

Accessing the Impact of Monetary Instrument towards Inflation in Malaysia

Abstract

The relationship between inflation and monetary policy are widely discussed in the research paper. Inflation is one of the packages that come along with the growth. It is crucial for the government to keep the country's inflation under control by adopting the right policies such as monetary policy. This paper examines the impact of monetary instrument towards controlling inflation rates in Malaysia over the period of 1970 to 2010. The analysis begins with the unit root test to determine the stationarity of the data. All the variables are found to have a long run relationship from the Johansen Juselius cointegration test. Besides that, from the causality test, there exist bilateral causality for all variables of CPI, interest, reserve and money supply for Malaysia. Among the practical suggestions that can be implemented by the policymaker based on the finding of this paper are constantly monitoring the level of reserve requirement in the country. Second, controlling the amount money supply in order to control money volume in the market is also an important measurement to reduce the excess demand of goods and services. Last but not least is by setting appropriate level of interest rate which also one of the key to control the inflation in the country.

Keywords: Infaltion; Monetary Policy; Financial Economics

1.0 Introduction.

The inflation rate in Malaysia was recorded at 1.50% in February of 2013 as reported by the Department Statistics of Malaysia. Historically from 1973 until 2013, Malaysia rate averaged from 3.75 percent to an all the time high of 23.90% in March of 1974 and a record low of -2.40 percent in July of 2009. In Malaysia the most important categories in the consumer price index (CPI) are food and non-alcoholic beverages (30% of total weight) followed by housing, water, electricity, gas and others fuels (23% of total weight). Others include transport (15%); communication (6 percent); recreation and culture (5%) and furnishing, household equipment and routine household maintenance (4%). The remaining components are restaurant and hotels at (3.2%) and miscellaneous goods and services at 6.3%.

Based on the economic view, inflation rate refers to the increasing of the general prices on the good and services in countries over a period of time. Each of the countries faced the problem of inflation rate. The increasing in the general level of prices of the daily goods and services in the country will cause the same amount of money can only buy fewer goods and services. Higher inflation will result in the low purchasing power of the citizen, higher cost of living, lower quality of life and also the overall country economic activities as well. Most economists believe and agree that high inflation rate is due to excessive growth of money supply of the country. Fischer (1993) and De Gregorio (1993) suggest that high or hyper-inflation will retard economic growth, although there could be a positive relationship between inflation and economic growth when the inflation rate is low. Inflation may have a negative impact on economic growth through the investment channel. Many of the counties used expansionary monetary policy to curb their inflation problem.

This paper intends to explore the most significant policy instrument to control the level of inflation in Malaysia by implementing extensive series of econometric testing to justify the finding of the research.

2.0 Literature review.

Monetary policy plays a key role in managing economic fluctuations. Most past studies tried to identify which instrument in monetary policy influenced the inflation. For example, Lars (1999) in his paper, "Inflation targeting as monetary policy rules", had done survey and discussed on inflation targeting in the context of monetary policy. They provided a general conceptual framework for monetary policy rules.

The relationship between inflation and monetary policy also can be proven by Richard et al (1999), "The Science of Monetary Policy: New Keynesian perspectives. They found that the monetary policy is credible to fight inflation. They exploited the monetary policy design problem with theoretical framework.

Arief (2007) found that the behaviour in conducting monetary policy in Thailand, Malaysia and the Philippines does not appear to change significantly while in the case of Indonesia, it significantly shift in the conduct of monetary policy. In the same line, fiscal policy also can be used to cater the inflation problem.

There have been various studies that examined the possibility of a causal relationship between deficit financing and the general price level. While most of these studies indicate budget deficit as fuelling inflation, a few others found no evidence to confirm that deficit financing is a major cause of inflation, Chimobi and Igwe, (2010). They found that inflation forecast targeting is important with monetary policy.

Matthieu et al (2012) had studied the monetary policy stabilization under rational expectations and perfect credibility by central bank. In this context a monetary authority committed to delivering a given inflation target can successfully steer expectation in the face of inflationary disturbances and achieve appropriate inflation volatility.

