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Revisiting Relationship Between Malaysian Stock Market Index and Selected Macroeconomic Variables Using Asymmetric Cointegration

(Mengkaji Semula Hubungan Antara Indeks Pasaran Saham Malaysia dan Pembolehubah Makroekonomi Menggunakan Kointegrasi Asimetri)

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ABSTRACT

This article re-examines the relationship of several macroeconomics variables with Malaysia Stock Market Index, KLCI. The paper applies Johansen (1988) procedure and vector error correction model (VECM) for symmetric cointegration, while threshold cointegration test proposed by Enders and Siklos (2001) is used for asymmetric cointegration. Using quarterly time series data set spanning from 1990 to 2015, the findings show the presence of the long-run relationship between KLCI and the macroeconomics variable i.e., industrial production index, inflation rate, exchange rate and money supply. We also found evidence for asymmetric adjustment of the stock price index towards its long-run values. These results have particularly important policy implications, concerning the formulation of macroeconomic policy to achieve financial stability and thus contribute to the further development of Malaysian Stock Market Index.

Keywords: Asymmetric cointegration; macroeconomic variables; stock market index.

ABSTRAK

Kertas kajian ini mengkaji semula hubungan beberapa pembolehubah makroekonomi dengan indeks pasaran saham Malaysia, (KLCI). Artikel ini menggunakan prosedur dan model pembetulan ralat vektor (VECM) untuk kointegrasi simetri, manakala ujian kointegrasi ambang yang dicadangkan oleh Enders dan Siklos (2001) digunakan untuk kointegrasi asimetri. Dengan menggunakan data siri masa suku tahunan yang meliputi tahun 1990 hingga 2015, hasil kajian menunjukkan kewujudan hubungan jangka panjang antara KLCI dengan pembolehubah makroekonomi iaitu indeks pengeluaran perindustrian, kadar inflasi, kadar pertukaran dan penawaran wang. Hasil kajian ini juga membuktikan kewujudan penyelarasan asimetrik indeks harga saham terhadap nilai jangka panjang. Hasil ini mempunyai implikasi dasar yang sangat penting, iaitu mengenai penggubalan dasar makroekonomi untuk mencapai kestabilan kewangan dan seterusnya menyumbang kepada perkembangan dalam indeks harga saham Malaysia.

Kata Kunci: Kointegrasi asimetri; pemboleh ubah makroekonomi; indeks pasaran saham.

INTRODUCTION

Stock market plays a pivotal role in measuring economic growth for a country. This has been proven by several past studies where they found that stock market development plays an important role in predicting future economic growth (Demirguc & Levine 1996; Singh 1997; Levine & Zervos 1998). For example, a rising stock market is a reflection of growing economy and shows a sign of developing industrial sector. That is the reason why the governments, central banks and industry keep a close watch on the developments of the stock market. Thus, it is imperative to maintain a good expectation of a future stock market. Furthermore, a stock market index is designed to help investors get a sense of how a market is doing. A good stock market can attract investors from both local and international to invest and thus generating economic growth for a country. Therefore, the importance of stock market is crucial from both perspectives which are the industry as well as the investor.

Figure 1 shows the trend of the Kuala Lumpur Composite Index (KLCI) from 1990 to 2015. We can observe that there is a dramatic change in the movements of the index during the crisis period, which is in 1997 to 1998 and 2008 to 2009. As a small open economy, the behavior of the Malaysian stock market is fragile and rely on both internal and external shocks. Hence, macroeconomic factors are more likely to influence Malaysian investment returns. By referring to the Figure 2, we can see that there is a connection between the macroeconomic variables and stock market index as any changes in the macroeconomic variables may affect the movements of the KLCI. The explanation of the interaction between macroeconomic variables and stock prices can be referred to several basic models. First, the standard stock valuation model explains that stock price represents

