An Empirical Study of Relationship between Monetary Policy and Stock Market Performance in Malaysia

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Abstract: This study examined the relationship between monetary policy and stock market performance for sample data from first quarter of 1991 to first quarter of 2011 in Malaysia. The result of Unit Root test revealed the monetary supply variables namely; M1, M2, and M3 were stationary only after first difference. The results also show same characteristic within market index of Kuala Lumpur Composite Index. Real interest rate was level stationary as well. The Augmented Dickey Fuller (ADF) and Phillip-Perron (PP) tests confirmed each other. Co-integration analysis and Vector Error Correction Models (VECM) were also suggested a possibility of merely one long-run equilibrium relationship between real Kuala Lumpur Composite Index regards to M1, M2, M3, and real interest rate. On the other hand, results of trace and maximum Eigenvalue methods suggested only one co-integration equation amongst research variables. The Vector Error Correction Models analysis shows a statistically significant relationship between M1 and M2 as a monetary supply variable included in the model; so that M1 and M2 has long term influence on Kuala Lumpur Composite Index. All in all, the research findings suggested that by increasing the money supply, the market index of Kuala Lumpur Composite Index would growth in long term.

Key words: KLCI, Monetary Policy, Money Supply, Real Interest Rate.

INTRODUCTION

The background of Malaysian monetary policy implementation can be divided into two main periods; monetary policy during the pre-liberalization and monetary policy during post-liberalization (Ngah, Saini, Habibullah, & Mohamed, 2000). Monetary policy during the pre-liberalization involved first decade after independence, through which the monetary policy stressed the development of integrated financial system. As the banking system promoted in 70’s, demands for banking service- for instance financial loan requested by enterprises- has been increased significantly. At the time, Bank Negara Malaysia (BNM) monitored money supply and credits of commercial banks through several monetary policy tools namely; statutory reserve requirement (SRR), minimum liquidity requirement (MLR), volume and direction of credit (VDC), interest rate and moral suasion.

On the other hand, monetary policy implemented during the post-liberalization started from 1978, which involved two separate stages; first, the moving maturity stage of monetary policy embarked on 1979 and continued to 1988. The second stage was a challenging period started from 1989 to 1995. In 1978 banking sectors were released to determine interest rate based on cost of loan. At the same time, Minimum Lending Rate (MLR) was reduced for many times and credit quotas were eliminated to dedicate loans. However, central bank supervised the loans for purchasing house and setting up industrial company. Besides, the money supply was adapted with market index under BNM control. During 1979 to 1988, inflation was hold 3.7 percent and interest rate for banking sectors reach 11.54% in 1985, which was the highest rate compared to the previous years (after independence). Additionally, money supply growth had been reduced during the period. It is confined regards to contractionary monetary policy, which was implemented by government in order to rectify the effect of global economic recession experienced in 1980. Conversely, during 1989 to 1994, Malaysia experienced incredible economic growth by the average annual rate of 8.6%, which reduced the unemployment rate throughout the nation. On that conducive situation of Malaysian money demands, BNM implemented expansionary monetary policy to satisfy economic needs at the time (Ngah, Saini, Habibullah, & Mohamed, 2000). There are three Monetary aggregates – M1, M2 and M3- and interest rate have been illustrated in Figure 1 and 2 as monetary policy instruments in Malaysia.
Fig. 1: Money supply M1, M2 and M3 (RM Million) during Q1 1991 to Q1 2011

Fig. 2: Interest rate of Malaysia during Q1 1991 to Q1 2011

Fluctuations in stock market index of Bursa Malaysia (formerly known as Kuala Lumpur Stock Index, or KLSE, with the market index of Kuala Lumpur Composite Index, or KLCI) are depicted in Figure 3. Minimum value for KLCI was 386.27 in third quarter of 1998 and the maximum value was 1519.94 in first quarter of 2011. Figure 3 illustrates the rapid growth in equity market during the period of between 1993 to 1997 and subsequent Asian Financial Crisis of 1997 to 1999. After 2000, stock market has witnessed rebounds, especially in 2007 and 2008. It also shows the effect of Global Financial Crisis of 2008/2009 on Malaysian stock market.

