Macroeconomic Indicators and the Malaysian Capital Market: Time-Series Analysis

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Abstract

The paper assesses the long-run and short-run equilibrium relationships between six macroeconomic variables namely; industrial production index (IP), producer price index (PPI), consumer price index (CPI), exchange rates (ER), narrow money supply (M1), broad money supply (M2) and the Malaysian Stock Market Index (SMI) using annual time-series data for the 1977-2011 period. However, the results indicate the presence of long-run and short-run equilibrium relationships between four macroeconomic variables and SMI. The study's findings are of particular interest and importance to policy makers and investors whom dealing with the Malaysian economy and its stock market.

Keywords: *Stock prices; Macroeconomic Variables; Bounds Statistics; Malaysia.*

JEL classification: *C32; E44; GI4; N95*

1. Introduction

During the last decades, the equilibrium relationships between macroeconomic variables and stock prices have been widely studied by academic researchers and practitioners. In fact, the literature is very rich for matured stock markets of Canada, France, Germany, Italy, Japan, the UK, and the US. However, latest studies in this area support the argument that stock prices are influenced by macroeconomic variables such as industrial production index (IP), consumer price index (CPI), producer price index (PPI), federal funds rate (FFR), narrow money supply (M1), broad money supply (M2), interest rates (INT), real gross domestic product (RGDP), and exchange rates (ER) in matured stock markets (Beltratti & Morano, 2006; Hatemi-J & Morgan, 2009; Humpe & Macmillan, 2009; Kizys & Pierdzioch, 2009).

Since the early 1980s, there has been an increasing attention to study the relationships between macroeconomic variables and stock prices in emerging stock markets. However, in the early 1990s, many emerging countries liberalized their stock markets and decided to open their domestic stock markets to foreign investors. As a result, this leaded to rapid growth in their stock markets and economies as well as increased their positions in the international economic and financial environment (Ghosh & Ariff, 2004). In light with these matters, it's reasonable to conclude that emerging stock markets have features attract investors and researchers to recognize, policy makers to evaluate and study these matters**.**

Notable studies have been conducted to examine the relationships between macroeconomic variables and stock prices in emerging stock markets. Hanousek and Kocenda (2011) used generalized autoregressive conditional heteroscedasticity (GARCH) Model and found significant evidence that emerging European stock market indices i.e., Czech Republic, Hungary, and

Poland were strongly influenced by mature European and the US stock market indices as well as their macroeconomic variables. Nguyen (2011) used moving average exponential (MAE)-GARCH Model and found that the US macroeconomic variables had positive effects on the conditional mean and negative effects on the conditional variance of Vietnam stock market index (GSE- share index).Using arbitrage pricing theory (APT), Rjoub et al. (2009) documented significant pricing relationships between stock returns and macroeconomic variables for the case of Turkey. Tsoukalas (2003) used vector autoregressive (VAR) Model and found that macroeconomic variables (CPI, ER, IP, and M2) were strongly related to stock prices for the case of Cyprus. Similarly, Verma and Ozuna (2005) showed that the changes in the macroeconomic variables of one Latin American country did not affect the stock markets of other Latin American countries. Moreover, they found that the Mexican stock market significantly affected other Latin American stock markets and the reverse did not hold.

In Malaysian context, few notable studies have been found in our area of interest. Ibrahim (1999) studied the relationships between seven macroeconomic variables (ER, foreign reserves (FR), credit aggregates (CG), consumer prices (CP), IP, M1, and M2) and the Malaysian stock market index using vector error correction model (VECM) and monthly time series data for the 1977-1996 period. The results suggested that Malaysian stock market index was efficient with respect to CP, CG, and FR, while inefficient with respect to M1, M2, ER, and IP. Similarly, Ibrahim and Aziz (2003) examined the short-run and long-run relationships between four macroeconomic variables (IP, CPI, M2, and ER) and the Malaysian stock market index using monthly time series data for the 1977-1998 period. They found positive short-run and long-run relationships between Malaysian stock market index and both of CPI and IP. Additionally, they found negative short-run and long-run relationships between Malaysian stock market index and both of M2 and ER.

The current paper provides further evidence to the literature on the equilibrium relationships between macroeconomic variables and stock prices. In particular, it examines the equilibrium long-run and short-run relationships between six macroeconomic variables (IP, PPI, CPI, ER, M1, and M2) and SMI in Malaysia for the 1977-2011period.

The rest of the paper is divided into six sections. Section 2 presents an overview of the Malaysian stock market. Section 3 discusses the review of previous empirical studies. Section 4 provides the bounds statistics methodology. Section 5 reports empirical results and analysis, while Section 6 provides policy implications. Conclusions and further studies are discussed in Section 7.

2. Overview of the Malaysian Stock Market

The Malaysian stock market is considered the second among the largest South East Asian stock markets according to its domestic market capitalization (See, Figure 1).

