011; Chen, 2009; Erdem et al., 2005; Hanousek and Kocenda, 2011; Hsing, 2011; Hsing and Hsieh, 2012; Kim et al., 2004; Nguyen, 2011; Rangel, 2011). Also, the results indicated that the conditional volatility of macroeconomic variables significantly influence stock market indices.

One of the key objectives of this paper is to analyze the long-run and short-run equilibrium relationships between macroeconomic variables (GDP, PPI, CPI, ER and M3) and SMI by applying the equilibrium time-series bounds tests Approach developed by PSS (2001). Therefore, the formulation of paper hypotheses is essentially based on the previous empirical studies that conducted using VAR and VEC equilibrium time-series models as follows:

$\boldsymbol{H_1}$: *There are significant long-run equilibrium relationships between macroeconomic variables (GDP, PPI, CPI, ER, and M3) and SMI.*

$\boldsymbol{H_2}$: *There are significantshort-run equilibrium relationships between macroeconomic variables (GDP, PPI, CPI, ER, and M3) and SMI.*

4. Data Selection and Methodology Specification

4.1 Data Selection

Annual time-series data for the macroeconomic variables and SMI for the 1977-2011 period were collected. SMI represents the annual figures of Malaysian stock market index was obtained from Bursa Malaysia (www.bursamalaysia.com). M3 (RM billion) and ER (RM/US$) were collected from Bank Negara Malaysia (www.bnm.gov.my). GDP denotes the proxy of Malaysian real economic activity (RM billion) was obtained from the World Bank economic indicators data base (http://databank.worldbank.org/ddp/home.do). PPI and CPI were collected from Malaysian department of statistics (www.statistics.gov.my). According to the theory variables (M3, ER, GDP, PPI and CPI) could influence stock market indices either positively or negatively (Chaudhuri and Smiles, 2004; Hanousek and Kocenda, 2011; Ibrahim and Aziz, 2003). To stabilize the variables variances and to remove the seasonality, the variables transformations into natural logarithmic forms were used (Montgomery et al., 2008), except ER to make this variable simultaneous with other variables (Chen et al., 1986).

4.2 Methodology Specification

Over the past decades, economists have been aware that estimating time-series econometric models with non-stationary variables leads definitely to spurious results (Gujarati and Porter, 2008). If a variable contains a unit root, then, it is non-stationary and it is combination with other non-stationary variable leads to non-meaningful or spurious regression (Brooks, 2008). Evidence from the past studies suggested the presence of unit root in most of financial and economic variables (Montgomery et al., 2008). Therefore, it need to differentiate variables either *I(1)* or *I(d)* to achieve their stationarity. For this reason, it is necessary to test the presence of unit roots and to differentiate the variables. The current study employs NP bounds statistics test to detect individually the variables stationarity, since this test is more appropriate with small sample sizes.

However, the concept of co-integration reveals the existence of long-run equilibrium relationship among variables, where there is no tendency change, since economic and financial variables are in balance (Gujarati and Porter, 2008). Besides, the concept of co-integration that deals with the long-run relationship among a group of variables, where these variables either *I(0)*, *I(1)* or *I(d)* (Gujarati and Porter, 2008) is used to determine the appropriate model. The present study uses the bounds F-statistics test to identify the co-integration among variables.

In time series methodologies, numerous studies examined the long-run and short-run equilibrium relationships between macroeconomic variables and stock market indices using VAR and VEC Models. Under VAR Model, however, all variables are stationary and not co-integrated at the same level either *I(1)* or *I(2)* (Engle and Granger, 1987). On another vein, under VECM all variables are stationary and co-integrated at the same level either *I(1)* or *I(2)* (Johansen and Juselius, 1990). To examine the long-run and short-run equilibrium relationships between macroeconomic variables (LGDP, LPPI, LCPI, ER and LM3) and LSMI, PSS bounds tests approach is applied. This approach has many advantages compared with VAR and VEC Models. In other words, under PSS approach all variables are stationary and co-integrated at the same level either *I(1)*, *I(0)* or mutually co-integrated. Furthermore, this approach is more appropriate with small sample sizes (PSS, 2001).In matrix elements, this approach could be formulated as the following system:

