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The Relation Between Output, Anticipated and Unanticipated Monetary Policy in Iraq*

Amer K. Al-Saji**

This paper is a test of the policy ineffectiveness hypothesis using quarterly data from Iraq. This hypothesis claims that only unanticipated component of money growth affects the level of real output. The empirical results obtained indicate that both anticipated and unanticipated components of money growth significantly affect the level of real output. The empirical results further indicate that raw money growth has a significant and positive impact on real output. These empirical results are at odds with the essence of the policy ineffectiveness hypothesis.

I. Introduction

In recent years, the consolidation of the rational expectations hypothesis with the model of the natural rate of unemployment paved the way for some important evolutions in monetary theory and policy. Recent studies have emerged and old issues have been reexamined under a new paradigm. The policy ineffectiveness hypothesis associated with Lucas (1973) and Sargent and Wallace (1975) contends that only unexpected changes in the money supply affect real variables. Expected movements in the money supply are neutral both in the short and in the long run. This is due to the fact that economic agents with restricted information may interpret the price movements induced by the unexpected component of money growth as a relative price change, they will therefore increase their output.[1] In this regard, Barro (1977, 1978, 1981) and Barro and Rush

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** Instructor of Economics, Dept. of Economics, Northern Illinois University.

1 Lucas (1973).

(1980) demonstrated empirically that the level of real output was affected only by the unanticipated component of money growth.

In addition, various studies have applied Barro's methodology to other industrial economies. Empirical evidence compatible with the tenor of the policy ineffectiveness hypothesis has been offered by Wogin (1980) for Canada, Attfield, Demery and Duck (1981) for the United Kingdom, Hoffman and Schlagenhauf (1982) for Canada, West Germany, Italy, the United Kingdom, Japan and the United States, Lawrence (1983) for the United Kingdom and Darrat (1985) for West Germany. One of the principal fidings of these studies is that the level of real output is affected only by the unanticipated component of money growth. The findings of these studies were widely explicated as an obvious confirmation of the policy ineffectiveness hypothesis. Inconsistent empirical evidence with the essence of the policy ineffectiveness hypothesis was presented by Mishkin (1982a, 1982b) for the United States, Gordon (1982) for the United States and Darrat (1985) for Italy.

On the other hand, a number of studies have examined the validity of the policy ineffectiveness hypothesis from the standpoint of developing countries and obtained mixed results. Barro (1979) examined the relationship between output and money growth in Mexico, Colombia and Brazil and discovered that the unanticipated money growth significantly affects output only in the instance of Mexico. Hanson (1980) found that the unanticipated money growth exerts a significant effect on output in all 5 Latin American countries under investigation. Moreover, the studies by Blejer and Fernandez (1980) for Mexico and Attfield and Duck (1983) for a group of developed and developing countries and Kormendi and Meguire (1984) for a range of developed and developing countries and Chopra and Montiel (1986) for the Philippines and Canarella and Pollard (1989) for 16 Latin American countries are primarily in accordance with the intent of the policy ineffectiveness hypothesis. Adverse empirical evidence of the policy ineffectiveness hypothesis was introduced by Edwards (1983a, 1983b) for 5 Latin American countries, Sheehey (1984) for a group of developing countries, Montiel (1987) for Mexico and Beladi and Samanta (1988) for India.

The main objective of this paper is to test empirically the potency of the policy ineffectiveness hypothesis in the case of Iraq utilizing Barro's (1977) format of analysis. This approach is used in order to see any differences from the results of other developing countries. Data used are quarterly over the period 1961:1-1977:3.[2] The remainder of this paper is

[2] I was unable to locate data for the period 1977: 4-1990:1. This is because the Central

arranged as follows. Section 2 presents the methodology to be employed and discusses the empirical results. Section 3 comprises a summary and some concluding remarks.

II. Methodology and Empirical Results

Following Barro's (1977) approach, the basic format of test on the policy ineffectiveness hypothesis is to specify a model of real economic activity as a function of anticipated and unanticipated money growth, plus other factors proper to deciding the level of real output.[3] Since anticipated and unanticipated components of money growth are unobservable variables, in order to implement the test, I have to specify a money growth equation in order to decompose actual money growth into its anticipated and unanticipated parts. The monetary instrument explored here is the proportional growth in the money supply ln (M_t/M_{t-1}). The measure of money stock used in the present study is the narrow definition of money stock which consists of currency plus demand deposits.[4] The reason for using the narrow definition of money stock is that an organized market for bonds does not exist in Iraq. To initiate the sequence of anticipated money growth, I have to identify the macro variables that impact monetary policy. Unfortunately, I do not have a properly developed theory to predict money growth in Iraq, although the following intuitions

Bank of Iraq did not publish any data for money supply, prices, GNP, etc., for the period 1977: 4-1990:1. Iraq's Central Bank governer stated, "we don't issue any figures. The last time we issued quarterly figures was before 1979.... and up to now we have not published any because peace is not yet formalised." For more details, see The Middle East, April 1990, pp. 8-10.

