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Monetary Policy and Gross Domestic Product in Malaysia: An Econometric Investigation

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Abstract: This study examined the relationship between monetary policy and gross domestic product (GDP) in Malaysia for quarterly data from 1991 Q1 to 2011 Q4. According to Unit Root test, monetary policy variables M1, M2, M3 and GDP were stationary only at first difference and however, real interest rate was at level and first difference for data stationary. Then, Johansson co-integration analysis and vector error correction method (VECM) were applied of the study. The result showed that there was a possibility of existence of long-run equilibrium relationship between GDP with M1, M2, M3 and real interest rate. Results of trace and maximum Eigen-value method indicated that there were also 2 co-integration equations at the 0.05 level significant. Results of VECM analysis showed that M1, M2, M3 as a monetary supply variable are statistically significant in the GDP model. Therefore, monetary supply instruments had long-term influences on GDP and also there was positive relationship between money supply and GDP in Malaysia.

Key words: Domestic product (GDP) · M1 · M2 · M3 and GDP · Results of VECM · (VECM)

INTRODUCTION

Malaysia is an upcoming emerging market in South East Asia. It is also classified in upper-middle-income by World Bank. Malaysian income has been evolved from exporting natural resources to manufacturing productions recently. Malaysia's revenue is based on exporting of tin and rubber that diversified to palm oil and petroleum. Although proportion of agricultural production in GDP has reduced but the portion of manufacturing productions has increased in GDP during the mentioned period. This was due to the industrialization policy adapted by the Malaysian government in late 70's. Today, industrialization and Foreign Direct Investment (FDI) play vital role in the development of Malaysian economy.

The economic policy of Malaysia can be classified in three categories. First, the New Economic Policy (NEP) was implemented during 1970 to 1990. Second, the National Development Policy (NDP) was executed in 1990 to 2000. Third, the National Vision Policy (NVP) was launched in 2001 and extended until 2010 [1, 2].

Therefore, the strategies of New Economic Policy (1970) focused mainly on free market mechanism. It clearly illustrated that Malaysian Gross Domestic Products (GDP) accelerated from USD 4.276 billion in 1970, to USD 44.024 billion in 1990, upon implementation of the NEP. NDP replaced with NEP in 1990. The strategies in NDP were enhanced further to several additional aspects. It addressed the issue of poverty to the hardcore poverty strategy and included employment of native people in industrial sectors. By implementing this strategy, although Malaysian economy experienced financial crisis, its GDP grew from USD 44.024 billion in 1990 to USD 92.783 billion in 2001. Nevertheless, this economic growth brought down the unemployment level and inflation rate during the periods. Malaysian economy has prospered during the period of 1975 to 2010 and now it has emerged as an emerging market in South East Asia due to its successful implementation of NEP, NDP and NVP. Malaysia is one of the important exporters of electronic devices and high technology sector. The economic success of Malaysia was clear when it could address the

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Fig. 1: GDP of Malaysia (Billion $) from 2001 to 2010 Source: [3].

world economic crisis in 2008-2009, compared to other development countries [3].

Therefore, economists consider economic development in Malaysia as one of the best models in South East Asia. This is because the Malaysian government succeeded in eliminating poverty by executing NEP and NDP during 1970 to 2000. Malaysia can get to this level because of three reasons; this country is one of the dynamic economies in South East Asia with its multiracial population, second reduction of the nation's poverty and accelerating the economic development have been the main parts in making decision for new strategy each time and third, direct successful implementation of NEP and NDP by the local government led to this country got to this position recently. Although Malaysia had accomplished previous programs but it needed to revise preceding strategies to hold its economic growth [3].

There was an important issue, which further led to a new strategy, how long local government could maintain its success to keep this economic growth and eradicating deficiency in Malaysia? Addressing this issue led to the National Vision Policy (NVP). NVP was launched in 2001 with the aim of placing Malaysia in a competitive position, with a stable society. Figure 1 below exhibits the effect of NEP on Malaysian economic development from 2001 to 2010. The aim of NVP can be pointed in different aspects that creating adjustable market and society with the external high technology, enhancing equitable society, maintaining economic growth and further accelerating economic growth, strengthening high technology sectors, modernizing the agricultural industry and making it competitive compared with external productions. Accordingly, GDP of Malaysia increased from USD 92.783 billion in 2001 to USD 237.803 billion in 2010 based on successful implementation of NVP [3].