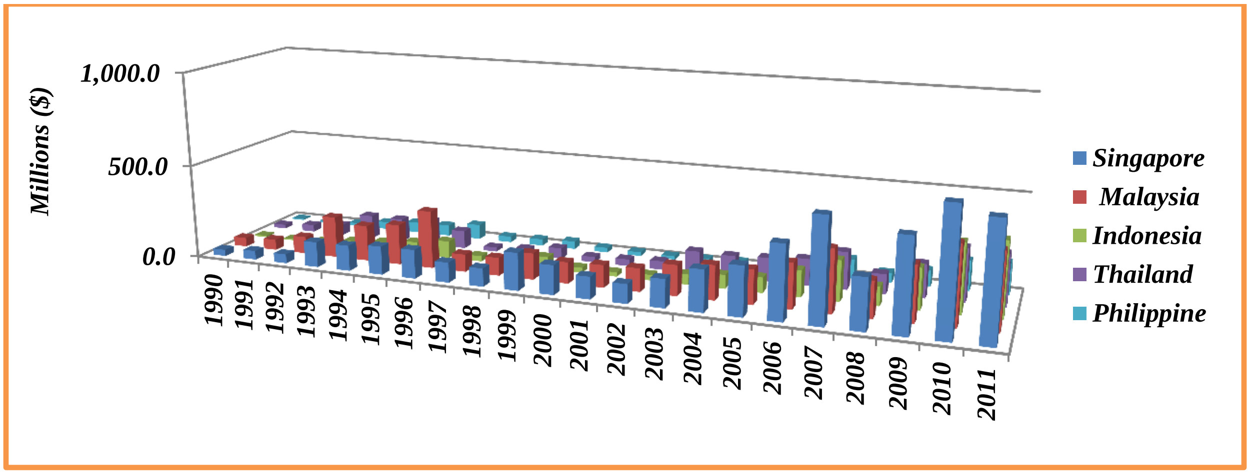

FIGURE *1:* DOMESTIC MARKET CAPITALIZATION FOR THE 1990-2011 PERIOD.
Source*:* WFE, http://www.world-exchanges.org/statistics/time-series/value-share-trading.

Figure 1 shows that the Singapore stock market achieved the highest domestic market capitalization of $598 million at the end of the year 2011 followed by the Malaysian, Indonesian, Thailand, and Philippine stock markets which recorded $396, $390, $268, and $165 million respectively. Malaysian stock market index (SMI) is the weighted average of stock prices which used to reflect the market capitalization of its components (Bursa Malaysia, 2012). SMI was started officially its operations in 1977 with a value of 113.40 points as shown in figure 2.

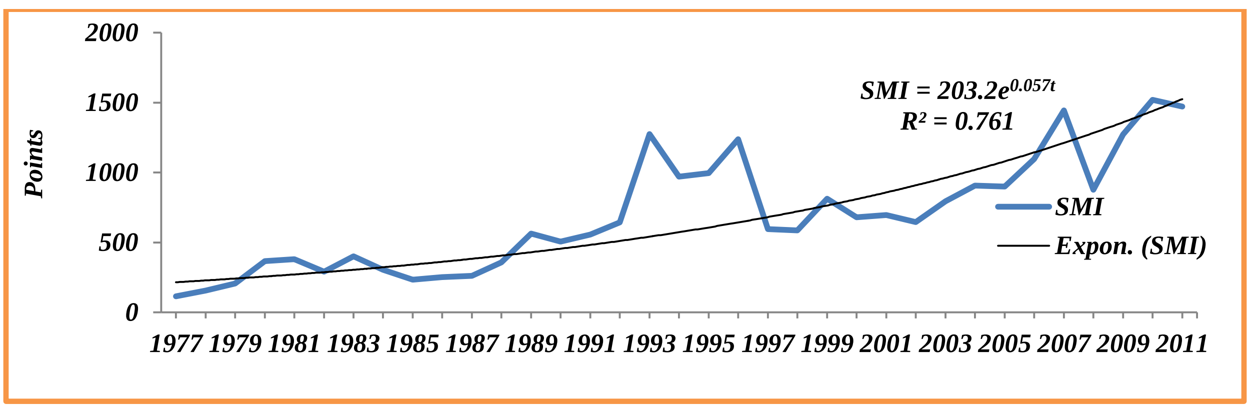

FIGURE 2*:* STOCK MARKET INDEX FOR THE 1977-2011 PERIOD.
Source*:* Bursa Malaysia, available on line at: www.bursamalaysia.com.

Figure 2 shows that SMI recorded an annual growth rate of 5.7% from 1977 till 2011. 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. However, SMI achieved more than 1400 points at the end of 2011. Besides that, figure 3 shows that the trading volume of shares in Malaysian stock market was vivid.

