THE ASYMMETRIC EFFECTS OF MONETARY POLICY: MALAYSIA EVIDENCE

BY

IZZELDIN E. ABD ALLA

A RESEARCH PAPER SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF ECONOMICS

KULLIYYAH OF ECONOMICS AND MANAGEMENT SCIENCES INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

NOVEMBER 2000

ABSTRACT

The relationship between output and money supply has been the subject of many empirical studies, which failed however, to take into account the distinction between positive and negative growth in money supply. This study explores whether positive and negative growth in money supply has symmetric effects on output in Malaysia. It attempts to test the hypothesis that positive growth in money supply does not have an effect on output, while negative growth in money supply significantly reduces output. All models used in the study are based on Granger framework, and are estimated using the method of Ordinary Least Squares (OLS). Using Granger causality tests at the preliminary analysis, the study recorded that the negative growth in money supply leads, while the positive growth lags output. In addition, the findings implied that the output effects of money supply in Malaysia are asymmetric. This result is robust across all the different specifications used in the study. The results of this paper indicate that at times of recession, expansionary monetary policy would not help in heating the economy, as the effects of the positive growth in money supply appeared to be statistically not different from zero. Moreover, the increase in money supply could fuel inflation, which would require a more significant offsetting future monetary contraction, an act that might prove to be counter-productive The results also imply that monetary policy could be used to cool down the economy if it is booming too fast. This study focused on monetary policy as an independent measure, however, there are other policies, which may also influence or change the results. Such influences might be the subject of further investigation in future

ملخص البحث

تمثّل العلاقة بين معدل النمو الاقتصادي و معدل النمو في عرض النقود الموضوع الاساسي للعديد من الدراسات التطبيقية، الا ان هذة الدراسات لم تاخذ في الاعتبار اهمية التمييز بين معدلات الزياده و النقصان في عرض النقود تهدف هذة الدراسة الى استطلاع ما اذا كانت معدلات الزيادة او النقصان في عرض النقود لها نفس التاثير على معدل النمو الاقتصادي بماليزيا بمعنى اخر فان الدراسة تحاول اختبار الفرضية التي تنص على ان معدلات الريادة في عرض النقود ليس لها تاثير على النمو الاقتصادي، في حين ان معدلات النقصان في عرض النقود تؤدي الى تخفيض كبير في معدل النمو الاقتصادي باستخدام طريقة المربعات الصغرى (OLS) تشير نتائج الدراسة على ان معدلات الزيادة و النقصان في عرض النقود لها اثار متباينة على النمو الاقتصادي في ماليزيا اي ان معدل الزيادة في عرض النقود ليس له اثر يذكر بينما تتاثر الحركة الاقتصادية سلبا و بشدة عند تخفيض معدل عرض النقود تدل هذة النتائج على انه ليس هنالك فائدة من السياسات النقدية التي ترمي الى زيادة كمية النقود بغرض النهوض بالاقتصاد عندما يكون في حالة ركود. و ذلك لان الزيادة في كمية النقود ليس لها اثر يذكر على النمو الاقتصادي كما اشارت هذة الدراسة و فوق ذلك، فان الزيادة في كمية النقود قد تساهم في ارتفاع معدلات التضخم، الشيء الذي قد يتطلب تخفيض معدل عرض النقود مستقبلا هذا و ان تم ذلك التخفيض فقد يؤدي الى ركود حقيقي في النمو الاقتصادي ركزت هذة الدراسة على السياسة النقدية كعنصر مستقل، و لكن لا بد من الاعتراف بان هنالك العديد من السياسات الاخرى التي ترتبط بالسياسة النقدية، و التي قد تؤثر على او تغير نتائج هذة الدراسة و لذا فان ذلك البعد نتركه للمزيد من التحقيقات في دراسات اخرى

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a research paper for the degree of Master of Economics.

Mansor Hj Ibrahim
Supervisor
Date

This research paper was submitted to the Department of Economics and is accepted as partial fulfillment of the requirements for the degree of Master of Economics

Selamah Abdullah Yusof
Head, Department of Economics
Date 20/11/2000

This research paper was submitted to the Kulliyyah of Economics and Management Sciences and is accepted as a partial fulfillment of the requirements for the degree of Master of Economics.
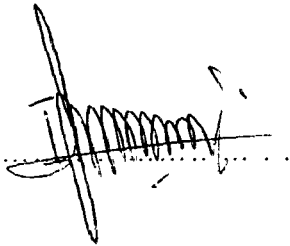
Mohd. Azmi Omar
Dean, Kulliyyah of Economics and Management Sciences
Date

DECLARATION PAGE

I hereby declare that this research paper is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by footnotes giving explicit references and a bibliography is appended.

