

INFLATION, MONEY SUPPLY AND ECONOMIC GROWTH: A CAUSALITY ANALYSIS FOR MALAYSIA

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ABSTRAK

Memang tidak dinafikan bahawa kenaikan harga yang berterusan dalam komoditi dan perkhidmatan menjejaskan prestasi ekonomi sesebuah negara. Oleh demikian, setiap kerajaan bermatlamat untuk mengekalkan tahap inflasi yang rendah dan stabil secara relatif. Hubungan empirikal antara inflasi, penawaran wang dan pertumbuhan ekonomi di Malaysia diuji dalam kajian ini dengan menggunakan analisis ujian kointegrasi dan Granger-Causality. Untuk tujuan ini, data suku tahunan KDNK deflator (P), penawaran wang (M_2) dan KDNK sebenar (Y) dari tahun 1996-2011 digunakan. Hasil kajian menunjukkan tidak wujud kointegrasi antara pembolehubah dalam siri yang digunakan. Sehubungan itu, tiada hubungan jangka panjang di antara pembolehubah. Penawaran wang dilihat sebagai Granger-Cause inflasi. KDNK dilihat mempunyai kesan hubungan yang kuat pada M_2 serta tingkat harga. Di samping itu, bukti hubungan satu hala jangka pendek antara penawaran wang dan paras harga umum menunjukkan bahawa inflasi merupakan fenomena kewangan dalam jangka pendek sahaja di Malaysia.

Kata kunci: Penawaran Wang, Inflasi, Pertumbuhan, Kointegrasi, Causality

ABSTRACT

It is without doubt that the persistent rise in the price levels of commodities and services adversely affects the economic performance of a country. Hence, the economic goal of every government is to maintain low and relatively stable levels of inflation. The empirical relationship between inflation, money supply and economic growth in Malaysia is tested in this paper by employing Cointegration and Granger-Causality test analysis. For this purpose, quarterly data on GDP deflator (P), money supply (M_2) and Real GDP (Y) for the period at 1996-2011 are used. The findings revealed no existence of a cointegrating between variables in the series used. Therefore, the variables do not have a long-run relationship between them. Money supply was seen to Granger-Cause inflation. GDP appear to have a strong causal effect on the M_2 as well as on prices level. In addition, the evidence of short-run unidirectional causality between money supply and general price level indicates that inflation is a monetary phenomenon in the short-run in Malaysia.

Keywords: Money Supply, Inflation, Growth, Cointegration, Causality

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1. INTRODUCTION

Inflation is a global economic phenomenon that always evokes heated debates among economic researchers. It appears in different ways in different countries or in a particular country in different periods of time. Inflation is defined as a price rise in the general level of goods and services over a period of time of a country. Sometimes, it is referred as an increase to the supply of money and credit. If the supply of goods and services does not increase relative to supply of money, it may result in the escalation in the price of goods and services, which will then lead to the value of money being lower than it actually is.