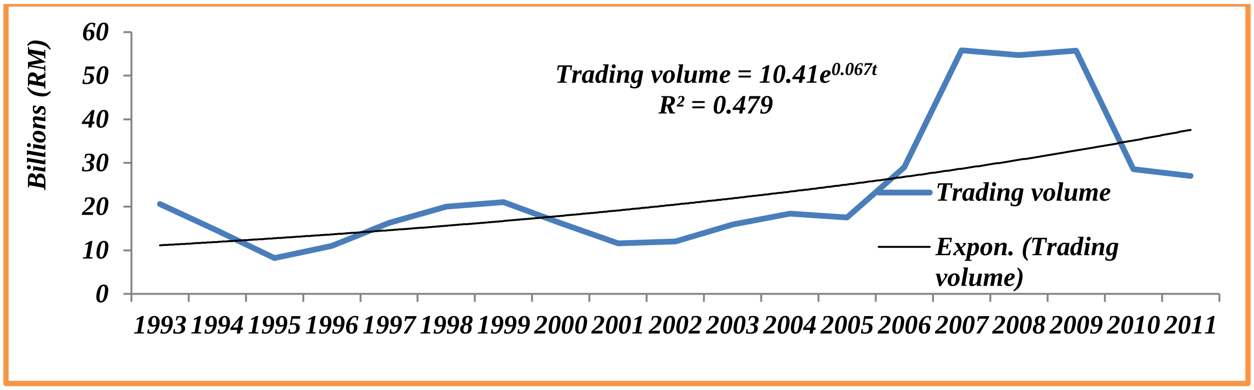

FIGURE 3: TRADING VOLUME FOR THE 1993-2011 PERIOD.
Source: Bursa Malaysia, available on line at: www.bursamalaysia.com.

However, the trading volume of shares recorded an annual growth rate of 6.7% for the 1993-2011 period. The trading volume started at RM20.6 billion and fell gradually to reach the first sharp decline in 1995 with a value of RM8.24 billion, then, the trading volume increased slowly to reach the first peak in 2007 with a value of RM 55.8 billion. The trading volume remained stable from 2007 till 2009. However, the trading volume declined sharply from RM28.6 billion in 2010 to RM 27billion in 2011.

3. Review of Previous Empirical Studies

The equilibrium relationships between macroeconomic variables and stock market indices received a lot of attention from academics whose studies employed different macroeconomic variables and data from both matured and emerging stock markets. However, in this section the researchers review a selected number of previous empirical studies from the vast literature which conducted in matured stock markets followed by studies conducted in emerging stock markets.

3.1. Previous Empirical Studies in Matured Stock Markets

Beltratti and Morano (2006) applied Markov switching (MS)-GARCH Model and daily time-series data to examine the relationship between macroeconomic variables (monthly IP, monthly CPI, FFR, and weekly M1) and the US stock market index (S&P500). They found a causality direction from S&P500volatility to macroeconomic volatility. However, the causality direction was stronger from macroeconomic to S&P500 volatility.

Hatemi-J and Morgan (2009) explored whether the Australian stock market was information-ally efficient in the semi-strong form in relation to ER and INT using Auto-Regressive Conditional Heteroscedasticity (ARCH) Model and daily time-series data for the 1994-2006 period. They found that the Australian stock market was not information-ally efficient with respect to the INT and ER.

Humpe and Macmillan (2009) investigated the impact of macroeconomic variables (IP, CPI, M2, and long-term INT) on S&P500 and the Japanese stock market index (Nikkei 225) using

VECM. For the US market, they found that S&P500 was positively related to IP and negatively related to both CPI and long-term INT. They also found positive relationship between S&P500 and M2. However, for the Japanese data, they found that Nikkei 225 influenced positively by IP and negatively by CPI and long-term INT.

Kizys and Pierdzioch (2009)examined the relationships between macroeconomic variables (short-term INT, inflation (INF), ER, CPI, and PPI) and the matured stock market indices of (Canada, France, Germany, Italy, Japan, the UK, and the US) using VAR Model and monthly time-series data for the 1975-2004 period. They found that the stock market indices were not systematically linked to the macroeconomic variables in both long-run and short-run.

3.2. Previous Empirical Studies in Emerging Stock Markets

Aburgi (2008) examined the impact of macroeconomic variables (ER, INT, IP, and M1) on stock market indices of four Latin American countries (Argentina, Brazil, Chile, and Mexico) using VAR Model and monthly time-series data for the 1986-2001 period. He found that macroeconomic variables influenced Latin American stock markets indices significantly.

Adjasi (2009) employed Exponential (E)-GARCH Model and monthly time-series data to investigate the effects of macroeconomic variables (CPI as a proxy of INF, M2, INT, gold prices (GP), oil prices (OP), and ER,) on the volatility of Ghanaian stock market index. He found that the volatility of INT increased the volatility of Ghanaian stock market index, while the volatility of GP, OP, and M2 reduced the volatility of Ghanaian stock market index.

Liu and Shrestha (2008) examined the long-run relationship between macroeconomic variables (time deposit INT, INF, M2, IP, and ER) and the two indices of Chinese stock market namely, Shanghai Stock Exchange, and Shenzhen Stock Exchange using GARCH Model and monthly time-series data for the 1992-2001 period with a total of 120 observations. The results showed that a co-integration relationship existed between stock market indices and macroeconomic variables in the long-run.

Pal and Mittal (2011) applied VECM and quarterly time-series data for the 1995-2008 period to examine the equilibrium long-run and short- run relationships between macroeconomic variables (INT, INF, gross domestic savings (GDS), and ER)and stock market indices in India. The results indicated co-integration relationships between macroeconomic variables and Indian stock market indices in both short-run and long-run.

Based on the previous empirical studies, the following hypotheses could be formulated for the current study:

H_1: There are significant long-run equilibrium relationships between macroeconomic variables (IP, PPI, CPI, ER, M1, and M2) and SMI.