MATERIALS AND METHODS

In executing monetary policy, usually central banks determine a desired interest rate, upon which they apply open-market operation to change bank reserves for reaching to the target rate. In the expansionary monetary policy, central bank decides to increase the supply of reserve from S_2 to S_3, therefore interest rate will reduce from y_2 to y_1 as depicted in Figure 2. Conversely in the contractionary monetary policy, supply of reserves is decreased from S_2 to S_1, therefore interest rate increases from y_2 to y_3. Figure 2 illustrates that the money supply is x_1, x_2, x_3 and three real interest rates are y_1, y_2, y_3. It is implementing the expansionary monetary policy, real interest rate decreases from y_3 to y_2 or y_1 [4].

According to the theoretical discussions, the following research framework is developed to identify the impact of monetary policy tools on GDP, representing the general economy of the country.

Single Equation Model of Monetary Policies and GDP: A short-term model of the GDP equation as a function of related factors (in logs) with monetary policy variables (M1, M2, M3 and interest rate) as follow:

$$GDP_t = \alpha + \beta_1 M1_{t-i} + \beta_2 M2_{t-i} + \beta_3 M3_{t-i} + \beta_4 IR_{t-i} + \varepsilon_t \quad (1)$$

GDP_t	:	Gross Domestic Product of Malaysia (GDP) in period t (RM million)
$M1_t$	:	Amount of M1 on period t (RM million)
$M2_t$	:	Amount of M2 on period t (RM million).
$M3_t$	:	Amount of M3 on period t (RM million).
Ir_t	:	Real interest rate on period t (percent per quarter).
RM	:	Malaysian Ringgit
α	:	Intercept of regression.
$\beta_1, \beta_2, \beta_3, \beta_4$	:	Coefficient of M1, M2, M3 and interest rate, respectively.
ε	:	Error term.
t	:	Quarterly data during 1991 to 2011 (1991Q1 to 2011Q1).

If time series are stationary, then, vector autoregressive (VAR) methods are applied on the model to determine the coefficients. However, if time series are non-stationary then they are analyzed by using vector error correction model (VECM) method [5,6]. As illustrated

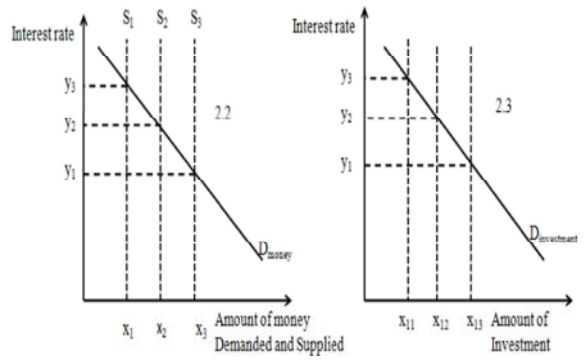

Fig. 2: Relationship between Interest rate, Amount of Money Demanded and Supplied and Amount of Investment. Source: [4].

by the framework, the objective of this research is measuring the strength of relation between components of monetary policy, M1, M2, M3 and interest rate on GDP in Malaysia. As mentioned in the literature review, monetary policies have a specific relation with GDP in each country in regarding type of monetary policies such as: expansionary monetary policy or contractionary monetary policy. In elaboration of this issue, monetary policies will be more efficient if a specified accurate policy is implemented on time and they also have adjustability with governments and economic objectives [4].