$$\begin{bmatrix} \Delta LSMI_t \\ \Delta LGDP_t \\ \Delta LPPI_t \\ \Delta LCPI_t \\ \Delta ER_t \\ \Delta LM3_t \end{bmatrix} = \begin{bmatrix} \gamma_1 \\ \gamma_2 \\ \gamma_3 \\ \gamma_4 \\ \gamma_5 \\ \gamma_6 \end{bmatrix} + \begin{bmatrix} \Gamma_{11} & \Gamma_{12} & \Gamma_{13} & \Gamma_{14} & \Gamma_{15} & \Gamma_{16} \\ \Gamma_{21} & \Gamma_{22} & \Gamma_{23} & \Gamma_{24} & \Gamma_{25} & \Gamma_{26} \\ \Gamma_{31} & \Gamma_{32} & \Gamma_{33} & \Gamma_{34} & \Gamma_{35} & \Gamma_{36} \\ \Gamma_{41} & \Gamma_{42} & \Gamma_{43} & \Gamma_{44} & \Gamma_{45} & \Gamma_{46} \\ \Gamma_{51} & \Gamma_{52} & \Gamma_{53} & \Gamma_{54} & \Gamma_{55} & \Gamma_{56} \\ \Gamma_{61} & \Gamma_{62} & \Gamma_{63} & \Gamma_{64} & \Gamma_{65} & \Gamma_{66} \end{bmatrix} \begin{bmatrix} \Delta LSMI_{t-i} \\ \Delta LGDP_{t-i} \\ \Delta LPPI_{t-i} \\ \Delta LCPI_{t-i} \\ \Delta ER_{t-i} \\ \Delta LM3_{t-i} \end{bmatrix} + \begin{bmatrix} \delta_{11} & \delta_{12} & \delta_{13} & \delta_{14} & \delta_{15} & \delta_{16} \\ \delta_{21} & \delta_{22} & \delta_{23} & \delta_{24} & \delta_{25} & \delta_{26} \\ \delta_{31} & \delta_{32} & \delta_{33} & \delta_{34} & \delta_{35} & \delta_{36} \\ \delta_{41} & \delta_{42} & \delta_{43} & \delta_{44} & \delta_{45} & \delta_{46} \\ \delta_{51} & \delta_{52} & \delta_{53} & \delta_{54} & \delta_{55} & \delta_{56} \\ \delta_{61} & \delta_{62} & \delta_{63} & \delta_{64} & \delta_{65} & \delta_{66} \end{bmatrix} \begin{bmatrix} LSMI_{t-1} \\ LGDP_{t-1} \\ LPPI_{t-1} \\ LCPI_{t-1} \\ ER_{t-1} \\ LM3_{t-1} \end{bmatrix} + \begin{bmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \\ \eta_5 \\ \eta_6 \end{bmatrix} \begin{bmatrix} ECM_{t-1} \\ ECM_{t-1} \\ ECM_{t-1} \\ ECM_{t-1} \\ ECM_{t-1} \\ ECM_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \\ \varepsilon_5 \\ \varepsilon_6 \end{bmatrix}$$

Δ represents the backshift operator; $\gamma_i (i = 1, \ldots\ldots, 6)$ and $\varepsilon_i (i = 1, \ldots\ldots, 6)$ denote intercepts and error terms respectively; ECM_{t-1} represents the one period lagged error term which used to link the long-run equilibrium of the variables with their short-run and to insure the co-integration; $\eta_i (i = 1, \ldots\ldots, 6)$ denote the coefficients of ECM_{t-1}; $\delta_{ij} (i, j = 1, \ldots\ldots, 6)$ and $\Gamma_{ij} (i, j = 1, \ldots\ldots, 6)$ represent the long-run and short-run coefficients of variables respectively.

The H_0 of no co-integration among the variables is tested by setting the δ_{ij} of the one lagged variables equal to zero i.e., H_0: $\delta_{ij} = 0$, against the H_1 of co-integration among variables where δ_{ij} of one lagged variables are not equal to zero i.e., H_1: $\delta_{ij} \neq 0$.

The calculated F-statistics are compared with the critical values tabulated at statistical tables in PSS (2001). If the calculated F-statistics are greater than the upper bounds, then the H_0 are definitely rejected, which means that the variables included in the models are shared long-run relationships among themselves (PSS, 2001).If the calculated F-statistics are smaller than the lower bounds, then the H_0 are accepted, which means that the variables included in the models are not shared long-run relationships among themselves (PSS, 2001). However, if the calculated F-statistics fall between the upper and the lower bounds values, then, the decisions are inconclusive to either accept or reject the H_0 (PSS, 2001).

However, after specifying stationarity and co-integration tests we proceed on analyzing the long-run and short-run coefficients as well as the error correction terms of the above system.