H_2: There are significant short-run equilibrium relationships between macroeconomic variables (IP, PPI, CPI, ER, M1, and M2) and SMI.

4. Bounds Statistics Methodology

In fact, the research methodology needs to be carefully designed to obtain results that are quite robust, objective, and realistic. For the current paper, several steps of the research methodology have been adopted.

4.1. Variables Sources

The present study uses annual time series data covering the 1977-2011period. However, data on SMI obtained from Bursa Malaysia (www.bursamalaysia.com); data on M1, M2, and ER obtained from BNM (www.bnm.gov.my); data on IP, PPI, and CPI obtained from department of statistics, Malaysia (DOSM) (www.statistics.gov.my).

4.2. Model Specification and Variables Descriptions

The researchers examine the long-run and short-run equilibrium relationships between six macroeconomic variables (IP, PPI, CPI, ER, M1, and M2) and SMI, by relying on the following model.

$$LSMI_t = \alpha_0 + \alpha_1 LIP_t + \alpha_2 LPPI_t + \alpha_3 LCPI_t + \alpha_4 ER_t + \alpha_5 LM1_t + \alpha_6 LM2_t + \varepsilon_t \quad (1)$$

Where α_0 denotes the intercept; α_i (i= 1,…. 6) represent the coefficients of the explanatory variables; ε_t denotes the error term. $LSMI_t$ represents the logarithms of yearly figures of Malaysian stock market index which obtained by taking the weighted average of daily closing stock prices; LIP_t represents the logarithms of yearly weights of Malaysian industrial production index, and covered manufacturing, mining, and electricity sectors using 2005 as the based year; $LPPI_t$ denotes the logarithms of yearly weights of Malaysian producer price index, and covered agriculture, fishing, mining, manufacturing, electricity, gas, and water supply sectors using 2000 as the based year; $LCPI_t$ denotes the logarithms of yearly weights that has been taken to measure the Malaysian aggregate price level of main groups of goods and services using 2000 as the based year; ER_t represents the yearly values of bilateral Malaysian Ringgit (RM) exchange rate *vis-à-vis* the US dollar ($); LM_1t and LM_2t denote the logarithms of yearly figures of the total amount of money available in Malaysian economy, and expressed in RM (millions). However, all variables transformed into natural logarithmic forms expect ER to make this variable simultaneous with other variables or series (Chen et al., 1986).

The error-corrections representations for ARDL Approach for the variables in equation 1 can be written as the following equation:

$$\Delta Z_t = \alpha + \acute{\Gamma}(L)\, \Delta Z_{t-s} + \prod(L)\, Z_{t-1} + \lambda(ECM_{t-1}) + \varepsilon_t \quad (2)$$

Where, ΔZ_t = n × t vectors of variables, $LSMI_t$, LIP_t, $LPPI_t$, $LCPI_t$, ER_t, $LM1_t$, and $LM2_t$. α = n × 1 vectors of constants. $\acute{\Gamma}$ (L) ∏ (L) = n × n matrices of the polynomial expression that represent the short-run and the long-run coefficients of variables respectively in the lag operator (L):

$$\acute{\Gamma}(L) = \sum_{s=\infty}^{K} \Gamma_{ij}(s)\, L^{t-s}, \text{ and } \prod(L) = \sum_{s=1}^{K} \Pi_{ij}(s)\, L^{t-1}$$

For i,j = number of lags, λ (ECM_{t-1}) = n × 1 vectors of error correction terms that are used to link the short-run coefficients of the variables with their long-run coefficients, and ε_t = n × 1 vectors of error terms.

The current paper uses the bounds statistics methodology to examine the long-run and short-run equilibrium relationships among variables in equation 2. Specifically, the researchers start with testing whether the variables achieve their stationarity at the upper or the lower bounds using both of augmented Dickey-fuller (ADF) and Phillips-Peron (PP) stationarity bounds statistics tests. Then, the researchers proceed for testing the number of co-integrating relationships among variables using Pesaran et al. (2001) bounds statistics tests. Finally, we use the results of stationarity and co-integration to analyze the long-run and short-run equilibrium relationships among variables.

5. Results and Analysis

5.1. ADF and PP Stationarity Bounds Statistics Tests

This study uses both of ADF and PP stationarity bounds statistics tests. However, Table 1 reports the stationarity results of ADF and PP tests. Table 1 shows that all variables in both ADF and PP tests are non-stationary at the lower bound except *LSMI*. When the first differences executed, all the variables are stationary. Specifically, at the lower bound, *LSMI* is stationary at 10% significance level in ADF test; while it is stationary at 5% significance level in PP test. At the upper bound, all the variables are stationary at 1% significance level in both ADF and PP tests except *LM2* which is stationary at 10% significance level.

TABLE 1*:* STATIONARITY RESULTS OF ADF AND PP BOUND STATISTICS TESTS.