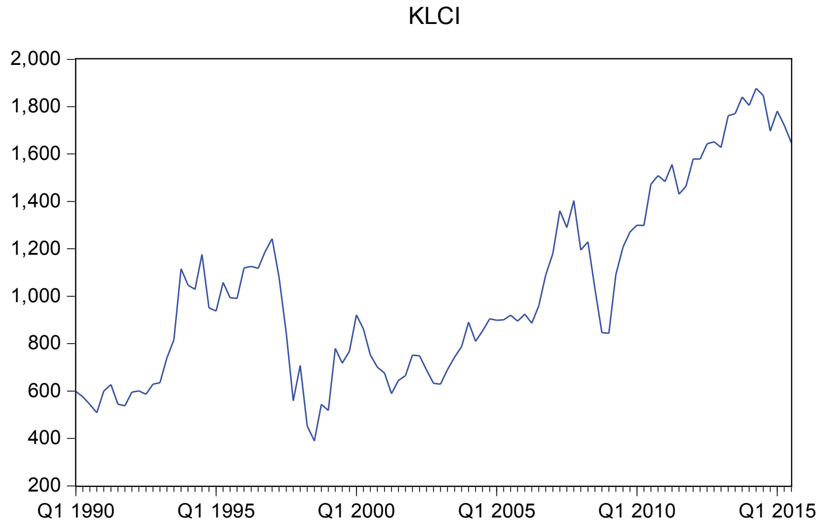

FIGURE 1. Trend of KLCI 1990-2015

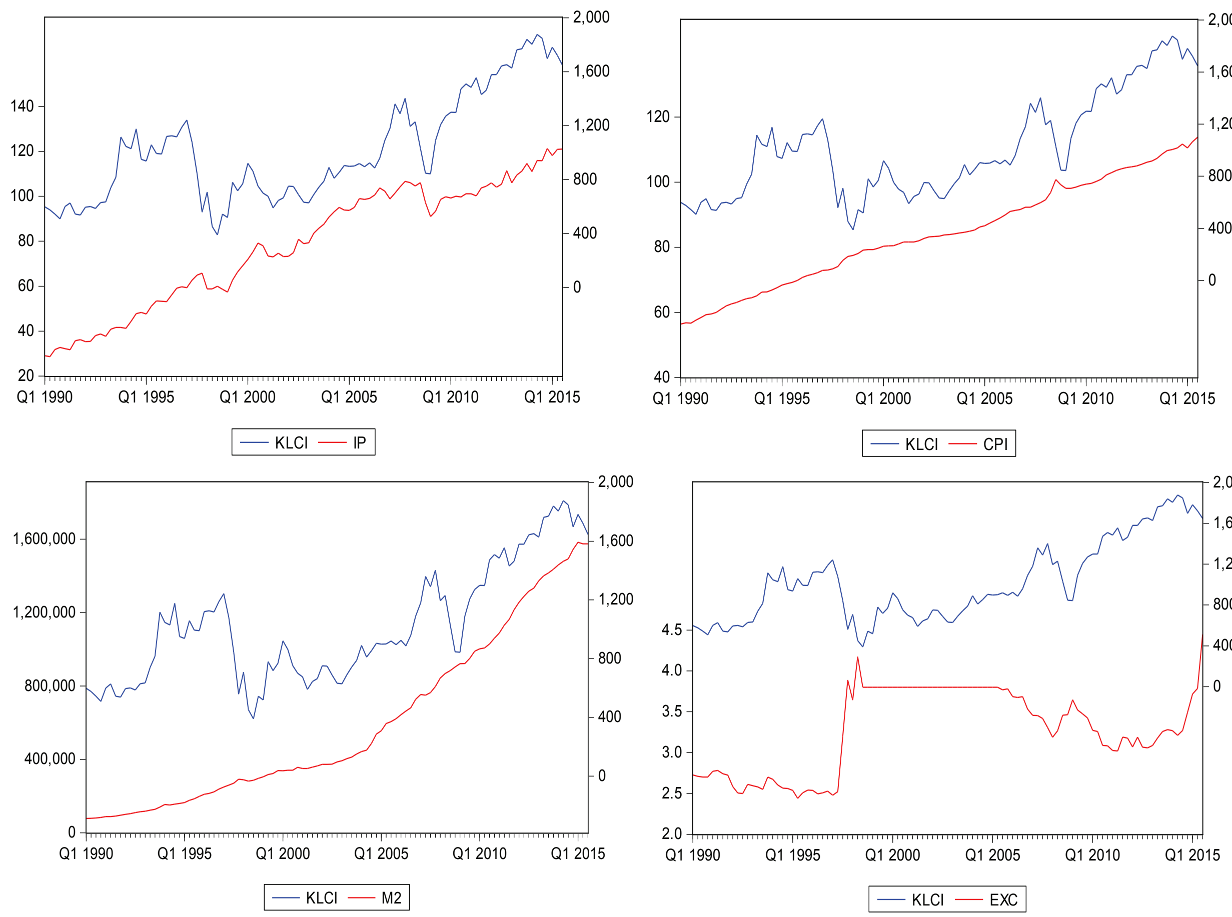

FIGURE 2. Trend of KLCI and macroeconomic VARiables

the discounted present value of the firm's future cash flows (Ibrahim & Aziz 2003; Ibrahim & Yusoff 2001). This indicates that any changes in economic variables may affect stock prices through their influences on expected discounted future cash flows. On the other hand, the standard AD-AS model also explained that the real activity or markets are highly influenced by the changes in money supply through various channels (Mishkin 1998). Then, Ross (1976) introduces the Arbitrage Pricing Theory (APT) model which predicts the future returns of the portfolio and single asset through a linear combination of many independent macroeconomic variables. All these models give a basic understanding of the interaction between macroeconomic variables and stock prices in the long-run and short-run.

Therefore, in order to maintain a reliable stock market, there are several macroeconomic factors that influence the stock market heavily. Researchers, economist, and students have attempted a lot of studies to investigate these connections. For example, some notable studies that focus on well-developed economies (Chen et al. 1986; Fama 1981; Hsing 2011; Humpe & Macmillan 2009; Masuduzzaman 2012; Mukherjee & Naka 1995; Poon & Taylor 1991) include inflation rate, interest rate, industrial production, exchange rate, and money supply as important variables in explaining stock market performance. For instance, Chen et al. (1986) proved that selected macroeconomic variables had influenced the United States stock market. Then, Poon and Taylor (1991) replicate the research to see if it was applicable to United Kingdom stock market. The result, however, found that macroeconomic factors did not influence stock market pricing in the United Kingdom. A recent study also concluded that the fluctuations in macroeconomic variables lead to the changes in the stock market (Adam et al. 2016).