5. Results Analyses

5.1 Stationarity Bounds Statistics Test

Table 1 reports the stationarity results of NP bound statistics test which is carried out on the logarithms of the variables and using the deterministic components of intercept and trend.

Table 1. Stationarity Results of Bounds Statistics Test

Stages	Variables	MZ_a^{GLS}	MZ_a^{GLS} Critical Values	MZ_t^{GLS}	MZ_t^{GLS} Critical Values	MSB^{GLS}	MSB^{GLS} Critical Values	MP_T^{GLS}	MP_T^{GLS} Critical Values
Lower Bound	LSMI	-13.87	-23.81	-2.60	-2.62	0.187	0.185	6.75	6.67
	LGDP	-2.29	-23.82	-0.96	-2.63	0.42	0.186	34.84	6.68
	LPPI	-5.02	-23.83	-1.54	-3.42	0.31	0.14	17.93	4.03
	LCPI	-6.32	-23.84	-1.67	-3.43	0.26	0.13	14.37	4.02
	ER	-7.12	-23.86	-1.77	-3.44	0.25	0.12	12.95	4.01
	LM3	-394.64*	-23.81	-14.00*	-3.45	0.04*	0.11	0.32*	4.04
Upper Bound	ΔLSMI	-32.57*	-23.88	-4.03*	-3.45	0.12*	0.16	2.82*	4.03
	ΔLGDP	-16.19***	-14.20	-2.74***	-2.66	0.17***	0.19	6.25***	6.67
	ΔLPPI	-16.14***	-14.21	-2.84***	-2.62	0.18***	0.18	5.67***	6.68
	ΔLCPI	-16.42***	-14.22	-2.86***	-2.63	0.17***	0.17	5.56***	6.67
	ΔER	-16.24***	-14.23	-2.85***	-2.64	0.18***	0.16	5.62***	6.69
	ΔLM3	-12.91	-14.25	-2.54	-2.62	0.20	0.15	7.06	6.66

Note: (1) *, *** denote significance at 1 and 10% level respectively.

(2) MZ_a^{GLS}, MZ_t^{GLS} and MSB^{GLS} are the enhancements of Phillips and Perron (1988) statistics tests. They used to correct the size distortions when residuals are negatively correlated.

Source: Output of Eviews 7.2 Econometric Software.

Table 1 shows that all variables are non-stationary at the lower bound except LM3 which is stationary at the 1% significant level. At the upper bound, however, all the variables are stationary, but with different significance levels. Specifically, LGDP, LPPI, LCPI and ER are stationary at 10% significance level, while LSMI is stationary at 1% significance level. The results indicate that all variables employed in regression are stationary and would not cause spurious regression results.

5.2 Bounds F-statistics Test

Given that all the variables are stationary, we can apply the bounds F-statistics as suggested by PSS (2001) to test the H_0 of no co-integration among variables. Table 2 provides the results of calculated and critical values of bounds F-statistics test.

Table 2. Bounds F-statistics Test Results

Models	Calculated F-statistics[2]	Critical values of F-statistics[1] Significance Level	Lower Bound	Upper Bound
$LSMI_t$	3.46**	1%	1.99	1.94
$LGDP_t$	2.97*	2.5%	2.27	3.28
$LPPI_t$	2.75*	5%	2.55	3.61
$LCPI_t$	3.47**	10%	2.88	3.99
ER_t	2.08*			
$LM3_t$	3.88***			

Notes: (1) PSS (2001), Critical Values Table; (2). *, **, ***, **** *denote significance at 1, 2.5, 5 and 10% levels, respectively.*

Source: Output of *Micro-fit 4.1 Econometric Software.*

Table 2 reveals that the H_0 of no co-integration in all models are rejected, but with different significance levels. The H_0 is rejected in $LSMI_t$ and $LCPI_t$ models at 2.5% and 5% significance level respectively.

For the $LGDP_t$, $LPPI_t$ and ER_t models the decisions are inconclusive to either accept or reject H_0 and in this study we reject the H_0. Also, it concludes that all variables are co-integrated with $LSMI_t$ in the long-run and any deviations may occur in the short-run. The results are confirmed with others results studies (Chaudhuri and Smiles, 2004; Hanousek and Kocenda, 2011; Ibrahim and Aziz, 2003).

5.3 Long-run and Error Correction Analyses

The presence of long-run equilibrium relationships among variables does not imply the perfect co-integration (Engle and Granger, 1987). That is, if the error correction terms are significant with negative signs, then, the error correction terms are stable and co-integration, the causality in the long-run is achieved. Table 3 provides the long-run coefficients and error correction terms of the models in the present paper (See, Section 4.2).