Stage	Variables	ADF	Critical values			PP	Critical values		
		Trend and intercept	1%	5%	10%	Trend and intercept	1%	5%	10%
At Lower Bound	LSMI	-3.47(0)***	-4.25	-3.54	-3.22	-3.59[4]**	-4.25	-3.56	-3.21
	LIP	-2.36(0)	-4.26	-3.53	-3.21	-2.36[0]	-4.26	-3.55	-3.23
	LPPI	-1.62(0)	-4.25	-3.55	-3.23	-1.78[3]	-4.24	-3.54	-3.21
	LCPI	-1.89(0)	-4.28	-3.56	-3.21	-1.91[3]	-4.25	-3.55	-3.22
	ER	-1.86(0)	-4.25	-3.55	-3.22	-2.04[5]	-4.24	-3.51	-3.25
	LM1	2.87(0)	-4.26	-3.54	-3.23	4.55[2]	-4.25	-3.56	-3.26
	LM2	3.13(0)	-4.28	-3.53	-3.24	2.55[2]	-4.24	-3.55	-3.27
At Upper Bound	Δ(LSMI)	- 7.86(0)*	-4.26	-3.55	-3.21	-8.38[4]*	-4.26	-3.55	-3.21
	Δ(LIP)	- 5.81(0)*	-4.27	-3.56	-3.22	-5.81[0]*	-4.28	-3.52	-3.22
	Δ(LPPI)	-5.71(0)*	-4.24	-3.53	-3.20	- 5.73[3]*	-4.26	-3.55	-3.21
	Δ(LCPI)	- 6.26(0)*	-4.26	-3.55	-3.21	- 6.32[3]*	-4.29	-3.52	-3.25
	Δ(ER)	-6.20(0)*	-4.25	-3.58	-3.22	-6.30[5]*	-4.27	-3.56	-3.21
	Δ(LM1)	- 4.97(0)*	-4.27	-3.56	-3.23	- 4.94[2]*	-4.28	-3.55	-3.22
	Δ(LM2)	- 3.34(0)***	-4.34	-3.59	-3.25	- 3.33[2]***	-4.26	-3.57	-3.23

Notes: (1), ***, **, *****, describe the stationarity at 1%, 5 % and 10% significance levels, respectively.
Source: Output of EViews 7.2 Software.

5.2. Pesaran Bounds Statistics Tests for Co-integration

The present study uses the F-statistics as suggested by Pesaran et al. (2001) to test the null hypotheses of no co-integration among variables by setting the long-run coefficients of the one lagged variables in equation 2 equal to zero i.e., H_0: $\prod_{ij} = 0$, against the alternative hypotheses of co-integration among variables where, the long-run coefficients of one lagged variables are not equal to zero i.e., H_1: $\prod_{ij} \neq 0$.

The calculated F-statistics are compared with the critical values tabulated at statistical tables in Pesaran et al. (2001). If the calculated F-statistics are greater than the upper bounds, then the H_0 of no co-integration are definitely rejected, which means that the variables included in the models are shared long-run relationships among themselves (Pesaran et al., 2001). If the calculated F-statistics are smaller than the lower bounds, then the H_0 of no co-integration is accepted, which means that the variables included in the models are not shared long-run relationships among themselves (Pesaran et al., 2001). However, if the calculated F-statistics fall between the upper and the lower bounds, then, the decisions are inconclusive to either accept or reject the H_0 of no co-integration among variables (Pesaran et al., 2001).

Table 2 presents the computed and the critical values of F-statistics to test the H_0 of no co-integration among variables in the considered models.

TABLE 2*:* BOUNDSSTATISTICS TESTS FOR THE EXISTENCE OF CO-INTEGRATION AMONG VARIABLES.

Models	**Computed F-statistics**	**Significance levels**	**Critical values of F-statistics**	
			Lower Bound	**Upper Bound**
$LSMI_t$ ($LSMI_t$ / LIP_t, $LPPI_t$, $LCPI_t$, ER_t, $LM1_t$, $LM2_t$)	**2.2258**	**10%**	**1.92**	**2.89**
		5%	**2.17**	**3.21**
		2.5%	**2.43**	**3.51**
		1%	**2.73**	**3.90**
LIP_t (LIP_t / $LSMI_t$, $LPPI_t$, $LCPI_t$, ER_t, $LM1_t$, $LM2_t$)	**3.7460**	**10%**	**1.92**	**2.89**
		5%	**2.17**	**3.21**
		2.5%	**2.43**	**3.51**
		1%	**2.73**	**3.90**
$LPPI_t$ ($LPPI_t$ / $LSMI_t$, LIP_t, $LCPI_t$, ER_t, $LM1_t$, $LM2_t$)	**4.3514**	**10%**	**1.92**	**2.89**
		5%	**2.17**	**3.21**
		2.5%	**2.43**	**3.51**
		1%	**2.73**	**3.90**
$LCPI_t$ ($LCPI_t$ / $LSMI_t$, LIP_t, $LPPI_t$, ER_t, $LM1_t$, $LM2_t$)	**2.0262**	**10%**	**1.92**	**2.89**
		5%	**2.17**	**3.21**
		2.5%	**2.43**	**3.51**
		1%	**2.73**	**3.90**
ER_t (ER_t / $LSMI_t$, LIP_t, $LPPI_t$, $LCPI_t$, $LM1_t$, $LM2_t$)	**1.8562**	**10%**	**1.92**	**2.89**
		5%	**2.17**	**3.21**
		2.5%	**2.43**	**3.51**