Monetary policies have different components which are effective, to some extent. In order to conduct this study, research variables include M1, M2, M3, Interest rate and GDP. M1 is defined as a liquid measure of money supply which involves cash and liquid assets that can be converted to the cash quickly. M2 indicates money and a close alternative for it. On the other hand, M2 covers a broader categorization of money than M1 which is an important economic indicator to predict inflation. M3 includes M2 plus long term deposit which can be pointed as the broadest measure of money. It is applied to estimate the whole of the money supply in the specific period. Interest rate is defined as additional charges which can be imposed by the lender for taking a risk and missing other opportunity for investment, to those who don't have access to the sufficient source of money. GDP is defined as the entire value of all produced goods and services that can be estimated for the specific period [4].

Model Identification: Unit Root Test (Data Stationary Test): The unit root test is to develop the time series into a stationary one for the GDP model with monetary policy variables (M1, M2, M3 and interest rate) in a series. [7-9] explained that most of time series variables are non-stationary, with mean and variance non constant (unit root). If the data contained unit root, the data are called non stationary, which lead to spurious regression result. Therefore, the unit root test checks for stationary of the data series, using Augmented Dickey Fuller (ADF) and Phillips-Peron's tests (PP).

Model Estimation: Vector Error Correction Model (VECM): After determining the characteristics of data and treating them accordingly, research frameworks and models are tested using appropriate econometric methods. Then, co-integration should be tested before conducting error correction models (ECM), or if required, vector error correction models (VECM). Later on, forecasting ability of results may be tested. Structural modeling of time series data, from a general perspective, is based on economic theories. However, economic theories fail to fully reveal the dynamic specifications of relations between variables of interest. Moreover, inference and estimation become complicated as endogenous variables appear on both side of equation. Such issues lead to the feasibility of using non-structural modeling approaches. Vector Auto-Regression (VAR) and Vector Error Correction Model (VECM) are discussed in the next sections as a mean for estimation and analysis. Moreover, tests of co-integration relations between non-stationary variables are discussed. In order to forecast systems of interrelated time series, one may use the vector auto-regression (VAR) method. Moreover, in a system of variables, it is used to investigate the dynamic impact of random disturbances. This method approaches all endogenous variables available in the system in a manner applicable for structural modeling by treating them as lagged functions of all endogenous variables [10]. This is mathematically represented as:

$$\Delta y_t = \alpha_1 + A_1 \Delta y_{t-1} + \ldots + A_p \Delta y_{t-p} + B_1 \Delta x_{t-1} + \ldots + B_q \Delta x_{t-q} + \varepsilon_t \quad (2)$$

Where y_t is a vector of endogenous variables, x_t is a vector of exogenous variables, $A_1 \ldots, A_p$ and B are coefficients and ε is residual vectors that is uncorrelated with its own lagged terms and other terms on the right side of equation, however, might be contemporaneously correlated. Such presentation and arrangement of variables eliminate the issue of simultaneity on the right side and enables the consistency of OLS estimators. This is due to the fact that only lagged terms of endogenous variables are presented on the right side of the equation.

Finally, it should be highlighted that although there is a possibility of contemporaneously correlated epsilon, efficiency of OLS is not affected and since identical regressors are used, it is the same as GLS. A Vector Error Correction Model (VECM) is a form of VAR restricted to be used for non-stationary co-integrated series of data. In VECM, the co-integration relation restricts the long term convergence of endogenous variables to their co-integrating relationships. In the meantime, it allows for short term dynamic short term adjustments. In a VECM method, the co-integration term is known, therefore, the deviation from long term value is corrected partially by means of short term corrections [11].

Therefore, we can write the co-integration equation of GDP as follows:

$$\beta_1 \Delta GDP_t + \beta_2 \Delta M1_{t-i} + \beta_3 \Delta M2_{t-i} + \beta_4 \Delta M3_{t-i} + \beta_5 \Delta IR_{t-i} = 0 \quad (3)$$

Moreover, the VECM equations model of GDP is as follow:

$$\Delta GDP_t = \alpha + \beta_{12} \Delta M1_{t-i} + \beta_{13} \Delta M2_{t-i} + \beta_{14} \Delta M3_{t-i} + \beta_{15} \Delta IR_{t-i} + \varepsilon_t \quad (4)$$

Co-Integration Rank Test: Theory of non-stationary time series analysis is developed as an answer to the fact that some of macro-economic time series are non-stationary and have a unit root [5] constructed a stationary time series by linearly combining two or more non-stationary time series. Such non-stationary time series are labeled as "co-integrated" only if such stationary linear combination exists. The co-integrating equation is interpreted as the long term relationship exists between variables.