Then, in a context of emerging economies, the exchange rate was believed to be a main factor in explaining the stock market performance (Gan et al. 2006; Gay 2008; Issam & Murinde 1997; Kwon & Shin 1999; Maysami & Koh 2000; Maysami et al. 2004; Miseman et al. 2013; Mohd Nor et al. 2012; Patel 2012; Quadir 2012). The results from Issam and Murinde (1997) and Patel (2012) were consistent where they found a causality running from exchange rate to Indian stock market. This means that the exchange rate has a greater implication for stock price behavior in India. Then, Maysami and Koh (2000) noted that the Singapore stock market was sensitive to external factors which are exchange rate and interest rate. For BRIC countries, Gay (2008) found no significant (although positive) relationship between exchange rate and stock prices. However, although all the selected macroeconomic variables have an impact on determining stock market index, Kwon and Shin (1999) and Gan et al. (2006) found that the stock market index was not a leading indicator of the macroeconomic variable in a case of South Korea and New Zealand respectively. Moreover, Abd Rahim and Mohd Nor (2007) found that ASEAN market also influenced by the behavior of larger markets such as Hong Kong.

In the case of Malaysia, the interaction between macroeconomic variables and the stock market is also well documented. Habibullah and Baharumshah (1996) found no cointegration exists between money, output and stock price in Malaysia. They also observed that KLSE had already incorporated all past information on both money supply and output. However, recent studies showed a different result from them. Ibrahim and Yusoff (2001) concluded that Malaysia stock market was influenced more by domestic factors particularly money supply rather than by external factors or exchange rate and proved that inflation and stock market are positively related. However, Karim et al. (2011) proved that firm-level stock returns responds more to external shocks than to domestic shocks.Other studies also found the positive relationship between inflation and Malaysia stock market (Ibrahim & Aziz 2003; Ratneswary & Rasiah 2010). Moreover, Janor et al. (2010) discovered the Kuala Lumpur Composite Index (KLCI), industrial production and money supply were the 'long run forcing' variables for the inflation as the long-run relationship do exist between the variables when inflation is the dependent variables. Recent studies by Nikmanesh et. al (2014) establishes that it was important to maintain the stability of the Malaysian financial market as any weakness in the macroeconomic policies may affect the performance of the stock market in the future.