Table 3. Long-run and Error Correction Coefficients

Models	Constant	$LSMI_{t-1}$	$LGDP_{t-1}$	$LPPI_{t-1}$	$LCPI_{t-1}$	ER_{t-1}	$LM3_{t-1}$	ECM_{t-1}
$\Delta LSMI_t$	-16.84		2.13^{**}	-2.02^{*}	-4.59^{*}	-0.20^{***}	-0.96^{***}	-1.37^{*}
$\Delta LGDP_t$	12.78^{*}	-0.41^{***}		0.07	0.15	0.04^{***}	0.40^{*}	-0.88^{*}
$\Delta LPPI_t$	-66.37^{*}	-0.41^{***}	5.21^{*}		-0.17	-0.26^{*}	-2.08	-0.33^{*}
$\Delta LCPI_t$	0.52	0.13^{*}	0.13	-0.08		0.06	0.07	1.00^{*}
ΔER_t	-22.42	-2.59	3.37	-5.66^{**}	-7.8		2.95	-0.53^{*}
$\Delta LM3_t$	-25.02^{*}	-0.02	1.85^{*}	-0.32^{***}	20.86^{**}	-0.16^{*}		-0.57^{*}

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

Source: Output of Micro-fit 4.1 Econometric Software.

Table 3 shows that at 1% significance level, $LGDP_{t-1}$ is positively associated with $LM3_t$ model, and the reverse does hold. $LPPI_{t-1}$ and $LCPI_{t-1}$ are negatively associated with $LSMI_t$ model, while $LPPI_{t-1}$ and ER_{t-1} are negatively associated with $LM3_t$ model. However, $LPPI_{t-1}$ is negatively associated with ER_t model. At 5% significance level, $LCPI_{t-1,}$ $LGDP_{t-1}$ and ER_{t-1} are positively associated with $LM3_{t,}$ LSMIt and $LCPI_t$ models respectively, while ER_{t-1} is negatively associated with $LPPI_t$ model. At 10% significance level, $LGDP_{t-1,}$ ER_{t-1} and $LM3_{t-1}$ are negatively associated with $LPPI_{t,}$ $LSMI_t$ and $LCPI_t$ models, while ER_{t-1} is positively associated with $LGDP_t$ model.

Furthermore, Table 3 illustrates that the coefficients of (ECM_{t-1})'s are significant with appropriate signs. Thus, the perfect co-integration and causality among variables are achieved. Further, the highly significant of ECM_{t-1} implies a quite speed of achieving the long-run equilibrium. Specifically, the $\Delta LSMI_t$ model records the highest ECM_{t-1} in absolute value among other models suggesting that 137% of any previous disequilibrium in the long-run would be shortly corrected back in the current year, while, $LPPI_t$ model records the lowest ECM_{t-1} in absolute value suggesting a very low speed toward its long-run equilibrium.

5.4 Short-run Analysis

After conducting long-run and error correction analyses we proceed for analyzing the short-run status of the models. So, table 4 presents the results of the short-run analysis. These results reveal that the lagged variables in $\Delta LSMI_t$ model are significant and the variables are Granger cause $\Delta LSMI_t$ in the short-run, while the lagged variables of $\Delta LCPI_t$ are not Granger cause $\Delta LGDP_t$, $\Delta LPPI_t$ and $\Delta LM3_t$ models. On the other hand, the lagged variables of $\Delta LSMI_t$, and $\Delta LM3_t$ are Granger cause $\Delta LCPI_t$ model, while the lagged variables of $\Delta LGDP_t$ and $\Delta LSMI_t$ are not Granger cause ΔER_t and $\Delta LM3_t$ models respectively.