Johansson co-integration [9] is used as a mean to test that whether some non-stationary time series are co-integrated. Results of test contain a part that presents the Trace statistics. Trace statistics test the null hypothesis that "there are r = co-integration relation exist between variables" against the alternative hypothesis that "there are k = co-integration relationships between variables". Number of exogenous variables is presented by k, while r is 0 to 1. Therefore, multiple results would be generated to cover different r values. Maximum Eigen-Value is another test statistics that is generated by Johansson co-integration test. Maximum Eigen-Value statistics provide results of the hypotheses tests of "there are r co-integration relation exist between variables" against the alternative hypothesis that "there are r+1 co-integration relationships exist between variables".

RESULTS AND DISCUSSIONS

This research is conducted in stages. In each stage, a set of analysis is applied and the findings in the respective stage determine the next stage. Upon collection of data, which is extracted during 1991 Q1 to 2011 Q4 quarterly, stationary analyses, should be tested. Hence, Augmented Dickey Fuller Test and Phillip-Perron Test are to be conducted on data to test for existence of unit root. If data are non-stationary, they are to be treated to become stationary. This is done by means of differencing from data. After that [12] suggested that co-integration test should be done before conducting Vector Error Correction Model. Results of unit root tests presented in Table 1 which indicates monetary supply variables (M1, M2 and M3) are stationary only after first difference. Real GDP also have similar characteristics. Real interest rate is level stationary. Results of ADF and PP tests confirm each other.

Effect of Money Supply on Real GDP: In order to test the model, long-term relationship between real GDP, money supply variables (M1, M2 and M3) and real interest rate are identified by means of co-integration tests. Results of Johansson co-integration test on the model (co-integration rank) is presented in Table 2. Table 2 provides Johansson co-integration results obtained from both methods of Trace and Maximum Eigenvalue. Results of trace method suggest existence of two co-integration equations; similarly, maximum Eigenvalue suggests there are two co-integration equations. In other words, both methods confirm each other's that there are two long-run equilibrium equations between real GDP, M1, M2, M3 and real interest rate exists within a multivariate framework.

As illustrated by Equation (5), the long run relation (co-integration equation 1), which is the horizontal equation in first row, suggests that long-term relationship between money supply variables of M1, M2 and M3 with GDP are statistically significant. This is due to respective t-statistics of 3.54, 3.99 and 4.17, which suggest a significant relationship between M1, M2 and M3 and real GDP at 0.01 acceptance level. On the other hand, t-statistic of 0.128 fails to support any form of relation between real interest rate and real GDP in Malaysia. The sign of coefficients of money supply variables are similar to the sign of coefficient of real GDP. Hence, one may infer a direct relationship between money supply and real GDP.

Table 1: The Results of Unit Root test of M1, M2, M3, Real Interest rate and Real GDP

	Augmented Dickey Fuller Test (ADF)			Phillip-Perron Test (PP)		
Variable	Level	1st Difference	2nd Difference	Level	1st Difference	2nd Difference
M1	3.920	-4.626***	-9.356***	5.462	7.862***	-42.113***
M2	3.468	-5.309***	-10.877***	4.976	-5.307***	-27.613***
M3	3.162	-5.641***	-11.567***	4.267	-6.037***	-22.021***
Real Interest Rate	-3.349**	-8.871***	-11.058***	-3.502**	-8.871***	-23.124***
Real GDP	-0.584	-11.938***	-12.961***	-0.319	-11.785***	-19.217***

Note: *, **, ***: statistically significant at respectively 0.10, 0.05 and 0.01 acceptance levels

Table 2: Results of Johansson Co-integration Test on GDP and Monetary Policy Instruments