From the above discussion, it seems that the relationship between macroeconomic variables and the stock market has been well documented. However, most previous studies have found a significant interaction between the macroeconomic variable and stock market, assuming that the relationship and the adjustment were symmetric. In terms of asymmetries, there are quite numbers of past research concerned about the asymmetric effect on the economic phenomenon. Many have claimed that major economic variables display an asymmetric behavior over the business cycle. This is because, according to Keynes (1936, p. 314) "the substitution of a downward for an upward tendency often takes place suddenly and violently, whereas there is, as a rule, no such sharp turning point when an upward is substituted for a downward tendency". This hypothesis have been proven by some of the earliest studies where they found an evidence of this type of asymmetry in the United State business cycle (DeLong & Summers 1986; Falk 1986; Neftci 1984; Sichel 1989). Then, Schwert (1989) and Hamilton and Lin (1996) investigated whether economic expansion and contraction have an impact on the volatility of stock returns. They found that stock return volatility was higher during the recession compared to during expansion. Furthermore, studies by Chen (2007) found that monetary policy has asymmetric effects on United State stock returns while Shen et al. (2007) proved the asymmetric cointegration relationship between Chinese Shanghai and Shenzhen stock markets.

By looking at the graph plotted in Figure 2, we can see the relationship between Kuala Lumpur Composite Index (KLCI) and the macroeconomic variables as they have symmetric movement in a certain time period. However, we also can observe the asymmetric behavior in the time trend. For an example, rising in the industrial production index (IP) does not necessarily makes the stock index (KLCI) to rise. Therefore, since there is no past research considered this asymmetries issue in the case of Malaysia, we were interested to fill the gap by testing the hypothesis that stock market adjusts asymmetrically to the past information. This study also used a new method to capture the asymmetries which are threshold cointegration introduced by Enders and Siklos (2001). While allowing the asymmetry in modeling, it will better capture the data generation process and, consequently, improving the power of the tests (Ibrahim 2015). To the end of the analysis, we also compare the results between symmetric cointegration using Johansen (1988) procedure with asymmetric cointegration proposed by Enders and Siklos (2001). The comparison is made to see the evidence on asymmetry behavior. Thus, the results of this research are expected to give new insight on the factors that may influence the changes in Malaysia stock market index and will give a motivation for developing a new policy that can capture the asymmetric behavior in order to enhance the development of stock market index.

This article is structured as follows: Section one depicts literature review in relation to this context, problem of statement and objective of this paper. Section two explains the methodology and data collection employed in this study. Section three presents the empirical findings. Lastly, Section four concludes the paper. To the best of our knowledge, this is the first paper that investigates the asymmetric cointegration between the stock market index and macroeconomics variable in the case of Malaysia.

DATA AND METHODOLOGY

According to past studies, we include the following macroeconomic variables, i.e., industrial production (IP) which measured the real output, consumer price index (CPI) as a measurement of the inflation rate, exchange rate (EXC) and M2 monetary aggregate (M2) represent the money supply. Then, we used Kuala Lumpur Composite Index (KLCI) to measure the Malaysia stock market index. Quarterly time series data spanned from 1990 to 2015 are employed. Datastream International is the source for data related to the macroeconomic variables as well as stock market index. Finally, all the variables are expressed in terms of natural logarithms.

Firstly, the unit root test is employed to analyze the data series' stationarity. Hence, the ADF (Augmented Dickey-Fuller) and PP (Philips-Perron) tests are used to examine the order of integration. It is compulsory for the variables to have the same order of integration so that we can determine the meaningful relationship between them. The second step involves the utilization of a procedure established by Johansen (1988) and Johansen Juselius (1990), i.e. the JJ cointegration test to ascertain the presence of the long-run relationship between variables. In this method, to estimate and determine the existence of cointegrating vectors in VAR system, the maximum likelihood procedure is conducted. This test involves the Maximum Eigenvalue ($\lambda_{\max}$) test and Trace test (λ_{trace}) to ascertain the number of cointegration vectors. The assumption of the test is that there is symmetric long-run adjustment process; but should there is an asymmetric adjustment, its power is not significant. Therefore, to capture the presence of asymmetric adjustment between the variables, the asymmetric cointegration test developed by Enders and Siklos (2001), referred as ES test is also applied by this paper.