3. Methodology and Sources of Data.

The model proposed for this paper as follow:-

$$CPI = \beta_0 + \beta_1 I_t + \beta_2 MS_t + \beta_3 RS_t + \varepsilon_t \text{ -----(1)}$$

We then transform the model into log form to avoid heteroscedasticity problem.

$$LNCPI = \beta_0 + \beta_1 LNI_t + \beta_2 LNMS_t + \beta_3 LNRS_t + \varepsilon_t \text{ -----(2)}$$

Based on monetarist point of view, it is expected that:-

$$\beta_1 < 0, \beta_2 > 0, \beta_3 < 0$$

Interest rate or discount rate, β_1 is expected to have negative relationship with the level of inflation, CPI. For example, when the country's interest rate is high, it will lead to higher cost of borrowing. Higher cost of borrowing will reduce the people's desire to loan more for consumption or investment activities. These will reduce the excess demand for goods and services and lead to a lower inflation rate in the country.

Money supply, β_2 is the amount of fiat money circulated in the economy. It has positive relationship with the level of inflation in the country. Higher amount of money supply means more money are circulated in the country lead to more consumption or investment activities and therefore lead to higher demand for more goods and services. This excess demand of goods and services lead to higher inflation.

97 Reserve requirement, β_3 is expected to have negative relationship with the level of inflation, CPI.
 98 Reserve requirement is referred to the amount of interest that commercial bank need to deposit into
 99 central bank account for each deposit received from the public. Lowering the reserve requirement
 100 lead to higher excess reserve, which refer to the amount of loan that the commercial bank can use to
 101 borrow to their potential customer. This will also lead to higher spending activities and higher level
 102 of inflation in the country.

103
 104 The tests that we run using this model are:-
 105

106 **I. Unit Root Test:**

107 The general idea of unit root test is to test whether each variables has stationary or non stationary
 108 properties in time series analysis. It is important to identify the unit root properties to avoid spurious
 109 estimates in the model (error term not normally distributed with means not zero and variance is not
 110 constant)
 111

112 **II. Johansen Juselius Cointegration Test:**

113 After all data contain no unit root problem, the cointegration test can be done. The general idea
 114 about cointegration test is to know the long-run relationship between variables. If there have
 115 cointegration, there will be a stable long-run equilibrium in the model and all variables move
 116 together to single equilibrium. But this study must find at least one cointegration factor before we
 117 proceed with VECM.
 118

119 **III. Vector Error Correction Model (VECM):**

120 The VECM is investigating the short-run relationship in the models. VECM stands for Multi Error
 121 Correction Models, means the models are more than one. VECM is used to investigate dynamic
 122 relationship and use together with Granger Causality analysis. The purpose of using VECM in this
 123 study is to know if there exists single stable equilibrium or not (error correction term is *diverge or*
 124 *converge*).
 125

126 **IV. Granger Causality Test:**

127 Granger Causality test is used to know the specific correlation between variables in the model. It
 128 means Granger is a test for each variables whether if it is correlated or causality to other variables. If
 129 both variables are causing each other, it means that the model is a good. But it also depends on the
 130 study and hypotheses.
 131

132 **V. Impulse Response Function (IRF) and Variance Decomposition (VDC):**

133 Variance decomposition (VDC) can be described as causality test outside the estimation period.
 134 VDC decomposes variations in an endogenous variable in the VAR. It shows the percentage of
 135 forecast error variance for each variable that may be attributed to its own shocks and to fluctuations
 136 in the other variables in the system. IRF on the other hand measures the predictable responses to a
 137 standard deviation shock to one of the system's variables on other variables in the system.
 138

139 The main aim of this paper is to detect the relationship between monetary instruments and inflation.
 140 The results also can be used to help policymaker to make a better decision making to curb inflation
 141 problem in Malaysia.
 142

144 **Sources of Data**

145
 146 The data for the variables used in this paper is obtained from World Development Indicator 2011
 147 International Monetary Fund statistical database and Bank Negara Malaysia annual report. This
 148 paper used annual data starting from 1970 up to 2010 with 41 number of observation.
 149

4. Empirical Result.

Table 1: Unit Root Test

Country	PP Unit Root Test			
Malaysia	Level		First Difference	
	No Trend	With trend	No Trend	With Trend
LNCPI	-4.092 (7)	-1.969 (9)	-3.614 (0)***	-4.431 (2)***
LNI	-1.555 (4)	-2.240 (5)	-5.700 (12)***	-6.963 (14)***
LNMS	-2.821 (6)	-2.195 (6)	-5.507 (1)***	-5.955 (4)***
LNRS	-2.468 (5)	-2.281 (3)	-4.988 (3)***	-5.135 (6)***
Note: (*),(**),(***), indicate significant at 10%,5% and 1% significant level respectively. Number in bracket represents number of lag. The test used Schwarz Info Criterion.				