Hypothesized No. of CE (s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prof. **
None*	0.448	111.273	69.819	0.000
At most 1*	0.409	64.339	47.856	0.001
At most 2	0.203	22.829	29.797	0.255
At most 3	0.059	4.895	15.495	0.819
At most 4	0.001	0.012	3.841	0.912

Trace test indicates 2 cointegrating equations at the 0.05 level.
* denotes rejection of the hypothesis at the 0.05 level.
** Mackinnon-Haung-Michelis (1999) p-values

Hypothesized No. of CE (s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prof. **
None*	0.448	46.934	33.877	0.001
At most 1*	0.409	41.511	27.584	0.001
At most 2	0.203	17.935	21.132	0.132
At most 3	0.059	4.883	14.265	0.757
At most 4	0.001	0.012	3.841	0.912

Trace test indicates 2 cointegrating equations at the 0.05 level.
* denotes rejection of the hypothesis at the 0.05 level.
** Mackinnon-Haung-Michelis (1999) p-values

Co-integration Equation:

$-0.411\Delta GDP_{t-1}+0.754\Delta M1_{t-1}+0.458\ \Delta\ M2_{t-1}+0.343\Delta M3_{t-1}-0.791\ \Delta\ IR_{t-1}=0$ (5)

t statistic = [-10.149***] [3.549**] [3.996**] [4.171**] [0.129]

VECM Equations of GDP Model:

$\Delta GDP_t=0.002+0.417\Delta M1_{t-1}+0.502\Delta M2_{t-1}+.095\Delta M3_{t-1}-0.005\ \Delta IR_{t-1}+0.652\ \Delta GDP_{t-1}+0.003\varepsilon_t$ (6)

t statistic = [5.869***] [2.513**] [0.368] [-1.984*] [6.565***] $R^2 = 0.742$ Adjusted $R^2 = 0.720$

In Equation (6), it provides the results of VECM equation about GDP model. The result reveals that the short-term relationship between real GDP and its own one period lagged term, one period lagged money supply variables (M1, M2 and M3) and one period lagged real interest rate. In other words, it shows the forecasting power of real GDP, money supply and real interest rate variable on one period ahead in time. Results are significant at 0.01 acceptance levels with R-Square value of 0.742, indicates that up to 74.2 per cent of variation in short term changes of real GDP of Malaysia are explained by variation in the lagged money supply variables as well as real interest rate. Therefore, this is a concrete model in predicting and explaining short term movement of real GDP of

Malaysia: Moreover, existence of such relationship is statistically supported. T-statistic of 6.565 indicates that the last quarter real GDP is positively affecting current quarter real GDP significantly at 0.01 acceptance level. Moreover, t-statistics of 5.869 and 2.513 suggest that the one quarter lagged M1 and M2 are statistically significant at 0.01 and 0.05 acceptance level. For real interest rate, the significance of the relationship is acceptable at 0.10 levels due to t-statistics of -1.984. Coefficients of 0.417, 0.502 and -0.005 indicate that one period lagged M1 and M2 have positive relationship and real interest rate has negative relationship with current real GDP. Results do not support any short-term relationship between M3 and real GDP.

$\Delta M1_t=0.003+0.017\Delta M2_{t-1}+0.349\Delta M3_{t-1}-0.003\ \Delta IR_{t-1}+0.049\Delta GDP_{t-1}+0.561\ \Delta M1_{t-1}+0.005\varepsilon_t$ (7)

t statistic = [0.059] [0.885] [-0.886] [0.326] [5.155***] $R^2 = 0.507$ Adjusted $R^2 = 0.465$

Equation (7) indicated that current time M1 has short-term relationship with one period lagged changes in real GDP, M1, M2, M3 and real interest rate. This is acceptable at 0.01 levels, as supported by R-square value of 0.507 suggests that up to 50.7 per cent of variation in changes in M1 can be explained by changes in independent variables. However, as t-statistics of 5.155 shows current M1 has a 0.01 acceptance level relationship with only one period lagged M1. Results fail to support any short-term relationship between M1 and other variables.