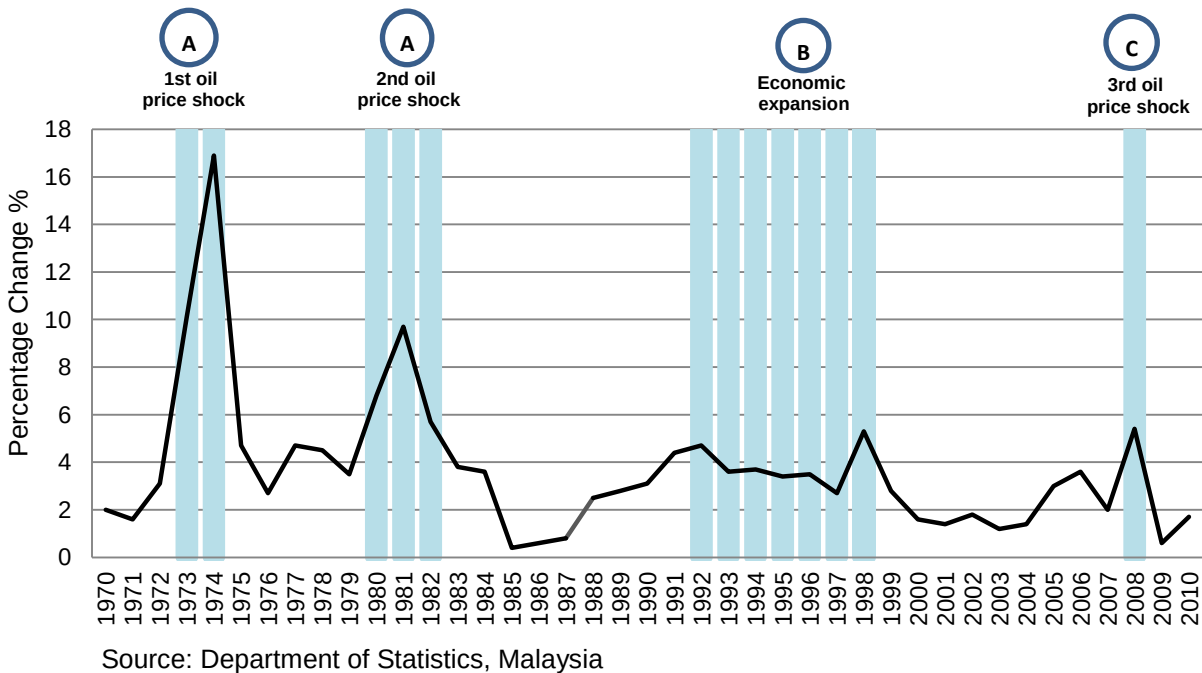
When inflation happens, it involves all levels of the community, households, workers, investors, and as well as pensioners are affected. The effect also varies as certain people benefit from it while others get the losses. It depends on how the money is used either been used to repay debt or to purchase goods. A high rate of inflation has brought the country many problems such as lost of investment, economic recession, slow down of economic growth and most important of all, the drop in the value of the Malaysian ringgit.

In economic study, the most known theory of inflation is the occurrence of inflation driven by either increased demand or increased cost pressures which is so-called as demand pull and cost push respectively. Economists agree that inflation pressures come from domestic and external sources as well as from both the supply and demand sides of the economy. Demand pull inflation occurs when there is initial increase in demand driven by a continuous increase in money supply. Cost-push inflation occurs when businesses respond to rising costs by increasing their prices to protect profit margins. The costs might rise in terms of the components cost and labour costs. Other factors are higher indirect taxes imposed by the government and a fall in the exchange rate.

1.1 Inflation Determinants during Periods of High Inflation

Historically, the average long-term inflation in Malaysia by 2.9 per cent is among the lowest rate of inflation in the region. However, the phenomenon of low inflation since 50 years ago was accompanied by four episodes of high inflation; in the mid-1970s, early 1980s, 1990s and late 2000s as in Figure 1.

Figure 1: Interest Rate in Malaysia 1970-2010



a. 1970s and 1980s: Surprise surge in global oil prices and food prices

The 1970s and 1980s saw significant increases in global energy and food prices due to disruptions in supply. World oil prices rose sharply due to the Egypt-Israel War and the Iranian Revolution in 1973 and 1979, respectively. The world oil shocks resulted retail fuel prices to escalate by 9.3 per cent and 7.9 per cent per cent respectively in 1974 and 1981. In addition, global food prices also rose strongly caused by global food shortage. This was a reflection of weak distribution linkages, the decreasing of land for cultivation due to urban development and industrialisation, as well as unfavorable weather conditions. The impact was amplified by the high weight of food in the CPI basket, which was as high as 47 per cent in the late 1960s. Food price inflation surged to double digit rates of 26.2 per cent and 11.4 per cent in both years mainly due to the significant increase in prices of rice, bread and other cereals and fruits and vegetables subcategories. As a result, there was a broad-based increase in domestic inflation to 17.3 per cent and 9.7 per cent in 1974 and 1981 respectively (Economic Developments in 2010, Bank Negara Malaysia).

b. 1990s: Strong domestic demand and capital inflows

As shown in Figure 1, inflation in 1990s remained above 3 per cent, except in 1997 (2.7 per cent) and 1999 (2.8 per cent). Price increases were broad-based, driven by both demand and supply factors. Substantial increases in the prices of property and equity, supported by strong growth in domestic liquidity and credit amid large capital inflows, led to increased net wealth and hence, supported domestic economic activity. Domestic supply also contributed to the inflation, particularly in the food category. Food supply

was constrained by adverse weather conditions, continued shortage of cultivated land, adjustments in administered prices by the Government, labour shortages and high capacity utilization. Inflation peaked at 5.3 per cent in 1998, reflecting rising cost pressures arising from higher import prices as the ringgit depreciated by 28.3 per cent against the US dollar towards the end of 1997 and due to cyclical shortage of essential food items (Economic Developments in 2010, Bank Negara Malaysia).