Name: Izzeldin El doma Abd Alla

Signature................................   Date: ..17..11. 2000 ....

Dedicated to:
My beloved wife, Bidour and our adorable daughter, Lemiya
My beloved mother, Aaminah Abdul Rahman, and my beloved father,
El doma Abd alla, who have sacrificed to nurture, educate and guide me from
Infancy, through all the years. To my brothers, Bushra, Eltaib, and Baha uddin,
and
Sister Mahasin

ACKNOWLEDGEMENTS

Finally, loving appreciation to my wife, Bidour Adam Abdul Rahman for care, encouragement and support May Allah bless you.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

The standard textbook economic theory predicts a direct association between money supply and output. At some time[1], this association was well worked out to be symmetric in nature; in other words, monetary expansions raise output, while monetary contractions have the opposite effect. This symmetry however, represents a direct consequence of analyzing the money supply-output relationship within the traditional IS-LM framework, which is basically static. Later, many researchers analyzed the money supply-output relationship in terms of the direction of causation. The common finding is that money Granger causes output[2].

In the late 1970s, attention focused on whether it was "anticipated" or "unanticipated" money that leads output. For instance, the new-classical macroeconomics hypothesis developed by Lucas (1973) and Sargent and Wallace (1975) which is also known in the literature as the neutrality theory, states that the effects of anticipated changes in money supply on real variables are neutral in both the long run and the short run. While the unanticipated changes in money supply have significant effects on the real variables in the short run. In contrast to the neutrality theory, Mishkin (1982) found that the anticipated component of money growth had a significant effect on output and unemployment in the United States. The empirical studies testing the theoretical work

---

[1] During the 1950s and 60s. For interested readers, please see Sims,C.A.1972. Money, Income, and Causality. *The American Economic Review*. **62**: 540-552.

[2] see for example, Sims (1972), and Christiano, L.J.& Ljungqvist.L.1988. Money does Granger cause output in the bivariate money-output relation. *Journal of Monetary Economics*. **22**: 217-235.

of the rational expectation proposition provided mixed results. Some findings support

the neutrality theory[3], while others reject it in favor of the non-neutrality thesis[4]

A very little empirical research about the effects of monetary policy has been done

using data for the developing countries[5]. For example, using data for Malaysia,

Marashdeh (1993) found that anticipated monetary policy influences output in the

short run, while unanticipated changes in monetary policy does not influence real

output.

Recent research provided evidence that the effects of monetary policy are asymmetric,

that are to say that the positive money supply shocks do not affect output, while, the

negative money supply shocks reduce output. These results have been cited in the

work of Cover (1992), Karras and Stokes (1999), Joonsuk and Ratti (1997).

Asymmetry in money supply could be explained by referring to the assumption that

the aggregate supply curve is upward sloping up to the expected price level, but

vertical at all prices above the expected price level. This aggregate supply curve is

derived with the assumption that wages are sticky downwards and flexible upwards in

what is known as the 'Ratchet effect'[6] as evidenced in the Keynesian context. With

these assumptions, it is obvious that only the negative money supply shocks will affect

---

[3] see for example, Barro, R. J.1997. Unanticipated money growth and unemployment in the United States. *The American Economic Review* **67**(2) 101-115

[4] there are so many of them, we mention here, Mishkin (1982), Mohabbat and Saji (1991), and Janardan et al (1990).

[5] on the other hand, there is a flood of theoretical and empirical research about the effects of monetary policy with reference to the industrially developed countries As examples, we quote a few of them Bernanke and Blinder (1988, 1992), Benjamin Friedman (1988), Milton Friedman (1968), Brunner and Meltzer (1988), Frydman and Rappoport (1987), and Gordon and Leeper (1994)

[6] see Shirvani and Wilbratte (1999)

output[7]. Moreover, the monetary transmission mechanism in the credit view of monetary policy (Karras 1996) indicates that negative money supply shocks have adverse effects in the banking system, because banks are forced to replenish their reserves. Therefore, the resulting impact would be a slowdown in the economic activity, with no corresponding effects in the positive side The intuition behind this is that with positive growth in money supply, banks are free to carry on their lending activities, but in the case of negative growth in money supply, banks are under pressure to reduce their lending activities Thus, the ultimate effect would be that firms would reduce their output.