$\Delta M2_t = 0.002 + 0.066\Delta M1_{t-1} + 0.077\Delta M3_{t-1} - 0.006\ \Delta IR_t + 0.149\Delta GDP_{t-1} + 0.373\Delta M2_{t-1} + 0.002\varepsilon_t$ (8)

t statistic = [1.124] [0.364] [-3.401**] [1.814*] [2.265**]
$R^2 = 0.403$ Adjusted $R^2 = 0.352$

Equation (8) showed that M2 of present quarter has a short-term relationship with one period lagged change in real GDP, M1, M2, M3 and real interest rate. R-square value of 0.403 suggests that the model can explain up to 40.3 per cent of variation in dependent variables using independent variables. In next step, t-statistic of -3.401 for changes in real interest rate indicates that it has a significant negative effect on present changes in M2 at 0.05 acceptance level. Moreover, t-statistic of 2.265 for one period lagged change in M2 shows its significant positive impact on changes in present time M2 at 0.05 acceptance levels. Finally, t-statistics of 1.814 for lagged change in real GDP suggests that it has a positive relationship with present changes in M2 only at 0.10 acceptance levels. Results fail to support between M1 and M3 variables significant relationships with present changes in M2.

$\Delta M3_t = 0.001 + 0.083\ \Delta M1_{t-1} + 0.122\ \Delta M2_{t-1} - 0.004\ \Delta IR_{t-1} + 0.147\ \Delta GDP_{t-1} + 0.465\ \Delta M3_{t-1} + 0.002\varepsilon$ (9)

t statistic = [1.977**] [1.034] [-3.068**] [2.493**] [3.051**]
$R^2 = 0.397$ Adjusted $R^2 = 0.346$

Equation (9) explained that current M3 has short-term relationship with one quarter lagged changes in real GDP, M1, M2, M3 and real interest rate. Moreover, R-square of 0.397 suggests that up to 39.7 per cent of variation in dependent variable might be explained by the variation in independent variables. Moreover, t-statistics of -3.068 and 3.05, respectively for lagged real interest rate and lagged change in M3 indicate that they have a respectively negative and positive effect on current changes in M3. Moreover, t-static of 2.493 for lagged changes in real GDP shows a significant positive relation at 0.05 acceptance levels. Finally, t-static of 1.977 for lagged changes of M1 suggests a positive relationship only at 0.05 acceptance levels. Results fail to support any statistically significant relationship between current M3 and lagged changes of M2 in Malaysia.

$\Delta IR_t\ 0.002 - 0.662\ \Delta M1_{t-1} - 0.757\ \Delta M2_{t-1} - 0.014\ \Delta M3_{t-1} - 1.236\ \Delta GDP_{t-1} - 0.554\ \Delta IR_{t-1} + 0.003\varepsilon_t$ (10)

t statistic = [-0.213] [-2.571**] [-0.878] [-0.281] [-5.279***]
$R^2 = 0.328$ Adjusted $R^2 = 0.271$

Equation (10) of the results of real interest rate has short-term relationship with lagged variables of real GDP, M1, M2 and M3. Moreover, R-square of 0.328 suggests that the model has ability to explain up to 32.8 per cent of variation in dependent variable. Result of t-statistics of -5.279 for lagged real interest rate shows that real interest rate is negatively affected by its own value lagged a period statistically significant at 0.01 acceptance level. Moreover, t-statistic of -2.571 for lagged changes in M2 shows a statistically significant negative relation at 0.05 acceptance level. Results fail to support statistical relationship between other variables.

Therefore, the previous studies about monetary policy's variables such as M1, M2 and M3 with GDP suggested that [13] conducted the relationship between money supply and output in Australia. A log-linear relationship was assumed in his research by using quarterly data for nominal growth domestic product GDP and money supply M3 was a proxy of money supply in this research during 1960 to 1975. According to his findings, there was a significant relationship between money supply M3 and GDP, in more detail, he indicated money supply M3 influenced on output with a lag of two quarters.