c. 2000 - present: Continuous rise in global commodity prices

Figure 1 shows that in early 2000, inflation moderated to a very low level as there was no pressures on supply and demand which became the main feature during the 1990s. However, inflation in Malaysia had increased in 2005, reaching a peak of 8.5 per cent in July 2008. The higher inflation during this period was mainly driven by external factors, particularly due to the higher global food and commodity prices. In contrast to the supply shocks of the 1970s and 1980s, the increase in global commodity prices was underpinned by both supply and demand factors (Economic Developments in 2010, Bank Negara Malaysia).

Thus, the reasons behind inflation are due to several current factors happening around the world. It is also caused by internal factors that help worsens the situation. The first factor was the increase of global crude oil prices. It affected the country's petrol prices rise, thus increasing the burden of the Government's on petrol subsidies.

1.2 Objective of the Study

The motivation of this study is initiated by the need for a further empirical analysis on the contributing factors of inflation in Malaysia at present. The aim of this study is to provide an empirical estimate of the relationship between inflation and money supply in Malaysia, and to test statistically the extent to which money creation is the cause or the effect. Specifically, this study attempts to re-examine the causal relationship between money, inflation and economic growth in Malaysia by employing Granger-causality test analysis for the period 1996-2011. It is essential to get in-depth knowledge on the contributing factors since it may assist the government and economists to take appropriate actions and rationalize the strategies in controlling and reducing the inflation rates. Milton Friedman (1970) famously said, "Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output". Thus, is inflation always a monetary phenomenon in Malaysia?

2. LITERATURE REVIEW

There has been a long debate in economics regarding the role of money in an economy particularly in the determination of income and prices. The Monetarists claim that money plays an active role and leads to changes in income and prices. In other words, changes in income and prices in an economy are mainly caused by the changes in money stocks. Hence, the direction of causation runs from money to income and prices without any feedback, i.e., unidirectional causation.

The Keynesians, on the other hand, argue that money does not play an active role in changing income and prices. In fact, changes in income cause changes in money stocks via demand for money implying that the direction of causation runs from income to money without any feedback. Similarly, changes in prices are mainly caused by structural factors.

Monetary policy plays an important role in boosting the economic growth of any country provided money is exogenously determined in the economy. Its impact on income and prices has been widely examined in the developed and developing countries in the context of Monetarists and Keynesians debate of Abbas and Husain (2006).

The direction of causality between money and prices has been tested in Malaysia over various periods of time. The results have yielded conflicting evidence. For example, Budina et al (2002) examined the causal relationship between money, inflation, and output from 1992 to 2000. They found excess supply of real money contributes significantly to the short-run dynamics of inflation. Their evidence suggested that inflation was largely a monetary phenomenon in Romania.

For example, Tan and Baharumshah (1999) has examined the dynamic causal chain among money (M1, M2 and M3), real output, interest rate and inflation in Malaysia using monthly data from 1975 to 1995. They found that price does Granger cause M2 through short-run channel. In addition, the error correction model has provided evidence that real income, interest rate and price do jointly lead M2 in the long run, and the real output, interest rate and M2 do jointly cause price. The study, however, did directly not tell the causal relations between money and price rather than joining the other variables.

Masih and Masih (1998) investigated the causality between money (M1 and M2) and prices in four Southeast Asian developing countries, namely Thailand, Malaysia, Singapore, and the Philippines from January 1961 to April 1990. They found that money supply lead prices which are in agreement with the monetarist view.

Mallik and Chowdhury (2001) on the other hand conducted an empirical analysis by applying co-integration and error correction models, to examine the short-run and long-run dynamics of the relationship between inflation and economic growth for four South Asian economies: Bangladesh, India, Pakistan, and Sri Lanka. They found two motivating results. First, the relationship between inflation and economic growth is positive and statistically significant for all four countries. Second, the sensitivity of

growth to changes in inflation rates is smaller than that of inflation to changes in growth rates. Therefore, these four countries are on the turning point of inflation-economic growth relationship.