There are at least two motivations for this investigation; firstly, the asymmetry theory itself, which identified two distinct, effects for the monetary policy, that is: monetary contraction has a greater effect on output than monetary expansion, as previous studies failed to provide such a distinction. Secondly, the policy implications of this theory as to whether the results can be regarded as a useful information by policy makers in the context of a developing country such as Malaysia.

It follows that, for the monetary authorities in Malaysia to take effective action regarding any expected economic slowdown, matters such as the studying of the effects of monetary policy on output deserve special considerations. For example, how does output respond to monetary expansions and contractions?

---

[7] it is believed that below the expected price level the aggregate demand would fall following the monetary contraction leading to a new equilibrium, at which the aggregate supply would also be lower But on the other hand, the aggregate supply curve is assumed to be vertical above the expected price level Therefore, if the increase in money supply increases the aggregate demand as claimed by the proponents of the credit view of monetary policy, then it would only push prices upwards with the output being held fixed

3

Is it wise to increase money supply at times of recession? That is because so many problems can be traced if the monetary authorities were to decide without the special considerations mentioned above. One of those problems could be that at times of recession, the policy makers might try to boost the economy by reducing interest rates or buying bonds to raise the stock of money supply. An act, which would require a more significant offsetting future monetary contraction in case it fails to increase output.

There is a lack of research on the asymmetric effects of monetary policy in Malaysia as a specific case. This lack of studies however, provided an additional motivation for this work, which intends to test whether asymmetry in money is a Malaysian phenomenon. And to determine the extent of the difference, if any, between the results obtainable here and those of the developed countries.

The present paper aims at examining the asymmetric effects of monetary policy on output in Malaysia, thereby testing the hypothesis that the monetary expansion has an insignificant impact on output, while monetary contraction significantly reduces output. The paper also aims at determining the policy implications that could be drawn therefrom; and to see the possibility of using the results of the study as anti-recession policies.

It is expected that the results of this study will provide evidence as to whether the monetary policy is asymmetric in the context of developing country like Malaysia. It is also expected to contribute to the knowledge base of Malaysia's central banking system. Moreover, it will contribute to the theory development by testing it in

4

Malaysia. Furthermore, the results are expected to contribute to policy development and implementation.

The organization of this paper is as follows: the next chapter presents the theoretical model. In chapter 3, the literature on related studies will be analyzed for the purpose of providing an empirical basis for this study. Chapter 4 discusses the empirical model and data used in the study. Chapter 5 presents the empirical results. Finally, chapter 6 discusses the results and concludes.

CHAPTER 2

THE ASYMMETRY THEORY

It was widely believed that monetary expansions and contractions have the same but opposite effects on output. But a new body of literature showed that the effects of monetary policy are asymmetric.

Asymmetry in monetary policy, is explained by the fact that 'monetary contractions reduce output by more than monetary expansions raise it, (Karras 1996; and Cover 1992).

The impact of the positive and negative growth of money supply on output could be explained using mathematics. Based on the basic Keynesian assumption, which states that wages are flexible upwards and sticky downwards, an increase in the growth rate of money supply would be absorbed by prices with no effects on output. However, the decrease in the growth rate of money supply only reduces output. This is due to the fact that prices are sticky downwards creating a ratchet effect causing the aggregate supply curve to take a horizontal shape. In this study, three equations are used to represent the aggregate supply curve AS, the IS curve and the LM curve respectively

$$Y = S(p), \qquad S_p \geq 0, \qquad (2.1)$$

$$I(r) = S(r,y), \qquad I_r < 0, S_r > 0, S_y > 0, \qquad (2.2)$$

$$M/P = L(y,r), \qquad L_y > 0, L_r < 0, \qquad (2.3)$$

Where Y is the output and / or income, S represents total savings, P denotes prices, I is the investment, r is the interest rate and M denotes money stock.