Table 4. Short-run Results

	Models					
Variables Lagged Values	$\Delta LSMI_t$	$\Delta LGDP_t$	$\Delta LPPI_t$	$\Delta LCPI_t$	ΔER_t	$\Delta LM3_t$
$\Delta LSMI_t$		0.03^{**}	-0.04	-0.01	-0.97^{*}	0.03
$\Delta LSMI_{t-1}$	0.26^{***}		0.06^{**}	-0.09^{*}	0.29^{***}	0.03
$\Delta LSMI_{t-2}$				-0.04^{**}		
$\Delta LGDP_t$	-2.91^{***}		1.11^{*}	0.12	1.78	0.53^{***}
$\Delta LGDP_{t-1}$		0.03	0.19			
$\Delta LGDP_{t-2}$		0.18	0.35^{**}			
$\Delta LPPI_t$	-272^{*}	0.42^{*}		0.08		0.04
$\Delta LPPI_{t-1}$	-1.53^{***}	0.06			-2.09^{***}	0.13
$\Delta LPPI_{t-2}$	-1.20	0.14				0.29^{**}
$\Delta LCPI_t$	-1.02		-0.06		0.02	-0.23
$\Delta LCPI_{t-1}$	4.75^{*}				4.21^{*}	
$\Delta LCPI_{t-2}$	2.24^{**}				1.84	
ΔER_t	-0.64^{*}		-0.03	0.01		0.00
ΔER_{t-1}		-0.09^{*}	0.12^{*}			0.05^{***}
ΔER_{t-2}			0.09^{*}			0.04^{***}
$\Delta LM3_t$	1.32^{***}	0.36^{*}	0.69^{*}	0.07	1.56^{***}	
$\Delta LM3_{t-1}$				-0.29^{*}		-0.18
$\Delta LM3_{t-2}$				-0.28^{**}		
Constant	-23.08	11.27^{*}	-22.08^{*}	0.53	-11.89	-14.27^{*}

***Note**: *, **, *** denote significance at 1, 5 and 10% level.*

Source: Output of Micro-fit 4.1 Econometric Software.

6. Policy Implications

The results of this study suggest that Malaysian policy makers should pay more attention to the effects of monetary policies and economic activity measurement on stock market. Specifically, the results are confirmed with earlier results of Ibrahim (1999) who found that the money supplies are positively and negatively associated with SMI in both long-run and short-run. The contraction of money supply leads to lower interest rate, lower firm investment, and then, decreases the attractiveness of investors to invest in stock market. In sharp contrast, the expansion of money supply leads to raise stock market index due to more liquidity, more output and portfolio adjustment (Hsing and Hsieh, 2012). However, a further increase in money supply reduces stock market index because of inflationary influences and its negative effects on stock market index. Besides, the results are confirmed with the results of Hanousek and Kocenda (2011) who revealed that the GDP is positively and negatively associated with the emerging European stock market indices. A high GDP in a particular industry, such as the Malaysian manufacturing industry is a sign that the firms in that industry are performing well, thereby leads to increase their share prices in stock market. In sharp contrast, a low GDP is a sign that these firms are not performing well, which lead to decrease their share prices in stock market. Indeed, the results are consistence with the results of Ibrahim and Aziz (2003) study who found that the ER is negatively associated with Malaysian stock market index in the long-run and short-run.

In addition, Malaysian policy makers, also, should be aware to the importance of inward FDI in enhancing economic growth. The attraction of FDI into Malaysia creates jobs and employment in economic and financial sectors, improves production and management techniques and moreover, increases the competitiveness in domestic and international markets.

7. Conclusions, Future Research and Limitation

The present paper examines the long-run and short-run equilibrium relationships between macroeconomic variables (GDP, PPI, CPI, ER, and M3) and SMI using annual time-series data for the 1977-2011 period. However, it employs NP bounds statistics test to detect the variables stationarity and bounds F-statistic for testing the co-integrating relationships among variables. The long-run and short-run equilibrium relationships among variables are analyzed using PSS bounds tests Approach. Results of NP test show that the H0 of non-stationary is rejected at all cases except one variable. More specifically, the variables SMI, GDP, PPI, CPI, ER, and M3 are stationary at the upper bound, while the variable GDP is stationary at the lower bound. The results of bounds F-statistics test reveal that all variables are co-integrated with SMI. In addition, the results of PSS bounds tests Approach show the presence of long-run and short-run equilibrium relationships between all macroeconomic variables and SMI. In particular, PPI, CPI, ER, and M3 are negatively associated with SMI in the long-run, while GDP is positively associated. Additionally, GDP, PPI, and ER are negatively associated with SMI in the short-run, while CPI and M3are positively associated.

The study adds to the existing literature and focuses on the long-run and short-run equilibrium relationships between macroeconomic variables and stock market index in Malaysia as an emerging stock market rather than matured stock markets (case of US or the UK) which have been frequently studied in the past. Finally, the results of this paper are of particular interest and importance to policy makers, financial economists, domestic investors and international investors dealing with Malaysian economy and stock market. In fact, future research could broaden this study by adding more variables that have significant influences on stock prices such as oil prices and inward FDI or including more than one country to draw robust results.

From statistical perspective, the main limitation of this study is the small sample size of 35 observations which has a limiting factor, since the number of lags that use, consumes the number of observations and leads to specification errors in the analysis (Gujarati & Porter, 2008).