Faria and Carneiro (2001) used a bivariate time series model (i.e., vector autoregression) with annual data for the period between 1980 and 1995, to investigate the relationship between inflation and economic growth in the context of Brazil which has been experiencing persistent high inflation. The empirical results obtained shows that although there exist a negative relationship between inflation and economic growth in the short-run, inflation does not affect economic growth in the long-run. Their empirical results also support the super neutrality concept of money in the long run. This in turn provides empirical evidence against the view that inflation affects economic growth in the long run.

Meanwhile, Abbas and Husain (2006), and Muhd Zulkhibri (2007) employed similar vector autoregressive (VAR), Johansen cointegration method and Granger-Causality test to analysis the relationship between money, inflation and real output in Indonesia, Pakistan and Malaysia respectively and conclude that money supply is a lead indicator of inflationary pressure.

Ahmed and Mortaza (2005) empirically explored the relationship between inflation and economic growth in Bangladesh, using annual data set on real GDP and CPI for the period of 1980 to 2005, and the co-integration and error correction models. The empirical evidence demonstrates that there exists a statistically significant long-run negative relationship between inflation and economic growth for the country as indicated by a statistically significant long-run negative relationship between CPI and real GDP.

Saaed (2007) explored the relationship between inflation and economic growth in the context of Kuwait, using annual data set on real GDP and CPI for the period of 1985 to 2005. The estimated result of the relationship shows a long-run and strong inverse relationship between CPI and real GDP in Kuwait.

In a broader scope, Omoke and Ugwuanyi (2010) examined the causality between money, price and output in Nigeria between 1970 and 2005, and employed cointegration and granger-causality test analysis. Their analysis revealed that no existence of a cointegrating vector in the series used. Money supply was seen to Granger cause both output and inflation. The result suggest that monetary stability can contribute towards price stability in the Nigerian economy since the variation in price level is mainly caused by money supply and they conclude that inflation in Nigeria is to an extent a monetary phenomenon.

Research on other countries has found both bi-directional causality and uni-directional causality. Jones (1987) examined the causality between money and prices in the US over the period 1959:Q1 to 1986:Q2. The results, however, show feedback relationship between the measures of money growth (M1 and M2) and inflation (CPI and wholesale

price index (WPI)). On the other hand, Darrat (1986) examined the direction of causation between money and prices for Morocco, Tunisia and Libya over the period 1960:Q1 and 1980:Q2. The results show a uni-directional causation running from money to prices without feedback for all the three countries concerned. Darrat (1986) concluded that the results support the monetarist view that money causes inflation.

3. DATA AND METHODOLOGY

The study employs two econometric models to achieve the empirical results. By applying the Johansen (1988) co-integration test, the first econometric model examines the short-run and long-run relationship between real GDP and CPI and the second is the application of the Granger causality test to determine the direction of causality between the two variables.

3.1 Data and Sources

The study uses the quarterly time series data of Real Gross Domestic Product, Broad Money Supply and GDP deflator for Malaysia from 1996:1 to 2011:4. The variables are obtained from National Accounts Gross Domestic Product (GDP), Quarterly National Product and Expenditure Accounts (various series) and Bank Negara Malaysia (BNM) Monthly Statistical Bulletin.

In literature, the two explanatory variables i.e. gross domestic product and money supply are found as important predictor for inflation. Therefore, we include M_2 as the variable reflecting money supply in the model. M_2 represents currency in circulation, demand deposits, saving deposits, fixed deposits, NIDs, repos and foreign currency deposits. Real Gross Domestic Product (Y) as a proxy of economic growth and GDP Deflator (P) as a proxy of inflation. Unlike some price indices (like the CPI), the GDP deflator is not based on a fixed basket of goods and services. The basket is allowed to change with people's consumption and investment patterns. Therefore, new expenditure patterns are allowed to show up in the deflator as people respond to changing prices. The theory behind this approach is that the GDP deflator reflects up to date expenditure patterns. The GDP deflator is the broadest based measure of the nation's price level. The GDP deflator is often considered the best measure of the nation's inflation rate because of its comprehensiveness and was applied in this study.

3.2 Model Specification

The study used a Vector Auto Regression (VAR) to identify the relationship between money, prices and economic growth. Based on previous study, the money-prices-GDP hypothesis is tested according to three macroeconomic variables. The relationship between variables can be represented by the equation 1 and 2.