Fig. 3: Fluctuation of KLCI during 1991Q1 to 2011Q1

Source: World Bank Data Catalog
Given above, many emerging and developing countries deal with the unstable international environment subject to a variety of shocks. Countries with a higher stock market performance withstand the adverse impact of sudden capital outflows and exchange rate depreciation, originating from the global financial crisis to a larger extent (Aizenman and Sun, 2009). To this context, Short-term nominal interest rate is considered as the standard monetary policy instrument. Monetary authority uses nominal interest rate to alleviate short-run economic fluctuations. A reduction of nominal interest rate stimulates economic expenditure and hence economic demand. On the other hand monetary authority increases nominal interest rate when economic contraction is required. The monetary policy framework has evolved in parallel to the stock market system in the South East Asian countries. The monetary policy implementation has accompanied several major financial, institutional, and policy developments (Kim and Park, 2006). As it may be seen, the concept of monetary policy and stock market performance can be found in finance literature, yet the linkage between the concepts considering interest rate is still open debate. The link between the concepts (monetary policy, stock market, and interest rate) was planned to be investigated in this research study. This paper is organized as follows.

**Theoretical Background:**

Transparency of monetary policy has become one of the main attributes of monetary decision during the recent decades. In theory, transparency of monetary policy means the symmetric information between private sectors and monetary policy makers. Monetary policy transparency can enhance the predictability of monetary policy outcomes which helps market participants. It increases credibility and stability of inflation expected for private sectors (Geraats, 2006). Arbitrage Pricing Theory (APT) indicates the asset’s return can be predicted as a linear function of many macro-economic factors. APT theory is able to consider multiple risk factors, such as price level of energy, inflation rate and interest rate (Vickers, 1999).

\[ r = E(r) + \beta_1 F_1 + \beta_2 F_2 + \ldots + \beta_n F_n + \]  

Where \( r \) is the actual return of security, \( E(r) \) indicates expected return of security, \( F_1 \) is the first factor, \( \beta_i \) represents the sensitivity of security to the first factor. Asset prices are determined in markets with future-looking of participants. Asset prices influence the spending decision of public, for instance; higher stock prices decreases the cost of equity financing, which stimulates investment growth (Issing, 2009). In following section empirical practices on monetary policy and stock market performance is discussed.

**Empirical Frameworks of Monetary Policy and Stock Market Performance:**

One of the methodologies for evaluating monetary policy is Vector Autoregressive (VAR) method which is reflected in the study by Cassola and Morana (2004). They employed a cointegrated VAR system, which consists of real GDP, M3, Interest rate, Inflation rate and stock prices in order to study effects of monetary policy within European Union (Crowder, 2006). According to the results, monetary policy shocks have great impact on stock return. Bjornland (2009), however, examined the relationship between U.S monetary policy and Standard & Poor's 500 (or S&P 500). The study used structural VAR to prove existence interdependence between federal fund rate and stock return. Following equation was applied in their research (Bjornland & Leitemo, 2009).

\[ i_t = F_t (...) + \sigma e_{MP} \]  

Where \( i_t \) is a tool used by the monetary authority (Federal rate in the United States). \( F \) is the function that associated with the interest rate. \( e_{MP} \) is the monetary policy shock; and \( \sigma \) is the standard deviation of the monetary policy shock.

Bernanke and Kuttner (2005) examined the reaction of equity prices as result of changing in federal rate. They applied Campbell and Ammer model to prove their hypotheses which used VAR to assess the relation between reflections of equity prices in response to changing on interest rate (Bernanke & Kuttner, 2005). According to the research, 0.25 percent reduction on interest rate increases stock indices by 1 percent. They used following equation described here:

\[ H_t = a + b_1 \Delta i_t^e + b_2 \Delta i_t^u + \epsilon \]  

Where \( H_t \) indicates stock return; \( \Delta i_t^e \) indicates the difference between expected interest rate; and \( \Delta i_t^u \) indicates the difference between unexpected interest rate.

Growder (2006) used a structural VAR model to observe the reaction of the stock market return in order to change discount rate. According to the findings, changing federal fund rate led to probable results. Reasons for doing the research were illogic volatilities in stock market in the late 90s which raised arguments for using proper monetary policy. However, researcher believed Federal Reserve affects economic situation in society by
using interest rate and money supply. Monetary policy could influence stock market return effectively with changing expectation of stock market contributors. In the other words, contractary monetary policy reduced firm’s expectation about future profitability and become the main reason for stock returns’ reduction. within this relationships, interest rate increased as result of executing tight monetary policy and reduced the stock prices due to decreasing in present value of companies’ future cash flow (author used daily data during February 3, 1970 to June 16, 2003 for proving his viewpoint). The present value model was applied in this research presented in following.

\[ P_{t+1} = E_t \left[ \frac{1}{(1+R_t)^t} D_t \right] + E_t \left[ \frac{1}{(1+R_t)^m} P_t \right] \]  

Where \( P_{t+1} \) is the present value of stock; \( D_t \) is the future expected cash flow; \( E_t \) indicates operators’ expectation according to availability of information on the market participants at time \( t \); and \( R_t \) is the discount rate that used by market participant to discount future cash flow.