References

Abugri, B. A. (2008). Empirical relationship between macroeconomic volatility and stock returns: Evidence from Latin American markets. *International Review of Financial Analysis, 17*, 396-410. http://dx.doi.org/10.1016/j.irfa.2006.09.002

Adeleke, A. I., & Gbadebo, A. O. (2012). Macroeconomic policy and returns on equities: Empirical evidence from the Nigerian capital market. *International Research Journal of Finance and Economics, 83*, 106-119.

Adjasi, K. D. C. (2009). Macroeconomic uncertainty and conditional stock-price volatility in frontier African markets: Evidence from Ghana. *The Journal of Risk Finance, 10*(4), 333-349. http://dx.doi.org/10.1108/15265940910980641

Agrawalla, R. K., & Tuteja, S. K. (2008). Share prices and macroeconomic variables in India. *Journal of Management Research, 8*(3), 137-146.

Araujo, E. (2009). Macroeconomic shocks and the co-movement of stock returns in Latin America. *Emerging Markets Review, 10*, 331-344. http://dx.doi.org/10.1016/j.ememar.2009.08.003

Beltratti, A., & Morano, C. (2006). Breaks and Persistency: macroeconomic causes of stock market volatility. *Journal of Econometrics, 131*, 151-177. http://dx.doi.org/10.1016/j.jeconom.2005.01.007

Bhar, R., & Malliaris, A. G. (2011). Dividends, momentums, and macroeconomic variables as determinants of the US equity premium across economic regimes. *Review of Behavioral Finance, 3*, 27-53. http://dx.doi.org/10.1002/rbf.14

Bjornland, H. C. & Leimtemo, K. (2009). Identifying the interdependence between US monetary policy and the stock market. Journal of Monetary Economics, 56, 275-282.

Black, A., Fraser, P., & Groenewold, N. (2003). U.S. Stock prices and macroeconomic fundamentals. *International Review of Economics and Finance, 12*, 345-367. http://dx.doi.org/10.1016/S1059-0560(03)00016-9

Brooks, C. (2008). *Introductory econometrics for finance.* 2nd Edition, Cambridge University press, New York, USA. http://dx.doi.org/10.1017/CBO9780511841644

Bursa Malaysia. (2012). FTSE Bursa Malaysia Index Series, available on line at: http://www.ftse.com/Indices/FTSE_Bursa_Malaysia_Index_Series/Downloads/FTSE_Bursa_Malaysia_Index_Series_FAQv3.pdf

Buyuksalvarci, A., & Abdioglu, H. (2010). The causal relationship between stock prices and macroeconomic variables: A case study for Turkey. *International Journal of Economic Perspectives, 4*(4), 601-610.

Chaudhuri, K., & Smiles, S. (2004). Stock market and aggregate economic activity: Evidence from Australia. *Applied Financial Economics, 14*(2), 121-129. http://dx.doi.org/10.1080/0960310042000176399

Chen, N., Richard R., & Stephen, A. R. (1986). Economic forces and the stock market. *Journal of Business, 59*(3), 383-403. http://dx.doi.org/10.1086/296344

Chen, S. (2009). Predicting the bear stock market: Macroeconomic variables as leading indicators. *Journal of Banking and Finance, 33*, 211-223. http://dx.doi.org/10.1016/j.jbankfin.2008.07.013

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for auto-regression time series with a unit root. *Journal of the American Statistical Association, 10*, 291-321.

Dritsaki, M. (2005). Linkage between stock market and macroeconomic fundamentals: Case study of Athens stock exchange. *Journal of Financial Management and Analysis, 18*(1), 38-47.

Engle, R. F., & Granger, C. W. J. (1987). Co-integration and error correction: Representation estimation and testing. *Econometrica, 55*, 251-276. http://dx.doi.org/10.2307/1913236

Erdem, C., Arslan, K. C., & Sema, M. (2005). Effects of macroeconomic variables on Istanbul stock exchange indexes. *Applied Financial Economics, 15*(14), 987-994. http://dx.doi.org/10.1080/09603100500120365

Filis, G. (2010). Macro economy, stock market and oil prices: Do meaningful relationships exist among their cyclical fluctuations? *Energy Economics, 32*, 877-886. http://dx.doi.org/10.1016/j.eneco.2010.03.010

Ghosh, D. K., & Ariff, M. (2004). *Global financial markets*. 1st edition. USA, Greenwood Publishing group.

Gujarati, D., & Porter, D. (2008). *Basic econometrics.* 5th edition, USA, New York, the McGraw-Hill companies.