The GDP (Y) is assumed simultaneously determined by monetary factors and by real factors. Money in circulation is a function of the evolution of certain aggregates like the

rate of growth of the GDP and public revenue. Inflation (P) is a monetary phenomenon following the monetarist view point and the quantity theory of money.

A relationship among the general price level, money supply and real gross domestic product can be represented by the equation (1).

$$\left. \begin{aligned} P_t &= f(M_{2t}, Y_t) \\ M_{2t} &= f(P_t, Y_t) \\ Y_t &= f(M_{2t}, P_t) \end{aligned} \right\} 1$$

Where:

P is GDP Deflator as a proxy for inflation

M₂ is the broad money supply used as a proxy for money supply

Y is the Real Gross Domestic Product as a proxy for economic growth

_t is the time trend

In the equation (1), exogenous variables can influence endogenous variables both at time t and time t-i, equation (1) therefore specifies a VAR model which can be represented by the equation (2).

$$\left. \begin{aligned} P_t &= \pi_{10} + \sum_{j=1}^I \pi_{1j} P_{t-j} + \sum_{j=1}^F \pi_{1j} M_{2t-j} + \sum_{j=1}^N \pi_{1j} Y_{t-j} + e_{1t} \\ M_{2t} &= \pi_{20} + \sum_{j=1}^I \pi_{2j} P_{t-j} + \sum_{j=1}^F \pi_{2j} M_{2t-j} + \sum_{j=1}^N \pi_{2j} Y_{t-j} + e_{2t} \\ Y_t &= \pi_{30} + \sum_{j=1}^I \pi_{3j} P_{t-j} + \sum_{j=1}^F \pi_{3j} M_{2t-j} + \sum_{j=1}^N \pi_{3j} Y_{t-j} + e_{3t} \end{aligned} \right\} 2$$

In equation (2), *i* is the period, π_{1j} , π_{2j} , π_{3j} are coefficients to be estimated and e_{1t} , e_{2t} , e_{3t} , are random disturbances, *n* is the number of optimum lag length, which is determined empirically by Schwarz criterion (SC). From an estimation of equation 2, Granger causality test can be applied and the effect among the variables can be seen.

3.3 Estimation Technique

This study employs three step procedures in order to determine the relationship between money, prices and GDP. The first stage involves establishing the order of integration using the Augmented Dickey-Fuller (ADF) to check whether each data series is integrated and has a unit root. The cointegration hypothesis between the variables is examined using the methodology developed by Johansen (1991) in order to specify the long-run relationship between the variables. To determine whether the current and lagged values of one variable affect another, Granger-Causality test was applied in this study. This procedure was suggested by Toda and Yamamoto (1995) with the objective

to overcome the problem of invalid asymptotic critical values when causality test are performed in the presence of non-stationary series.

4. EMPIRICAL ANALYSIS

Prior to Johansen cointegration and also causality tests, it is necessary for this study to conduct unit root tests to determine the time properties for each series. In order to ascertain the order of integration, this study applied the ADF unit root test.

4.1 Unit Root Test

The first stage involves establishing the order of integration using Augmented Dickey Fuller (ADF) for both at the level and the first difference on intercept and intercept & trend. Table 4.1 presents the results of unit root tests for the three variables, P, Y and M_2 .

Table 4.1: Unit Root Test Result

Variables	Level		1 st Difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
	t-statistics	t-statistics	t-statistics	t-statistics
P	-0.213	-4.165	-6.208	-6.170
Y	1.305	-2.948	-4.401	-4.839
M_2	5.111	0.140	-1.047	-6.179

The results indicate that all the variables are not stationary in their levels. On the other hand, all data are stationary at first difference at 1 per cent, 5 per cent and 10 per cent level of significant and therefore indicating that all variables are I(1).

Given the variables are I(1), the cointegration hypothesis among the variables is examined using the methodology developed by Johansen (1991) in order to specify the long run relationship among the variables.

4.2 Johansen Cointegration Test

This test will determine the presence of long-run relation between price, money and GDP based on the linear deterministic trend model. The result of cointegration condition that is the existence of a long term linear relation is presented in Table 4.2 (Trace Statistics) and Table 4.3 (Maximum Eigenvalue) using methodology proposed by Johansen and Juselius (1990).