By totally differentiating equations (2.1), (2.2) and (2.3) we obtain:

$$d_y = S_P * d_P,$$ (2.4)

$$S_r * d_r + S_y * d_y = I_r * d_r,$$ (2.5)

$$(P * d_m - M * d_P) / P^2 = L_y * d_y + L_r * d_r,$$ (2.6)

Equations (2.4), (2.5) and (2.6) are then divided by d_m (which, represents the change in money supply) and rewritten as follows:

$$(\frac{d_y}{d_m}) - S_P * (\frac{d_P}{d_m}) = 0.$$ (2.7)

$$S_y * (\frac{d_y}{d_m}) + (S_r - I_r) * (\frac{d_r}{d_m}) = 0.$$ (2.8)

$$L_y * (\frac{d_y}{d_m}) + L_r * (\frac{d_r}{d_m}) + (\frac{M}{P^2}) * (\frac{d_P}{d_m}) = \frac{1}{P}.$$ (2 9)

Using matrix algebra, equation (2.7), (2.8) and (2.9) are shown in the system of equations below

$$\begin{Bmatrix} 1 & 0 & -S_P \\ S_Y & (S_r - I_r) & 0 \\ L_y & L_r & M/P^2 \end{Bmatrix} * \begin{Bmatrix} d_y/d_m \\ d_r/d_m \\ d_P/d_m \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \\ 1/P \end{Bmatrix},$$ (2.10)

Firstly, the aggregate supply curve is assumed to be vertical at any point above the expected price level. This however, would imply that output would be fixed at any given price above the expected price level. Thus, we assume that $S_P = 0$.

From the above system of equations, using Cramer's rule we can find d_y / d_m (the change in output with respect to change in money supply).

$$d_y / d_m = \frac{\begin{vmatrix} 0 & 0 & -S_P \\ 0 & (S_r - I_r) & 0 \\ 1/P & L_r & M/P^2 \\ 1 & 0 & -S_P \\ S_y & (S_r - I_r) & 0 \\ L_y & L_r & M/P^2 \end{vmatrix}}{} = \left\{ \frac{(1/P)*(S_r - I_r)*\overbrace{(-S_P)}^{=0}}{\left[\left\{ M/P^2 + (L_y)*\underbrace{(S_P)}_{=0} \right\}*(S_r - I_r) \right]} \right\} = 0,$$

(2.11).

It is obvious that above the expected price level, the change in money supply has no effect on output.

$$d_r / d_m = \frac{\begin{vmatrix} 1 & 0 & -S_P \\ S_y & 0 & 0 \\ L_y & 1/P & M/P^2 \end{vmatrix}}{\left\{ M/P^2 + (L_y)*(S_P) \right\}*(S_r - I_r)} = \left\{ \frac{\overbrace{(-S_P)}^{=0}*(S_y)*(1/P)}{\left[\left\{ M/P^2 + (L_y)*\underbrace{(S_P)}_{=0} \right\}*(S_r - I_r) \right]} \right\} = 0,$$

(2.12).

Here, the effects of change in money supply appeared to have no effect on the interest rate and hence, it has no effect on output.

$$d_P / d_m = \frac{\begin{vmatrix} 1 & 0 & 0 \\ S_y & (S_r - I_r) & 0 \\ L_y & L_r & 1/P \end{vmatrix}}{\{M/P^2 + (L_y)*(S_P)\}*(S_r - I_r)} = \left\{ \frac{(1/P)*(S_r - I_r)}{\left[\underbrace{M/P^2 + (L_y)*(S_P)}_{=0} \right] *(S_r - I_r)} \right\} = P/M > 0$$

(2 13).

Since (d_P / d_m) is positive, then it could be argued that above the expected price level, an increase in money supply is more likely to be absorbed by the increase in prices on a one to one basis.

Secondly, the aggregate supply curve is assumed to be upward sloping below the expected price level. Here, (S_P) is assumed to be greater than zero: $S_P > 0$

Using cramer's rule to find the change in output with respect to change in money supply provides the following result:

$$d_y / d_m = \frac{\begin{vmatrix} 0 & 0 & -S_P \\ 0 & (S_r - I_r) & 0 \\ 1/P & L_r & M/P^2 \end{vmatrix}}{\begin{vmatrix} 1 & 0 & -S_P \\ S_y & (S_r - I_r) & 0 \\ L_y & L_r & M/P^2 \end{vmatrix}} = \left\{ \frac{(S_P)*(S_r - I_r)*(1/P)}{(S_r - I_r)*\{(M/P^2) + (L_y)*(S_P)\}} \right\} > 0,$$

(2.14).

This result gives an indication as to the direction of the effect of changes in money supply on output below the expected price level, which, implies that an increase in money supply does not increase output permanently as thought. And, as shown above, holding prices as fixed, an increase in money supply means increasing the

denominator and hence reduces the overall positive effect of money supply on output. While a reduction in money supply (m) reduces the denominator, and hence, the effect would be bigger.