		1%	**2.73**	**3.90**
$LM1_t$ ($LM1_t$ / $LSMI_t$, LIP_t, $LPPI_t$, $LCPI_t$, ER_t, $LM2_t$)	**3.2295**	**10%**	**1.92**	**2.89**
		5%	**2.17**	**3.21**
		2.5%	**2.43**	**3.51**
		1%	**2.73**	**3.90**
$LM2_t$ ($LM2_t$ / $LSMI_t$, LIP_t, $LPPI_t$, $LCPI_t$, ER_t, $LM1_t$)	**4.7322**	**10%**	**1.92**	**2.89**
		5%	**2.17**	**3.21**
		2.5%	**2.43**	**3.51**
		1%	**2.73**	**3.90**

Source*:* Output of Micro-fit 4.1package.

Table 2 shows that the H_0 of no co-integration among variables in $LPPI_t$ and $LM2_t$ models are rejected at all significance levels. We reject the H_0 of no co-integration among variables in $LPPI_t$ model at 10%, 5%, and 2.5% significance levels. Also, we reject the H_0 of no co-integration among variables in $LM1_t$ model at 10% and 5% significance levels. However, the researchers accept the H_0 of no co-integration among variables in ER_t model.

The decisions are inconclusive to either accept or reject the H_0 of no co-integration among variables in $LSMI_t$ and $LCPI_t$ models. Specifically, we accept the H_0 of no co-integration among variables in $LSMI_t$ and $LCPI_t$ models at the 10% significance level.

Finally, the researchers conclude that the variables in LIP_t, $LPPI_t$, $LM1_t$, and $LM2_t$ models are co-integrated among themselves, while the variables in ER_t, $LSMI_t$, and $LCPI_t$ models are not co-integrated among themselves. In fact, the results of co-integration are confirmed with the results of Pan et al. (2007) who found a no co-integration between ER_t and $LSMI_t$, and Ibrahim and Aziz (2003) who found a co-integration between (LIP_t and $LM2_t$) and $LSMI_t$.

5.3 Analyzing the Long-Run and Short-Run Equilibrium Relationships

The main objective of the current study is to analyze the long-run and short-run equilibrium relationships between macroeconomic variables and *SMI*. However, after conducting the bounds statistics tests for co-integration, we conclude that all variables are co-integrated with $LSMI_t$ expect ER_t and $LCPI_t$, therefore we need to examine the long-run and short-run equilibrium relationships among these variables. Table 3 shows the estimations of long-run coefficients.

TABLE 3*:* LONG-RUN COEFFICIENTS ESTIMATIONS.

LIPt model

$$LIPt = -3.89 + 0.12LSMI_{t-1} - 0.17LPPI_{t-1} + 0.60LCPI_{t-1} + 0.13ER_{t-1} - 0.01LM1_{t-1} + 0.39LM2_{t-1}$$

S.E	**= (0.86)**	**(0.06)**	**(0.28)**	**(0.32)**	**(0.02)**	**(0.18)**	**(0.18)**
S.S	**= (0.004)[a]**	**(0.07)[c]**	**(0.56)**	**(0.11)**	**(0.002)[a]**	**(0.97)**	**(0.07)[c]**

$LPPI_t$ model

$$LPPI_t = 5.33 - 0.14LSMI_{t-1} + 0.66LIP_{t-1} - 0.80LCPI_{t-1} - 0.12ER_{t-1} - 0.08LM1_{t-1} + 0.19LM2_{t-1}$$

S.E	**= (1.53)**	**(0.06)**	**(0.26)**	**(0.47)**	**(0.03)**	**(0.20)**	**(0.18)**
S.S	**= $(0.01)^a$**	**$(0.03)^b$**	**$(0.03)^b$**	**(0.11)**	**$(0.004)^a$**	**(0.71)**	**(0.31)**

$LM1_t$ model

$$LM1_t = 5.62 + 0.09LSMI_{t-1} + 0.82LIP_{t-1} - 0.85LPPI_{t-1} - 0.54LCPI_{t-1} - 0.10ER_{t-1} + 0.67LM2_{t-1}$$

S.E	**= (2.01)**	**(0.06)**	**(0.39)**	**(0.42)**	**(0.47)**	**(0.06)**	**(0.25)**
S.S	**= $(0.02)^b$**	**(0.16)**	**$(0.06)^c$**	**$(0.07)^c$**	**(0.28)**	**(0.13)**	**$(0.02)^b$**

$LM2_t$ model

$$LM2_t = 0.91 - 0.14LSMI_{t-1} + 0.81LIP_{t-1} + 0.72LPPI_{t-1} + 0.04LCPI_{t-1} - 0.13ER_{t-1} + 0.56LM1_{t-1}$$

S.E	**= (0.05)**	**(0.08)**	**(0.18)**	**(0.21)**	**(0.31)**	**(0.04)**	**(0.12)**
S.S	**= (0.43)**	**$(0.01)^a$**	**$(0.00)^a$**	**$(0.00)^a$**	**(0.91)**	**$(0.01)^a$**	**$(0.00)^a$**

Notes: (i) S.E denotes the standard errors of long-run coefficients. (ii) S.S defines the statistical significance of long-run coefficients. (iii) The notations a, b, and c denote the statistical significance at 1%, 5%, and 10% levels, respectively.