Gujarati, D., & Porter, D. (2008). *Basic econometrics*. 5th edition, New York, USA, McGraw-Hill companies.

Gunasekarage, A., Pisdtasalasai, A., & Power, D. (2004). Macroeconomic influence on the stock market: Evidence from an emerging market in South Asia. *Journal of Emerging Market Finance, 3*(3), 285-304. http://dx.doi.org/10.1177/097265270400300304

Hanousek, J., & Kocenda, E. (2011). Foreign news and spillovers in emerging European stock markets. *Review of International Economics, 19*(1), 170-188. http://dx.doi.org/10.1111/j.1467-9396.2010.00939.x

Hassapis, C., & Kalyvits, S. (2002). Investigating the links between growth and real stock price changes with empirical evidence from the G-7 economies. *The Quarterly Review of Economics and Finance, 42*, 543-575. http://dx.doi.org/10.1016/S1062-9769(01)00111-9

Hatemi-J, A., & Morgan, B. (2009). An empirical analysis of the informational efficiency of Australian equity markets. *Journal of Economic Studies, 36*(5), 437-445. http://dx.doi.org/10.1108/01443580910992366

Herve, D. B. G., Chanmalai, B., & Shen, Y. (2011). The study of causal relationships between stock markets indices and macroeconomic variables in Cote d'Ivoire: Evidence from Error-Correction Models and Granger causality test. *International Journal of Business and Management, 6*(12), 146-170.

Hess, M.K. (2004). Dynamic and asymmetric impacts of macroeconomic fundamentals on an integrated stock market. *International Financial Markets, Institutions & Money, 14*, 455-471. http://dx.doi.org/10.1016/j.intfin.2003.12.005

Hosseini, S. M., Ahmad, Z., & Lai, Y. W. (2011). The role of macroeconomic variables on stock market index in China and India. *International Journal of Economics and Finance, 3*(6), 233-244. http://dx.doi.org/10.5539/ijef.v3n6p233

Hsing, Y. (2011). Effects of macroeconomic variables on the stock market: The case of the Czech Republic. *Theoretical and Applied Economics, 7*(560), 53-64.

Hsing, Y., & Hsieh, W. (2012). Impacts of macroeconomic variables on the stock market index in Poland: New evidence. *Journal of Business Economics and Management, 13*(2), 334-343. http://dx.doi.org/10.3846/16111699.2011.620133

Humpe, A., & Macmillan, P. (2009). Can macroeconomics variables explain long-term stock market movements? A comparison of the US and Japan. *Applied Financial Economics, 19*(2), 111-119. http://dx.doi.org/10.1080/09603100701748956

Ibrahim, M. H. (1999). Macroeconomic variables and stock prices in Malaysia: an empirical analysis. *Asian Economic Journal, 13*(2), 219-231. http://dx.doi.org/10.1111/1467-8381.00082

Ibrahim, M. H., & Aziz, H. (2003). Macroeconomic variables and the Malaysian equity market a view through rolling subsamples. *Journal of Economic Studies, 30*, 6-27. http://dx.doi.org/10.1108/01443580310455241

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*, 169-210. http://dx.doi.org/10.1111/j.1468-0084.1990.mp52002003.x

Karacaer, S., & Kapusuzoglu, A. (2010). Investigating causal relations among stock market and macroeconomic variables: Evidence from Turkey. *International Journal of Economic Perspectives, 4*(3), 501-507.

Kim, S., McKenzie, M. D., & Faff, R. W. (2004). Macroeconomic news announcements and the role of expectations: evidence for US bond, stock and foreign exchange markets. *Journal of Multinational Financial Management, 14*, 217-232. http://dx.doi.org/10.1016/j.mulfin.2003.02.001

Kizys, R., & Pierdzioch, C. (2009). Changes in the international co-movement of stock returns and asymmetric macroeconomic shocks. *Journal of International Financial Markets, Institutions and Money, 19*, 289-305. http://dx.doi.org/10.1016/j.intfin.2008.01.002

Kyereboah, A., & Agyire, K. (2008). Impact of macroeconomic indicators on stock market performance: The case of the Ghana Stock Exchange. *Journal of Risk Finance, 9(*4), 365-378. http://dx.doi.org/10.1108/15265940810895025

Li, Y. D., Iscan, T. B., & Xu. K. (2010). The impact of monetary policy shocks on stock prices: Evidence from Canada and the United States. *Journal of International Money and Finance, 29*, 876-896. http://dx.doi.org/10.1016/j.jimonfin.2010.03.008

Liu, M., & Shrestha, K. M. (2008). Analysis of the long-term relationship between macro-economy variables and the Chinese stock market using heteroscedastic co-integration. *Managerial Finance, 34*(11), 744-755. http://dx.doi.org/10.1108/03074350810900479

Maradoglu, G., Taskin, F., & Bigan, I. (2000). Causality between stock returns and macroeconomic variables in emerging markets. *Russian and East European Finance and Trade, 36*(6), 33-53.