The analysis begins by testing the stationarity of the data by using Phillip Perron (PP) unit root test for all the variables used in the model. We used PP unit root test because it is more powerful than DF/ADF Unit Root Test. Based on table 1 above, all the data is found to be stationary at I(1) only after the first difference. Therefore, it fulfils the requirement to precede the analysis with Johansen-Juselius cointegration test (JJ).

Table 2: Johansen-Juselius Cointegration Test

Hypotheses	Eigen value	Trace statistic	Critical value (5%)	Max-Eigen value	Critical value (5%)
Ho : r = 0	0.654	73.630**	47.856	40.428**	27.584
Ho : r ≤ 1	0.473	33.202*	29.797	24.365*	21.131
Ho : r ≤ 2	0.206	8.836	15.494	15.780*	14.264
Ho : r ≤ 3	0.001	0.055	3.841	0.055	3.841
Note: Lags = 2 are determining after testing with Correlogram test and it free from autocorrelation problem (testing with each variables residual). r indicates the number hypotheses of cointegration factor (r=0 means 1 cointegration, r=2 means at least two cointegration factor). *means 5% and ** means 1% significant level (α). Data also using SIC criterion.					

Johansen-Juselius Cointegration test.

The optimum lag is detected through residual for each variables used in the model. The optimum lag is detected by making sure that all the residual probability must be larger than 5% significant level in order to avoid autocorrelation problem. The process will begin from the lowest lag, up to the point that all the variables residual is greater than 5% significant level. Here, lag 2 was detected as the optimum lag for the study. By following max-eigen value statistics, it indicates the existence of at least 3 cointegrating vector between the variables where the null hyphothesis ($r \leq 2$) is rejected at 5% significant level. Since there is more than one cointegrating vector, the analysis using VECM and granger causality test was proceeded.

VECM model

Table 3: VECM model

$LCPI_t = 2.921 - 0.419LI_t + 0.541LMS_t - 1.639LRS_t + \mu$
Orthodox monetarist state that Interest (LI) has -ve correlation, Money Supply (MS) +ve and Reserve (RS) has -ve relation to inflation.

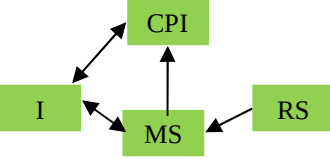
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The VECM model above shows that all the variables have a corrected sign and supported orthodox school of monetarist that CPI, has negative correlation with interest rate (I) and reserve (RS) and positive relationship with money supply (MS). To be more specific, a 1% increase in MS lead to 0.54% increase in CPI. The evidence was consistent with the past finding of Latifah (2004) and Fahad and Svetlana (2010) as they found out that broad money growth or money supply is found to be highly significant in determining inflation in both the short and long terms of inflation, especially in the long run. Besides, a 1% increase in I and RS will lead to the reduction of CPI by 0.419% and 1.639% decrease respectively. Here, it can be concluded that RS gave the highest impact to inflation (CPI) followed by MS and I.

Granger Causality test

Result of Granger causality can be viewed in Table 4. To summarize, MS has bidirectional relationship with CPI, RS has bidirectional with MS. MS and I have two way relationships besides CPI and I. The granger causality test is detected by following F-statistic. The negative value of ECT_{t-1} has proven that all the variables will converge in the long run. To simplify, if there is any change in CPI value (dependent variable), it will narrow down the gap value in the model, which means in the long run there only exist single stable equilibrium point. So this is the proof that there actually has strong relationship between inflation (CPI) with other variables (MS and RS) and weak relationship with I.