[14] studied on effectiveness of fiscal and monetary policy on economy in Nigeria with co-integration and error correction model by using annual data were extracted from central bank of Nigeria during 1970 to 1998. Their results indicated monetary policy was more effective than fiscal policy for the stabilization of Nigeria economy [15] investigated on relationship between monetary policy and output in Euro Area. According to his result, an unexpected increase in the short-term interest rate led to reduction of economic growth and maximum effect would be occurred with a lag of one year. VAR model was employed in his research by extracting data during 1971 to 2000.

[11] tried to compare the impact of monetary policy on output which was implemented by ECB on various countries in Euro area. Austria, Belgium, France, Germany, Italy, Netherland and Spain were selected in order to analyze the interdependence between monetary policy and output by using structural VAR with quarterly data during 1980 to 1998. According to their findings, there was approximately consistent impact over entire Euro area, but in some cases it needs to be pointed there were

stronger effects on output in Germany than Netherland or stronger effects on prices existed in Italy and Spain compared with Austria and Netherlands. However, impacts of monetary policies on output were somewhat similar across mentioned countries.

[16] analyzed the impact of monetary policy on output growth rate in seven countries of Euro Union during 1980 to 1998. Linear regression equation was used for this research. Based on their findings negative impact of increasing on interest rate in order to tight monetary policy was greater in recession compared with booms. Furthermore, results indicated a higher fraction of short term debt over total debt, a lower coverage ratio (which means a lower companies' ability to pay off its debt) and smaller firms were more sensitive as response of monetary policy changes during recession periods. Therefore, these results offered financial ratio could demonstrate which industries were more influenced during recessions compared with others.

10] analyzed the effect of monetary policy shocks, he figured out contractionary monetary policy shocks didn't have significant impact on GDP but it should be considered that price level of goods and services were affected gradually as result of monetary policy. He applied VAR model to analyze the relation between monetary policy shock and GDP, continuously monthly data were extracted from January 1965 to December 2003. On the other words, Implementation of tough policy led to change in GDP by ± 0.2 percent with a probability of 2/3, moreover GDP price deflator faced with reduction less than commodity price index. Therefore, price level changes gradually in duration of one year. However, based on his findings contractionary monetary policy didn't lead to tough impact on output necessarily.

[17, 18] have assessed the effectiveness of monetary policy regarding on the state of economy. They used Hamilton Markov switching model with quarterly data which were extracted during 1978 to 2003 for Indonesia, Philippines, Thailand and 1974 to 2003 for Malaysia. According to their findings, monetary policy had more influence on the economy which was in downward rather than upward.

[19] studied on reaction of economic activity and property as result of monetary policy shocks. In this research they used VAR model in order to analyze interdependence between CPI, real GDP, property prices and interest rate in 18 members of OECD during 1986 to 2008 Quarterly. $Y^n_t = (p^n_t, y^n_t, i^n_t, cr^n_t)$ is a N*1 vector including CPI (p), real GDP (y), three-month interest rate (I) and real credit (cr) for N countries, μ^n is a country-specific intercept, $A^n(L)$ is a log polynomial with the VAR coefficients and ε^n_t is the residual. [20] have studied on specific models which indicated how contractionary monetary policy effect on GDP through the effect on aggregate demand, VAR model were applied to investigate the mentioned relationship.

CONCLUSION

Results of Johansson cointegration test indicate that there are two long-term equations among real GDP, money supply variables of M1, M2 and M3 and real interest rate. The VECM, then, was conducted over the dataset and its results suggested that there was a long run relationship between real GDP and monetary supply variables of M1, M2 and M3. However, results did not support any long run relationship between real GDP and real interest rate.

As results presented in Equation (6), there was a positive relationship between money supply variables of M1, M2 and M3 and real GDP. However, there is significantly relationship between M1, M2 and real GDP only. This implies that if the money supply increases in Malaysia, there is a positive impact on the overall long-term production (in terms of gross domestic production) of the country. Therefore, Bank Negara Malaysia may choose the expansionary monetary policy to boost the real GDP growth of the country as a long-term plan. Again, this is supported by the experience of loose money supply policy in last decades.

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