In trying to find the effect of a change in money supply on interest rates, based on the above assumptions, we calculate dr/dm as follows:

$$d_r / d_m = \frac{\begin{vmatrix} 1 & 0 & -S_P \\ S_y & 0 & 0 \\ L_y & 1/P & M/P^2 \end{vmatrix}}{(S_r - I_r) * \{M/P^2 + (L_y) * (S_P)\}} = \left\{ \frac{(-S_P) * (S_y) * (1/P)}{(S_r - I_r) * \{M/P^2 + (L_y) * (S_P)\}} \right\} < 0,$$

(2.15).

$d_r / d_m < 0$ implies that below the expected price level, money can have an effect on output through its impact on interest rates, but this effect is not permanent, and rather temporarily.

$$d_P / d_m = \frac{\begin{vmatrix} 1 & 0 & 0 \\ S_y & (S_r - I_r) & 0 \\ L_y & L_r & 1/P \end{vmatrix}}{(S_r - I_r) * \{M/P^2 + (L_y) * (S_P)\}} = \left\{ \frac{(1/P) * (S_r - I_r)}{(S_r - I_r) * \{M/P^2 + (L_y) * (S_P)\}} \right\} > 0,$$

(2 16).

This relationship enforces the argument that the increase in money supply increases prices, whether above or below the expected price level. And hence reduces the ability of an increase in money to increase output.

In spite of the fact that in our analysis we assumed that initially, the aggregate demand and aggregate supply curves are in equilibrium at the expected price level, this is not need to be the case in order for asymmetry to exist. That is because at any point in the aggregate supply curve, an increase in money supply would push the aggregate demand outwards leading to an increase in prices and an insignificant increase in output While a decrease in the growth rate of money supply shifts the aggregate demand curve inwards causing a significant reduction in output with prices being held constant due to the ratchet effect.

CHAPTER 3

LITERATURE REVIEW

The Symmetric Effects of Monetary Policy:

What are the effects of monetary policy on output? A number of studies have been

done to answer the above important question. For example, Gordon and Leeper (1994)

developed an empirical model for examining the money supply-output relationship.

They used monthly series of data from January 1971 to September 1979; and from

December 1982 to April 1992. Their model identifies monetary policy shocks that

generate dynamic responses of variables that are consistent with the predictions of

traditional monetary analysis. That is, expansionary monetary policy shock shifts the

supply curve of reserves outwards but leaves the demand curve unchanged. As a

result, the short-term interest rate falls and output rises The opposite is true for

contractionary monetary policy shocks.

The Causal Ordering Question for Money and Output:

The direction of causation between money supply and output attracted the attention of

many in the field of macro-economic research. Sims (1972) analyzed the causal

relationship between money and real GNP with quarterly data for the United States.

He found that causality is unidirectional from money to GNP in a bivariate system.

Christiano and Ljungqvist (1988) used a bivariate Granger-causality test to test the

causal relationship between money and output in the U.S they found that Granger-

causality from money to output is statistically and quantitatively significant[8].

---

[8] in fact, they find that when the data are measured in the log levels, money is found to be causally prior
to output, but not when the data are measured in the first difference of the logs Bootstrap simulations
experiments indicate that most probably, the first difference results reflect lack of power, whereas the
level results reflect Granger-causality that is actually in the data

Within the framework of causality between money and output, Tan and Cheng (1995), used quarterly data for Malaysia from 1984.1 to 1994.2 to test the causal nexus of money and output. Using Geweke's approach to Wiener-Granger causality, a bi-directional causation between money supply and nominal output were found.

Empirical Tests of the NCM Hypothesis:

Through their distinction between the effects of the anticipated and unanticipated monetary policy, Lucas (1973) and Sargent and Wallace (1975) came out with a proposition known in the literature as the new classical macroeconomics (NCM) hypothesis[9] which, states that only unanticipated monetary policy affect real economic variables. They argued further that anticipated changes in aggregate demand policy will have been taken into account already in economic agent's behavior and will evoke no further output or unemployment response Since then, wide ranges of empirical research have been devoted to testing the new classical macroeconomics hypothesis. However, the results of these empirical tests were found to be mixed, in the sense that some studies support the above hypothesis while the others discard it.

Among the studies that support the NCM hypothesis, Barro (1977) used annual observations for the 1941 to 1973 period for the United States to specify a model of money supply process The equation includes a measure of federal government expenditure relative to normal, a lagged unemployment rate and two lagged values of money growth as explanatory variables The author fitted this money growth equation with the purpose of dividing money growth into anticipated and unanticipated

---

[9] this hypothesis is also named the macro-rational expectations (MRE) hypothesis