Table 4: VECM Granger Causality Test and Diagram

Dependent Variables	Granger Causality Chi-square statistic (probabilistic)				VECM _{t-1} Value (t-statistic)	Causality Diagram
	D(CPI)	D(LI)	D(LMS)	D(LRS)	ECT _{t-1}	
D(CPI)	-	3.156	2.212	0.872	-0.071	
D(LI)	2.422	-	4.812	9.689		
D(LMS)	0.369	15.849	-	1.875		
D(LRS)	1.085	2.801	7.501	-		
Note: VECM_{t-1} is value to determine the short run relationship. This value is important because if significant, changing in independent variables will affect widening or narrowing the dependent variables. ECT_{t-1} is Error Correction Term, where CPI = inflation, I= interest, MS = Money Supply, RS = reserve and L = Pure logarithm. This test also using 10% significant level. The granger causality test is based on F-statistic.						
						→ Bidirectional ↔ Two way directional

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Impulse response Function

Figure 1: Impulse Response Function

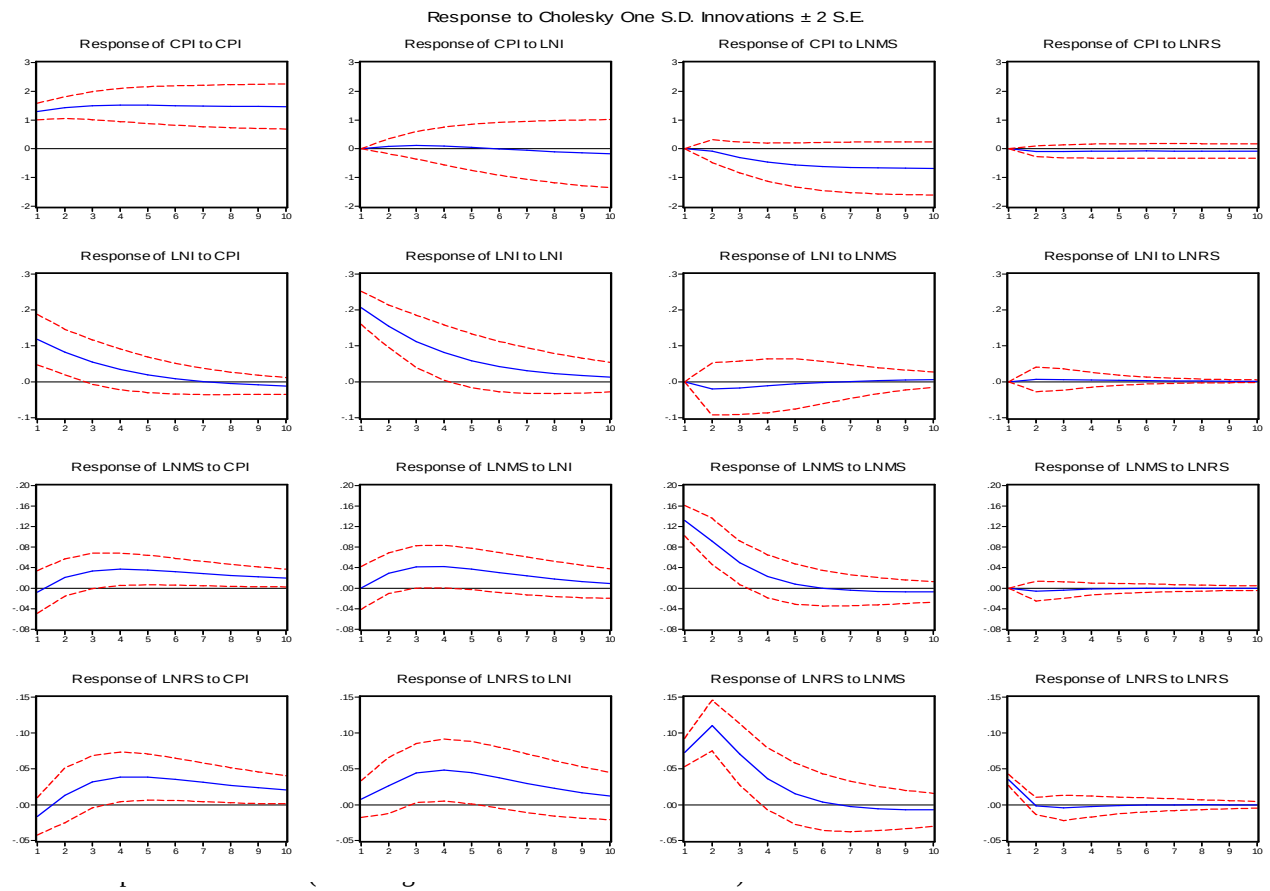


Figure 2: Impulse Response Function of One Standard Deviation Shocks/Innovations

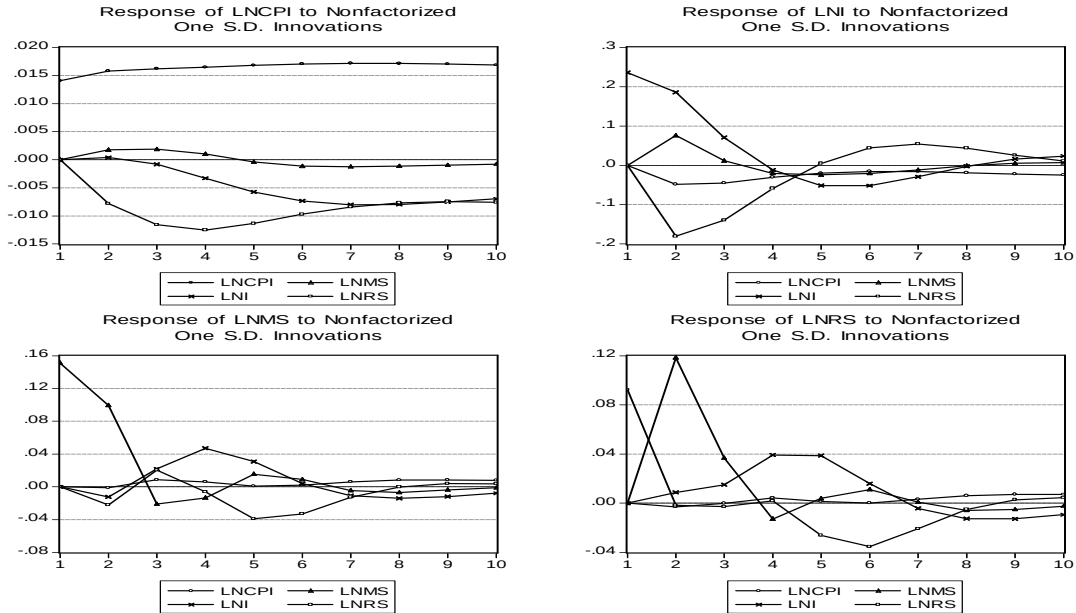


Table 5: Summary of Variance Decomposition

Period	LCPI	LI	LMS	LRS
1	100.0000	82.69043	91.49956	56.87093
2	91.51510	79.46786	72.91537	32.86215
3	82.04942	79.30939	58.30016	29.02522
4	74.44853	79.74061	46.39358	25.09565
5	68.68582	78.95106	39.06318	21.41360
6	63.97206	77.90181	35.10568	19.86473
7	59.75034	77.18652	32.35717	19.33902
8	55.82491	76.80226	29.92356	19.14908
9	52.09478	76.65672	27.71724	19.06744
10	48.59602	76.62082	25.80382	19.03200

The result of VDC is reported in Table 5 above. A ten-period horizon is employed to convey a sense of the dynamics of the system. The Granger-causal chain implied by the analysis of VDC tends to suggest that RS is the relatively endogenous since it has the lowest percent 19.03% (at year 10) compared to MS, CPI and I. I is relatively exogenous because the percentage change seems small from 82.69% in period 1 to 76.62% in period 10. 