Table 4.2: Unrestricted Cointegration Rank Test (Trace)

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistics	0.10 Critical Value	Prob.**
None *	0.229	27.379	27.067	0.093
At most 1	0.163	12.028	13.429	0.156
At most 2	0.026	1.543	2.706	0.214
Max-eigenvalue test indicates no cointegration at the 0.1 level * denotes rejection of the hypothesis at the 0.1 level **MacKinnon-Haug-Michelis (1999) p-values				

Table 4.3: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistics	0.10 Critical Value	Prob.**
None	0.229	15.352	18.893	0.265
At most 1	0.163	10.484	12.297	0.182
At most 2	0.026	1.543	2.706	0.214
Max-eigenvalue test indicates no cointegration at the 0.1 level * denotes rejection of the hypothesis at the 0.1 level **MacKinnon-Haug-Michelis (1999) p-values				

In the cointegration tables, trace test shows that there is one cointegration that exists between variables. Meanwhile, Eigenvalue indicates that no cointegration exists at 10 per cent level of significance. When there is a different result between trace statistics and maximum eigenvalue test, maximum eigenvalue is preferred (Banerjee et, al., 1993). Hence, it concludes that no long run relationship among price, money and GDP.

4.3 Granger-Causality Test

The lead-lag relationship between price-money-and GDP is examined using the Granger-Causality test at 10 per cent level of significance and the result is presented in Table 4.4.

Table 4.4: Pairwise Granger Causality Tests

Null Hypothesis	F-Statistic	Prob.	Decision	Type for Causality
Y does not Granger Cause P	6.265	0.001	Reject H_0	Bi-directional causality
P does not Granger Cause Y	2.258	0.092	Reject H_0	Bi-directional causality
M_2 does not Granger Cause P	2.220	0.096	Reject H_0	Uni-directional causality
P does not Granger Cause M_2	0.582	0.630	Accept H_0	No causality
M_2 does not Granger Cause Y	1.480	0.230	Accept H_0	No causality
Y does not Granger Cause M_2	6.248	0.001	Reject H_0	Uni-directional causality

Following the result in Table 4.4, the null hypothesis that Y does not granger cause P and P does not granger cause Y is rejected, confirming a bi-directional causality run from Real Gross Domestic Product to Inflation with feedback relationship, supporting the results from Ahmed and Mortaza (2005), Saaed (2007) findings.

The null hypothesis that M_2 does not granger cause P is rejected and it is safe to conclude that Uni-directional causality run from Money Supply to Inflation. This indicates that monetary aggregate is a lead indicator of inflationary pressure in Malaysia and this reported result is similar to the findings of Darrat (1986), Masih and Masih (1998), Budina et al (2002), Abbas and Husain (2006), Muhd Zulkhibri (2007) and Omoke and Ugwuanyi (2010) that reported uni-directional causal relationship from money supply to price.

Moreover, the null hypothesis that Y does not granger cause M_2 is also rejected, which indicates that Uni-directional causality run from Real Gross Domestic Product to Money Supply.

5. CONCLUSION

This paper examined empirically the relationship between inflation (P), money (M_2) and economic growth (Y) in Malaysia for the period 1996:1 to 2011:4 by employing Johansen approach and Toda-Yamamoto causality approach. Drawing a conclusion based on the main findings of this study, it revealed that no existence of a cointegrating vector in the series used. Using the causality testing procedure developed by Toda and Yamamoto (1995), this study found evidence of uni-directional link from money to prices without significant feedback. This tends to support the quantity theorist's view that the causal relation between money and prices, broadly consistent with Darrat (1986), Masih and Masih (1998), Budina et al (2002), Abbas and Husain (2006), Muhd Zulkhibri (2007) and Omoke and Ugwuanyi (2010) that reported uni-directional causal relationship from money supply to price. Accordingly, the result shows real gross domestic product appears to have a strong causal effect on the prices as well as on money supply.

The result suggests that monetary stability can contribute towards price stability in the Malaysian economy since the variation in price level is mainly caused by money supply. In addition, the evidence of short-run unidirectional causality between money supply and general price level indicates that monetary aggregate is a lead indicator of inflationary pressure in Malaysia supported by Milton Friedman (1970) who famously quipped, "Inflation is always and everywhere a monetary phenomenon."

This is well known that the objective of Malaysian monetary policy is to maintain price stability in the form of low inflation in order to create a stable environment for sustainable economic growth. As suggested by monetarists, this can be best achieved by maintaining a steady rate of growth of the money supply, roughly corresponding to the long-run growth of the real output in order to achieve price stability and economic disturbances.

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