Maysami, R. C., & Koh, T. S. (2000). A vector error correction model of the Singapore stock market. *International Review of Economics and Finance, 9*, 79-96. http://dx.doi.org/10.1016/S1059-0560(99)00042-8

Mishkin, F. S. (2004). *The economics of money, banking, financial markets*. 7th edition, the Addison-Wesley series in econometrics, USA.

Montgomery, D. S., Jennings, C. L., & Kulahci, M. (2008). *Introduction to time series analysis and forecasting.* 1st edition, Canada, John Wiley & Sons.

Morelli, D. (2002). The relationship between conditional stock market volatility and conditional macroeconomic volatility Empirical evidence based on UK data. *International Review of Financial Analysis, 11*, 101-110. http://dx.doi.org/10.1016/S1057-5219(01)00066-7

Muradoglu, G., Metin, K., & Argac, R. (2001). Is there a long run relationship between stock returns and monetary variables: Evidence from an emerging market. *Applied Financial Economics, 1*1, 641-649. http://dx.doi.org/10.1080/09603100110094411

Nasseh, A., & Strauss, J. (2000). Stock prices and domestic and international macroeconomic activity: a co-integration approach. *The Quarterly Review of Economics and Finance, 40*, 229-245. http://dx.doi.org/10.1016/S1062-9769(99)00054-X

Ng, S., & Perron, P. (2001). Lag length and the construction of unit root tests with good size and power. *Econometrica, 69*(6), 1519-1554. http://dx.doi.org/10.1111/1468-0262.00256

Nguyen, T. (2011). US macroeconomic news spillover effects on Vietnamese stock market. *Journal of Risk Finance, 12*(5), 1-16. http://dx.doi.org/10.1108/15265941111176127

Ortiz, E., Cabello, A., & Jesus, R. D. (2006). Long-run inflation and exchange rates hedge of stocks in Brazil and Mexico. *Global Economy Journal, 6*(3), 1-29. http://dx.doi.org/10.2202/1524-5861.1188

Pal, K., & Mittal, R. (2011). Impact of macroeconomic indicators on Indian capital markets. *Journal of Risk Finance, 12*(2), 84-97. http://dx.doi.org/10.1108/15265941111112811

Patra, T., & Poshakwale, S. (2006). Economic variables and stock market returns: evidence from the Athens stock exchange. *Applied Financial Economics, 16*(13), 993-1005. http://dx.doi.org/10.1080/09603100500426523

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approach to the analysis of level relationships. *Journal of Applied Econometrics, 16*, 289-326. http://dx.doi.org/10.1002/jae.616

Rangel, J. G. (2011). Macroeconomic news, announcements, and stock market jump intensity dynamics. *Journal of Banking and Finance, 35*, 1263-1276. http://dx.doi.org/10.1016/j.jbankfin.2010.10.009

Ratanapakom, O., & Sharma, C.S. (2007). Dynamic analysis between the US stock returns and the macroeconomic variables. *Applied Financial Economics, 17(*5), 369-377. http://dx.doi.org/10.1080/09603100600638944

Tsoukalas, D. (2003). Macroeconomic factors and stock prices in the emerging Cypriot equity market. *Managerial Finance, 29*(4), 87-92. http://dx.doi.org/10.1108/03074350310768300

Verma, R., & Ozuna, T. (2005). Are emerging equity markets responsive to cross-country macroeconomic movements? Evidence from Latin America. *Journal of International Finance Markets, Institutions and Money, 15*, 73-87. http://dx.doi.org/10.1016/j.intfin.2004.02.003

Wong, W.K., Khan, H., & Du, J. (2006). Do money and interest rates matter for stock prices? An econometric study of Singapore and USA. *The Singapore Economic Review, 51*(1), 31-51. http://dx.doi.org/10.1142/S0217590806002214

Wongbangpo, P., & Sharma, S. (2002). Stock market and macroeconomic fundamental dynamic interactions: ASEAN-5 countries. *Journal of Asian Economics, 13*, 27-51. http://dx.doi.org/10.1016/S1049-0078(01)00111-7