The following equation is what the ES co-integration is based upon:

$$\Delta u_t = I_t\rho_1 u_{t-1} + (1-I_t)\rho_2 u_{t-1} + \sum_{i=1}^{k}\gamma_i \Delta u_{t-1} + \varepsilon_t \quad [1]$$

where u_t refers to error term acquired from the long-run equation, I_t refers to the Heaviside indicator depending either on the error term's level or changes and k refers to the optimal lag order. The indicator as a function of the error term in level is specified as

$$I_t = \begin{cases} 1 & \text{if } u_{t-1} \geq 0 \\ 0 & \text{if } y_{t-1} < 0 \end{cases} \quad [2]$$

the threshold autoregressive (TAR) model is obtained. In TAR model, the error term's adjustment is dependent upon the negative or positive sign of last period's error term. On the other hand, should the error term or shock tends to move toward one direction, then it is more appropriate that the Heaviside indicator specification to be dependent upon error term changes (Enders and Dibooglu, 2001). Thus,

$$I_t = \begin{cases} 1 & \text{if } \Delta u_{t-1} \geq 0 \\ 0 & \text{if } \Delta y_{t-1} < 0 \end{cases} \quad [3]$$

The momentum threshold (M-TAR) model is the combination of equation [1] and the indicator function [3]. The difference between these two models are, TAR model is able to capture the process of a deep cycle should, for example, the negative deviations are less prolonged than the positive deviations, whilst autoregressive decay to be dependent upon Δu_{t-1} is allowed by M-TAR (Chang et al. 2009). Hence, the sharp movement in the sequences can be captured by the M-TAR model. Furthermore, the threshold value, τ, can be either zero or non-zero. If the τ is non-zero, the Chan's (1993) method is used to search all possible thresholds and the threshold is based on minimum residuals of sum squares. Generally, since there is no specific rule of whether to utilize the TAR or M-TAR model, the selection of the best adjustment mechanism depends upon the model selection criterion such as Akaike Information Criteria (AIC) and Schwartz Criteria (SIC).

When, $-2 < (\rho_1, \rho_2) < 0$, the stationarity of u_t for both TAR and M-TAR models, is achieved. The testing of the null hypothesis of the ES test used the F-statistics; whereby $H_0 = \rho_1 = \rho_2 = 0$ indicates no cointegration exist. Then, if the existence of cointegration is confirmed, the standard F-statistics will be used to examine the null hypothesis, i.e. symmetric adjustment $H_0 = \rho_1 = \rho_2$, against the other possibility, i.e. asymmetric adjustment process. The rejection of both $H_0 = \rho_1 = \rho_2 = 0$ and $H_0 = \rho_1 = \rho_2$ indicates the threshold effect exists and the adjustment is asymmetric. In the final step, the variables' movement in the long-run equilibrium association is calculated through the model of symmetric error-correction. The following is the specification of the asymmetric error-correction model;

$$\Delta klci_t = \alpha + \sum_{i=1}^{k_1} \gamma_i \Delta klci_{t-i} + \sum_{i=0}^{k_2} \delta_i \Delta ip_{t-i} + \sum_{i=0}^{k_3} \theta_i \Delta cpi_{t-i} + \sum_{i=0}^{k_4} \vartheta_i \Delta exi_{t-i} + \sum_{i=0}^{k_5} \varphi_i \Delta m2_{t-i} + \omega_1 T^{+}_{t-1} + \omega_2 T^{-}_{t-1} + v_t \quad [4]$$

where Δ denotes first difference operator, k_i for i = 1, ..., 5 are the optimal lag orders, $T^{+}_{t-1} = I_t u_{t-1}$ and $T^{-}_{t-1} = (1 - I_t)u_{t-1}$, u is the error-correction term (ECT). The ECT coefficient, which is also known as adjustment speed for the long-run equilibrium path, calculates the long-run disequilibrium speed adjusted in the next period. In equation [4], we expect $|\omega_2| > |\omega_1|$, reflecting that the stock market index adjust faster when it is below the long-run equilibrium

EMPIRICAL RESULT

First of all, ADF test and PP test has been conducted. The results of unit root tests are presented in Table 1. It is clear that the null hypothesis of no unit roots for all variables of log-level based are failed to be rejected since the values are all insignificant except for LIP at constant. However, when plotting the graph, LIP shows an increasing trend over the time period. Thus, we conclude that LIP is also insignificant at level. Then, the null hypothesis at their first differences can be rejected as the value is all-significant at 1% significance level. The results tell that all the series is stationary and integrated of order 1, I(1).