76.62% of the variance can be explained by itself (exogenous). I is a leading variable in this case, followed by CPI, MS and RS. Decomposition of CPI, besides being explained by its own variables, CPI can be explained by I. The same can be said for I, in addition to be explained by the variable itself, it is explained by variable CPI.

4. Policy recommendation and conclusion.

This paper helps to clearly determine monetary instrument used to combat inflation in Malaysia. We also used more advanced econometric tests to forecast and evaluate in more deeply the contribution of each of the variables used in the model. Deposit rate used to capture interest rate, (I) have negative relationship with CPI. Higher interest rate means higher cost of borrowing and therefore shrink the purchasing power of Malaysian people. Reduction in demand for good and services end up reducing the level of inflation, CPI in our country. Besides, money supply, (MS) has a positive relationship with the inflation and thus has proven the quantity theory of money developed by Irving Fisher. The difference is that we failed to find a proportional relationship between the MS and CPI. The last variable, reserve, (RS) or required reserve ratio which used liquid liabilities as percentage of GDP as proxy also found a negative relationship with CPI. Higher required reserve ratio means higher amount of share from each deposit enter into central bank, lowering the excess reserve and therefore lead to lower borrowing to the people and inflation level. In summary, this paper found that the best instruments used under monetary policy to curb the problem of inflation in Malaysia are the reserve requirement, followed by money supply and interest rate.

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