Table 3 shows that at the 1% significance level, the variable ER_t is positively associated with LIP_t model, while negatively associated with $LPPI_t$ and $LM2_t$ models. On the other hand, the variables LIP_t $LPPI_t$, and $LM1_t$ are positively associated with $LM2_t$ model, while the variable $LSMI_t$ is negatively associated. At the 10% significance level, the variables $LSMI_t$ and $LM2_t$ are positively associated with LIP_t model. Furthermore, the variable LIP_t is positively associated with LMI_t model, while $LPPI_t$ is negatively associated. At the 5% significance level, the variables $LSMI_t$ and LIP_t are negatively and positively associated with $LPPI_t$ model respectively, while the variable $LM2_t$ is positively associated with $LM1_t$ model. Table 4 presents short-run coefficients, error-corrections representations, and estimation methods based on least squares and relevant diagnostic tests.

TABLE 4*:* SHORT-RUN COEFFICIENTS AND ERROR-CORRECTIONS REPRESENTATIONS.

ΔLIP_t model

$$\Delta LIP_t = -3.69 + 0.31LIP_{t-1} + 0.25LIP_{t-2} - 0.01LSMI_t - 0.14LSMI_{t-1} - 0.07LSMI_{t-2} + 0.53LPPI_t -$$

$(0.01)^a$ (0.13) (0.14) (0.76) $(0.06)^c$ (0.14) $(0.06)^c$

$$0.13LPPI_{t-1} + 0.40LPPI_{t-2} - 0.14LCPI_t - 0.46LCPI_{t-1} + 0.05ER_t - 0.06ER_{t-1} + 0.35LM1_t$$

$(0.06)^c$ (0.47) $(0.03)^b$ (0.60) $(0.10)^c$ $(0.07)^c$ $(0.012)^b$

$$0.39LM1_{t-1} + 0.14LM1_{t-2} + 0.57LM2_t - 0.24LM2_{t-1} - 0.43LM2_{t-2} - 0.94ECM_{t-1}$$

$(0.07)^c$ $(0.012)^b$ (0.20) $(0.03)^b$ (0.32) $(0.01)^a$

Estimated methods: Least squares		
R^2 = 0.98	S.E of regression = 0.02	F-statistics = 17.62[0.00]

Diagnostic tests	
J-B normality test = 3.23[0.20]	Lagrange Multiplier test of residual serial correlation = 1.13[0.34]
ARCH test = 0.67[0.41]	Ramsey RESET test of model specification = 4.11[0.10]

$\Delta LPPI_t$ model

$\Delta LPPI_t = 3.35 + 0.22LPPI_{t-1} + 0.08LSMI_t + 0.17LSMI_{t-1} + 0.08LSMI_{t-2} + 0.40LIP_t - 0.31LCPI_t$ $(0.00)^a \quad (0.15) \quad (0.02)^b \quad (0.00)^a \quad (0.01)^a \quad (0.002)^a \quad (0.01)^a$ $0.59LCPI_{t-1} - 0.08ER_t - 0.60LM1_t - 0.27LMI_{t-1} - 0.24LM1_{t-2} + 0.04LM2_t - 0.16LM2_{t-1} +$ $(0.01)^a \quad (0.00)^a \quad (0.00)^a \quad (0.00)^a \quad (0.07)^c \quad (0.02)^b \quad (0.80)$ $0.37LM2_{t-2} - 0.63ECM_{t-1}$ $(0.00)^a \quad (0.00)^a$		
Estimated methods: Least squares		
$R^2 = 0.91$	S.E of regression = 0.02	F-statistics = 8.30[0.01]
Diagnostic tests		
J-B normality test = 1.16[0.56]	Lagrange Multiplier test of residual serial correlation = 1.19[0.30]	
ARCH test = 0.10[0.75]	Ramsey RESET test of model specification = 1.28[0.26]	
ΔLM1 $\Delta LM1_t$ ***model***		
$\Delta LM1_t = 3.10 - 0.45LM1_{t-1} + 0.20LSMI_t + 0.20LSMI_{t-1} + 0.11LSMI_{t-2} + 0.29LIP_t - 0.47LIP_{t-1} -$ $(0.00)^a \quad (0.00)^a \quad (0.00)^a \quad (0.00)^a \quad (0.00)^a \quad (0.11) \quad (0.00)^a$ $0.40LIP_{t-2} - 0.73LPPI_t + 0.34LCPI_t + 0.47LCPI_{t-1} - 0.06ER_t - 0.05ER_{t-1} - 0.02ER_{t-2}$ - $(0.00)^a \quad (0.01)^a \quad (0.00)^a \quad (0.10) \quad (0.03)^b \quad (0.002)^a \quad (0.17)$ $0.37LM2_t - 0.55ECM_{t-1}$ $(0.02)^b \quad (0.00)^a$		
Estimated methods: Least squares		
$R^2 = 0.98$	S.E of regression = 0.02	F-statistics = 32.78[0.00]
Diagnostic tests		
J-B normality test = 0.98[0.61]	Lagrange Multiplier test of residual serial correlation = .45[0.50]	
ARCH test = 0.10[0.75]	Ramsey RESET test of model specification = 0.01[0.91]	
$\Delta LM2_t$ ***model***		
$\Delta LM2_t = 0.53 + 0.26LM2_{t-1} + 0.16\ LM2_{t-2} - 0.08LSMI_t + 0.47LIP_t + 0.41LPPI_t + 0.02LCPI_t$ $(0.41) \quad (0.03)^b \quad (0.09)^c \quad (0.01)^a \quad (0.00)^a \quad (0.01)^a \quad (0.91)$ $+0.02ER_t + 0.07ER_{t-1} + 0.52LM1_t - 0.21LM1_{t-1} - 0.58ECM_{t-1}$ $(0.15) \quad (0.00)^a \quad (0.00)^a \quad (0.01)^a \quad (0.00)^a$		
Estimated methods: Least squares		
$R^2 = 0.91$	S.E of regression = 0.022	F-statistics = 17.02[0.00]
Diagnostic tests		
J-B normality test = 1.39[0.50]	Lagrange Multiplier test of residual serial correlation = 1.74[0.19]	
ARCH test = 1.08[0.30]	Ramsey RESET test of model specification = 3.64[0.07]	