Then, we move to JJ and ES cointegration tests. Table 2 shows the JJ cointegration results which report both the λ_{trace} and $\lambda_{\max}$ at optimal lags of 12. From the results, both the λ_{trace} and $\lambda_{\max}$ indicate the presence of four cointegrating vectors. Since our objective only focuses on the relationship between the stock market index and macroeconomic variables, we only consider one cointegrating vector to be investigated in order to see the long-run relationship between the variables. To confirm the long-run relationship, an error-correction term (ECT) was determined. The results from Table 3 shows that the ECT for the KLCI is significant at the 10% significance level but the value is positive which indicates that there exists long-run equilibrium but cannot explain about the speed of adjustment. Diagnostic tests have also been done and it is proven that the residuals satisfy all the assumptions of the error term are not correlated, homoscedastic, normally distributed and stable.

Therefore, the normalized symmetric long-run relationships can be represented as stated in equation [5]. Since the variables are expressed in natural logarithms, the estimated long-run coefficients may be interpreted as elasticity measures.

$$\underset{}{lklci} = 4.573955 + \underset{(0.5124)}{2.574463}lip + \underset{(6.2257)}{2.232034}lcpi - \underset{(0.4539)}{3.933639}lexc - \underset{(12.2761)}{1.043979}lm2 \quad [5]$$

(0.5124) (6.2257) (0.4539)
(12.2761) (1.0556)

Notes: number in parenthesis () indicates t-statistics.

As we can see from the equation [5] above, the long-run relationship between KLCI and the industrial production index is positive which is consistent with the findings for the USA by Fama (1981), South Korea by Kwon and Shin (1999), Singapore by Maysami and

TABLE 1. ADF and PP unit root test

Variable	ADF Statistics		PP Statistics		Test Equation
	I(0)	I(1)	I(0)	I(1)	
LKLCI	–1.5582	–10.4129***	–1.5856	–10.4105***	Constant
	–2.5149	–10.3597***	–2.5307	–10.3606***	Constant with Trend
LIP	–2.9849**	–5.1846***	–3.0822**	–9.6390***	Constant
	–2.0022	–5.9481***	–1.8475	–10.1778***	Constant with Trend
LCPI	–1.9803	–8.3441***	–2.0323	–8.3696***	Constant
	–2.4134	–8.5063***	–2.4061	–8.3858***	Constant with Trend
LEXC	–0.9133	–8.0689***	–1.2343	–8.0485***	Constant
	–1.3698	–8.0370***	–1.7065	–8.0166***	Constant with Trend
LM2	–2.4367	–7.5171***	–2.3062	–7.5788***	Constant
	–1.4583	–7.9944***	–1.1606	–7.9557***	Constant with Trend

Note: **, *** indicates significant at 5% and 1% significance level respectively.

TABLE 2. Symmetric cointegration tests

H_0	Trace	1% Value	λ-max	1% Value
$r = 0$	233.8873	84.45	85.54378	39.79
$r \leq 1$	148.3436	60.16	67.1646	33.24
$r \leq 2$	81.1789	41.07	51.1429	26.81
$r \leq 3$	30.0360	24.60	22.7295	20.20
$r \leq 4$	7.3066	12.97	7.3066	12.97

TABLE 3. Symmetric long-run relationship

Dependent Variable	$ECT_{(t-1)}$	LM	ARCH	JB
ΔLKLCI	0.3905 (0.0894)	1.1845 (0.3689)	0.9388 (0.5148)	0.5454 (0.7613)

Note: Value in the parenthesis indicates the p-values. $ECT_{(t-1)}$ is an error-correction term which measures the long-run relationship. LM is Lagrange multiplier for serial correlation test, ARCH is for heteroscedasticity test and JB is Jarque-Bera normality test. The null hypothesis for LM, ARCH and JB are the residuals are not serially correlated, residuals are homoscedastic and residuals are normally distributed respectively.