The study by Ioannidis and Kontonikas (2008) assessed the effect of monetary policy on stock market among members of Organization for Economic Co-operation and Development (OECD) during the period of 1972 to 2002. They realized that monetary policy had a considerable impact on stock market, which showed changing in discount rate influenced on contributors of stock markets significantly (Ioannidis & Kontonikas, 2008). As might be known, tight monetary policy increases interest rate; therefore, stock’s value reduces according to reduction in the value of companies’ future cash flows. In this investigation, stock price and interest rate were considered as monthly data, which were collected from 13 members of OECD including 7 members of G7 and 6 members of European Union (Belgium, Finland, Netherland, Sweden, Switzerland and Spain) from January 1972 until July 2002. The study used regression model to examine the relationship between interest rate and stock market return.

\[ \Delta S_t = a + \beta \Delta r_t + u_t \]  

\( \Delta S_t \) indicates the equity returns; \( \Delta r_t \) shows monetary policy changes. According to the research assumption, positive (or negative) value of \( \Delta r \) were related to the contractionary (or expansionary) monetary policy; for instance, if the \( \beta \) is negative and interest rate is increased, then the contractionary monetary policy eliminates the equity returns at the same month. This equation has been regularly applied in the financial economic literature to support the inverse relationship between interest rate and equity return.

Dufour and Tessier (2006) also investigated the relationship between monetary policy and stock market return. According to their research, monetary aggregates affect income and inflation in long run. In the case of United States, authors could not find any evidence to indicate macroeconomic variables influence stock return; yet in Canada, there were some findings which indicated the relationship between money supply, inflation and GDP (Dufour & Tessier, 2006). Vector Autoregressive (VAR) model was used in order to investigate short and long term relationship between monetary policy tools and stock returns.

\[ W(t) = \mu(t) + \pi w(t) + a(t); t = 1, 2, ..., T \]  

\[ W(t) = (w_1t, w_2t, ..., w_mt) \] which is a random vector.

\( \mu(t) \) indicates a deterministic trend; and \( a(t) \) indicates a white-noise process of order two with a non-singular variance-covariance matrix \( \Omega \).

Bohl, Siklos and Sondermann (2007) analyzed the reaction of stock markets to unanticipated interest rate volatility in European countries. In this research four largest stock markets were selected in the European Union namely; the German DAX 30, the Italian MIB 30, The Spanish IBEX 35 and the French CAC 40. Intentions of this research were to assess the short term effect of monetary policy on stock market in European countries. According to their findings, there was a significant relationship between unexpected interest rate decisions and European stock market index. They found increasing interest rate by 0.25 percent; stock market indices would confront a reduction between 1.56 to 2.32 percent (Bohl, Siklos, & Sondermann, 2008). This relationship was more significant than the interdependence between monetary policy shock and stock return in the U.S. They used heteroskedasticity approach of Rigobon and Sack in their research. Equations below presented the method applied in the study.

\[ \Delta h_t = \beta \Delta S_t + \gamma z_t + u_t \]  

\[ \Delta S_t = \alpha \Delta h_t + z_t + \eta_t \]
Equation (7) indicates the function of a monetary policy reaction where the stock return changes leads to reaction of monetary policy. Equation (8) illustrates dependency of stock return by changing in the monetary policy.

Chortareas, Nankervis and Noikokyris (2010) studied the effect of monetary policy on stock return before and after implementation of inflation targeting in the United Kingdom during 1982 to 2010. The research findings indicated that stock return had a negative association with monetary policy before the inflation targeting. However, publication of inflation reports affected on both stock prices and fluctuation of stock returns (Chortareas, Nankervis, & Noikokyris, 2010). Heteroscedasticity methodology of Rigbon and Sack with methodology of Bernanke and Kuttner were employed in this research (Bernanke, 2007).

\[
r_i = \alpha + \beta \Delta i_{\text{UK}} + \epsilon_i
\]  

(9)

Where \( r_i \) indicates a daily returns on the FTSE all shared Index, \( \Delta i_{\text{UK}} \) indicates the changes in the UK official policy rate.