Notes: (i) Figures in parentheses ( ) identify the statistical significance levels of short-run and $(ECT_{t-1})'s$ coefficients. (ii) J-B represents jarque-bera for testing normality. (iii) Figures in brackets [ ] identify the p-values. (iii) ARCH represents the auto-regressive conditional heteroscedasticity for testing heteroscedasticity.

Table 4 shows that the speed of adjustments to obtain the equilibrium, i.e., the (ECM_{t-1})'s highly significant at 1% level, which suggest a high speed of arriving the long-run equilibrium. Specifically, the ΔLIP_t model records the highest ECM_{t-1} in absolute value among other models suggesting that 94% of the disequilibria in ΔLIP_t model of the previous year's shock adjust back to the long-run equilibrium in the current year. While, ΔLMI_t model records the lowest ECM_{t-1} in absolute value suggesting a very low speed of converge toward its long-run equilibrium. The validity of estimated models by relying on both chi-square and F-version is confirmed using diagnostic tests such as J-B test, Lagrange Multiplier test, ARCH test, and Ramsey RESET test. However, J-B test approved the normality assumption of the estimated residual series in all models, the Lagrange Multiplier test confirmed the assumption of no residual autocorrelation in all the models, the ARCH test confirmed the homoscedasticity assumption in all models, and the Ramsey RESET test confirmed the correct specifications of all models.

6. Policy Implications

The findings of this study suggest that Malaysian policy makers should pay the most attention to the effects of monetary policies on stock market. Specifically, the results of the current study are confirmed with results of Ibrahim (1999) that found, both of M1 and M2 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 hyperinflation, but increases share prices in stock market. Furthermore, the results of the current study are confirmed with the results of Ibrahim (1999) that found, IP is positively and negatively associated with SMI in both long-run and short-run. A high IP in a particular industry, let us say 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 IP is a sign that these firms are not performing well, which lead to decrease their share prices in stock market.

7. Conclusions and Further Studies

The present paper examines the long-run and short-run equilibrium relationships between macroeconomic variables (IP, PPI, CPI, ER, M1, and M2) and SMI using annual time-series data for the 1977-2011 period. However, it employs Augmented-Dickey Fuller (ADF) and Phillips-Perron (PP) stationarity bounds statistics tests**.** Then, it uses Pesaran bounds statistics for testing the co-integrating relationships among variables, and eventually, the results of stationarity and co-integration tests are used to analyze the long-run and short-run equilibrium relationships among the variables. Results of ADF and PP tests show that the H_0 of non-stationary cannot be rejected even at 10% significance level in all cases except one variable. More specifically, the variables IP, PPI, CPI, ER, M1, and M2 are stationary at the upper bound, while the variable SMI is stationary at both lower and upper bounds. However, the results of pesaran bounds statistics reveal that all variables are co-integrated with SMI except ER, and CPI. The results of stationarity tests and co-integration show the presence of long-run and short-run equilibrium relationships between four macroeconomic variables and SMI. In particular, IP and M1 are positively associated with SMI in the long-run, while PPI and M2 are negatively associated.

Additionally, IP and M2 are negatively associated with SMI in the short-run, while PPI and M1 are positively associated.

The present study adds to the existing literature and focuses on the long-run and short-run equilibrium relationships between macroeconomic variables and stock prices for the case of an emerging stock market, Malaysia, rather than a mature stock market, the 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, and investors dealing with Malaysian economy and Malaysian stock market.

In fact, our results could lead to research questions that need to be answered. For instance, further research could broaden this study by adding more variables that have significant influences on stock prices such as oil prices. Furthermore, another research could broaden this study by including more than one country to draw robust results, since the main limitation of this study is the use of one country.

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