Koh (2000), Ibrahim and Aziz (2003) and Ratneswary and Rasiah (2010) for the case of Malaysia. The positive relationship is expected as the industrial production index often serves as the main indicator of economic health. Thus, a good overview of Malaysia economy will attract more investors, which lead to the high growth rate in Malaysia stock market index. Then, the equation [5] also shows that inflation rate and the stock market are positively related. Although the sign contradicts with the theories and many past studies, our results seem to be consistent with Khil and Lee (2000), Ibrahim and Yusoff (2001), Ibrahim and Aziz (2003), Asmy et al. (2009), and Ratneswary and Rasiah (2010) for the case of Malaysia and Maysami et al. (2004) in the case of Singapore. The argument is that an increase in output price, which is higher than input price, leads to increase in cash flows. A positive relationship between inflation and the stock market also reflect that the stock price in Malaysia is a good hedge against inflation (Ibrahim & Yusoff 2001).

Furthermore, we found a negative relationship between the stock price index and exchange rate. This result also in line with Kwon and Shin (1999), Maysami and Koh (2000) and Ibrahim and Aziz (2003). Based on the past arguments, exchange rate and stock price can be either positively or negatively related depending on the nature of the country's economy. Since Malaysia highly depends on international trade, currency depreciation will make local products on the world market become cheaper and hence will encourage exports. This leads to an increase in firm's profitability that also will gives benefits to the increasing of the stock values. Finally, we also found that stock price index and money supply (M2) are negatively related. This is because, an increase in M2 results in inflation instability, which leads to less expectation in the future contractions (Ibrahim & Yusoff 2001).

Then, we proceed to ES threshold cointegration test for asymmetric adjustments. First of all, we estimate the asymmetric cointegration with all four selected macroeconomic variables, however, the value of F-equal ($\rho_1 = \rho_2$) and F-joint ($\rho_1 = \rho_2 = 0$) are not significant, which means that the null hypothesis of symmetric adjustment and no cointegration are failed to be rejected. Then, we fitted several possible models that may exist asymmetric cointegration in its long-run to achieve our main objective. By using the AIC model selection criteria, the TAR and M-TAR model seem to be equally favored. Out of eleven models that have been tested, only four models have successfully rejected both null hypotheses of symmetric adjustment and no cointegration. To choose the best model to further the analysis, we considered the models that have the most macroeconomic variables significant. Therefore, the TAR asymmetric error-correction model (model III) should be used in order to model the KLCI asymmetric cointegration. Due to space constraint, we only report up to three models as shown in Table 4. The full table will be provided upon request.

Since we prove the existence of asymmetric adjustments, we can explore the movement of the variables in a long-run equilibrium relationship by using an asymmetric error-correction model. The final specification of the model is obtained by applying the general-to-specific procedure in which the insignificant first-difference variables on the right hand side will be trimmed. Table 5 reports the estimation results of

TABLE 4. Asymmetric cointegration test

Model	$\rho_1 = \rho_2$	$\rho_1 = \rho_2 = 0$	Flags	Lags	τ
I. LIP + LCPI + LEXC + LM2	1.7845 (7.5559)	7.7501 (12.4072)	M-TAR	3	–0.0731
II. LIP + LCPI + LEXC	0.5998 (3.4586)	8.9765** (8.8843)	M-TAR	3	0
III. LIP + LCPI + LM2	7.1171** (6.0081)	10.0348** (9.1817)	TAR	5	0

Note: ** indicates significant at 5% significance level based on Monte Carlo statistics.