The study by Pennings and Ramayandi (2011) tended to prove effectiveness of monetary policy on financial market in several countries such as: Canada, New Zealand, Australia, United Kingdom, Korea, Indonesia, Thailand and Malaysia during financial crisis (Pennings, Ramayandi, & Tang, 2011). According to their research, if interest rate increased by 1 percentage point, stock market index declined by one percent. For OECD countries, there was no strong evidence on the impact of monetary policy in financial market during financial crisis; yet in non OECD countries, some evidences indicated the stronger effect of monetary policy on stock return in the period of financial crisis. In this research two crisis-periods were studied, the narrower period was during 15 September 2008 to 15 March 2009 and the broader period begun at 1 January 2008 to 1 June 2010. The study pursued Bernanke and Kuttner’s method to analyze the impact of monetary policy on financial market during the financial crisis (Bernanke, 2007).

\[
\Delta f_t = \alpha + \beta \Delta \text{it}_{\text{un}} + \epsilon_t ; f = e, s 
\]  

(10)

Where \( \Delta \text{it}_{\text{un}} \) indicates unexpected changes in the monetary policy and \( \Delta f_t \) represents financial variables such as the exchange rate (e) and the stock market index (s). Following section describes the data and methodology applied together with the results extracted in analysis process.

**Data, Methodology, and Results:**

There are several steps were applied in this study. Through each step, one set of analysis is applied and results determine the next steps. The data for this study were collected from financial sources from 1991 to 2011 quarterly in Malaysia. The stationary analysis was tested in the first step. Hence, Augmented Dickey Fuller (ADF) Test and Phillip-Perron (PP) Test were conducted on data to test for existence of unit root. Non-stationary data were treated in a way to become stationary for further analysis. This was done by means of differencing exist in data. In the next step, co-integration test was conducted before applying Vector Error Correction Model (VECM) (Khin, Eddie, Zainalabidin, & Nasir, 2010). Results of unit root test are presented in Table 1.

<table>
<thead>
<tr>
<th>Table 1: Results of Unit Root Test</th>
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<tr>
<td>Variable</td>
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<td>M1</td>
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<td>M2</td>
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<td>M3</td>
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<tr>
<td>KLCI</td>
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<td>Real Interest Rate</td>
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*, **, ***: statistically significant at respectively 0.10, 0.05, and 0.01 acceptance levels

The results of unit root test indicate that monetary supply variables (M1, M2, and M3) are stationary only after first difference. Real GDP and market index of KLCI also have similar characteristics. They are also stationary after first difference. On the other hand, the real interest rate is inferred to be level stationary too. Thus, the results of ADF and PP tests confirm each other. In order to test the research model, long term relations between variables were identified by means of cointegration tests. Results of Johansson cointegration test on the model (cointegration rank) is presented in Table 2.
As illustrated in Table 2, Johansson cointegration results encompassed both methods of Trace and Maximum Eigen-value. Results of trace method suggested the existence of one cointegration equation; while similarly maximum Eigen-value method suggested that one cointegration equation. In other words, there is a possibility of existence of only one long-run equilibrium relationship between KLCI, M1, M2, M3, and real interest rate within a multivariate framework.

The long run relation (cointegration equation 1), where represented in the horizontal equation in the first row, suggests that money supply variables of M1 and M2 have statistically significant impact on KLCI. According to the Table 3, t-statistics of 5.23 for M1 shows a significant relation between M1 and KLCI at 0.01 acceptance levels and t-statistics of 1.98 for M2 indicates a significant relationship between M2 and KLCI at 0.05. However, t-statistics of 0.50 fail to support a significant relationship between M3 and KLCI. In addition, t-
This paper aimed to investigate the monetary policy impacts on the variables of M1, M2, and M3 and real interest rate on the return of stock market index in Malaysia. The research and theoretical background, empirical frameworks of monetary policy concepts and stock market performance are discussed in this study. The results of Johansson cointegration test indicate one long-term relationship among money supply variables of M1, M2, M3 and real interest rate.

Conclusion:

This paper aimed to investigate the monetary policy impacts on the variables of M1, M2, and M3 and real interest rate on the return of stock market index in Malaysia. The research and theoretical background, empirical frameworks of monetary policy concepts and stock market performance are discussed in this study. The results of Johansson cointegration test indicate one long-term relationship among money supply variables of M1, M2, M3 and real interest rate.
The VECM analysis also revealed statistically significant relationship between M1 and M2 as a monetary supply variable included in the research model. Thus, M1 and M2 have long term influence on KLCI. It can be inferred that by increasing money supply the market index of KLCI would increase eventually. This means firms have better access to financing options that can help them towards their economic growth or operations. In other words, firms can increase their revenue and boost their value in capital market. Therefore, firms may expect growth in stock price within the market, results the overall market index growth.

The implication of this finding is basically for policy makers and central bank (i.e. Bank Negara Malaysia, or BNM). They may affect the market index positively over a long period by choosing expansionary monetary policy. This is supported by the findings of this study based on expansionary monetary policy (especially in terms of M1 and M2) and would boost the return on the index of Bursa Malaysia.

REFERENCES