TABLE 5. Estimation results of an asymmetric error-correction model

$$\Delta klci_t = \underset{(0.5829)}{-0.01781} + \underset{(0.8086)}{0.0235T^{+}_{t-1}} - \underset{(0.0000)}{0.48394T^{-}_{t-1}} + \underset{(0.0113)}{0.2829\Delta klci^{-}_{t-2}} + \underset{(0.0002)}{0.4110\Delta klci^{-}_{t-3}} + \underset{(0.0390)}{3.9583\Delta cpi_{t-4}} - \underset{(0.0376)}{1.1062\Delta m2_{t-4}}$$

Adj-R^2 = 0.4269	JB = 26.9061 (0.000001)	BPG = 1.2139 (0.2758)
F-stat = 2.6953 (0.0009)	LM(3) = 1.6702 (0.1803)	RESET(1) = 0.4475 (0.5035)

Note: Number in parenthesis are the p-values. LM is Lagrange multiplier for serial correlation test, BPG is a Breusch-Pagan-Godfrey test for heteroscedasticity test JB is Jarque-Bera normality test and RESET is a Ramsey RESET test of functional form. The null hypothesis for LM, ARCH, JB and RESET are the residuals are not serially correlated, residuals are homoscedastic, residuals are normally distributed and no specification error, respectively.

asymmetric error-correction models for the KLCI with the TAR threshold specification. Based on the value of adjusted R^2 and significant F-statistics, we can say that the performance of the models is satisfactory. Moreover, the model passes almost all the diagnostic tests except for the normality. Then, inflation shows a positive and significant value, and the money supply also negatively significant influence the KLCI in the short-run. The results are consistent with the symmetric long-run relationship that we have obtained earlier. Thus, it is proven that inflation rate and money supply (M2) have a positive and negative relationship, respectively, towards stock market index in the case of Malaysia.

Then, the T^{+}_{t-1} and T^{-}_{t-1} Indicates the error-correction term for the asymmetric cointegration model. From the equation [4], we found that the error correction coefficients are significant, especially when the KLCI is below its long-run value. The results suggest that for about 48.39% of KLCI negative deviations from long-run values are corrected in the next quarter. The corresponding speed of adjustment for the positive deviations of KLCI is 2.35%, but it turns out to be insignificant. Therefore, it is obvious that negative deviations from long-run KLCI are eliminated more quickly than the positive ones. This results also in line with Koutmos (1998) which shows that stock prices in developed countries adjust faster for bad news than for good news.

CONCLUSION

The present paper reassesses the interaction between the Malaysian stock market and macroeconomics variables by using a new data set spanning from 1990 to 2015. Our findings give various information and implications on the issues of macroeconomic policies, which are monetary and fiscal policy, market efficiency and the monetary transmission mechanism. From the symmetric cointegration results, we proved the presence of the long-run relationship between Malaysian stock market and four selected macroeconomic variables. In the other words, in the long run, the movements of Malaysian stock market are affected by its economic fundamentals. However, the results from asymmetric cointegration only success to capture the asymmetric adjustment with only three variables, which is industrial production, inflation rate and money supply. Thus, comparing these two results, we can conclude that industrial production, inflation rate and money supply is indeed a main factor in predicting the movement of Malaysian stock market. Therefore, policymakers, investors and financial institutions should take a close look at this information to strengthen their policies.

Our results also revealed that Malaysian stock price is a good hedge against inflation. Thus, controlling and stabilizing the inflation rate may give a great return in the future. Furthermore, we also proved that money supply and Malaysian stock market are negatively related. Therefore, policymakers should focus on these two variables as it is related to each other. In the other words, shocks or changes in money supply may lead to inflation instability and thus uncertain behavior of stock market is expected to happen. Therefore, policymakers have to be careful in managing the stock of money supply, as it is possible to affect the financial market. Then, for market efficiency, it is often measured by the speed of adjustment to new information. According to our results, we can say that Malaysian stock market is quite efficient as it response about 48% when there is a shock and took about three quarters to regain its stability level. Then, from the error correction term of asymmetric cointegration results, it gives new information which is the adjustment speed for negative deviation from the long-run equilibrium is faster compared to when it is positive. This suggests that investors are more interested in rising stock prices. Thus, our findings on the evidence of asymmetric adjustment are consistent with a partial adjustment price model, which state that the bad news or negative returns are incorporated faster into current market prices than good news or positive returns. Thus, by comparing the two methods used in this study, it seems that asymmetric cointegration gives new information about the relationship between the stock market and macroeconomic variables. Our findings could provide some insight to the policymakers so that they could formulate a new policy to enhance the development of Malaysia stock market.

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