3 This general estimation procedure has been mentioned to in the literature as a two-step procedure. However, it is important to note that some economists (i.e., Pagan (1984)) have suggested that this method may confer biased test statistics, though it yields consistent parameter estimates. An alternative method, namely, the joint estimation procedure, utilized by Mishkin (1982a, 1982b), Abel and Mishkin (1983), comprises estimating both the money growth forecasting equation and the out-put equation as a simultaneous system, which is hypothesized to generate more efficient parameter estimates. Nevertheless, in their 1982 study, Hoffman, Low and Schlagenhauf showed that the joint estimation procedure is not absolutely exceptional to the two-step procedure in deciding the infraction or existence of neutrality of expected money growth variables. It is also interesting to report that Barro estimated some of his preceding models utilizing the joint estimation method proposed by Abel and Mishkin. He noticed that expected money and output specifications were comparable to those in two-step estimation. His findings relating to the neutrality of expected money were not varied. For more information, see Barro and Rush (1980).

4 In a further effort, equation (1) has been estimated by replacing M1 with M2. The results obtained were similar to those reported in Table 1.

are germane: First, one of the economic goals of the Iraqi monetary authorities is the preservation of a low level of unemployment (UN), then they might have to follow an expansionary monetary policy in order to reduce the unemployment rate. Therefore, I expect that the unemployment rate lagged one period will have a positive impact on money growth. Second, if the monetary authorities attempt to satisfy government spending[5] (GOV) and the government is unwilling to increase taxes to finance spending, then it is essential for the monetary authorities to pursue an expansionary monetary policy. Consequently, I expect that the rise in government spending will have a positive influence on the growth rate of money supply. Third, Iraq is considered a major oil exporting country and all oil revenue is received in foreign exchange, which is the principal element of international reserves (RES). Therefore, I anticipate that the increase in international reserves will have a positive effect on the growth rate of money supply. Fourth, to allow for the continuity in policy, the money growth equation should incorporate the value of the dependent variable, which is supposed to recover lagged adjustment not seized by other explanatory variables.[6] As a result, the Iraqi money growth equation has been selected from the following relationship:

$$(1) \quad \ln(M_t/M_{t-1}) = f(\ln(M_{t-1}/M_{t-2}),\ \ln(M_{t-2}/M_{t-3}),\ \ln(M_{t-3}/M_{t-4}),\ \ln GOV_{t-1},\ \ln GOV_{t-2},\ \ln UN_{t-1},\ \ln UN_{t-2},\ \ln RES_{t-1},\ \ln RES_{t-2}) + u_t$$

A number of specifications of this functional relationship have been estimated by ordinary least squares (OLS) method over the period 1961:1-1977:3. Only the macro variables with the most significant t-values which are theoretically most relevant have been preserved in the regression. The regression results of the favored money growth forecasting equation are displayed in Table 1.[7] These results show that the coefficient on government spending that lagged one period exerts a significant and positive effect on the growth rate of money supply. The results also sug-

5 I used government consumption as a proxy due to unavailability of data.

6 See Barro (1981).

7 I also estimated several money growth equations other than that appearing in Table 1. One of them included one to four quarter lags of the log of the proportional growth in the money supply $\ln(M_t/M_{-1})$, government spending (GOV), unemployment rate (UN), international reserves (RES), the exchange rate (EXCH), the inflation rate (INF), but the results turned out to be statistically insignificant. The other equation included five lag values on unemployment rate (UN), government spending (GOV) and the current account of the balance of payments (CUR), but I obtained insignificant results.

gest that the two periods lagged coefficient on unemployment (UN_{t-2}) turned out to be positive and statistically different from zero at the 5 percent level of significance. The coefficient of determination ($R^2 = 0.684$) indicates that the regressors of the money growth equation explain a sizable portion of the variation in money growth. The Durbin's h-statistic value of 0.2839 suggests the absence of first-order serial correlation in the residuals. The Chow (1960) stability test was employed to examine the structural stability of money growth forecasting equation. Utilizing the midpoint as the breaking date,[8] the computed F-value is 1.049. At the 5 percent level of significance, the critical F-value is 2.34. These results indicate that the money growth forecasting equation is structurally stable.

The second step of the testing procedure is the estimation of the output equation. The aim of this estimation is to assess the output responses to the anticipated and unanticipated money growth. Therefore, following

Table 1

MONEY GROWTH EQUATION FOR IRAQ
THE DEPENDENT VARIABLE IS $\ln(M_t/M_{t-1})$

Variables	Estimates
constant	-0.0358
	(-0.707)
$\ln(M_{t-1}/M_{t-2})$	0.0595
	(0.455)
$\ln GOV_{t-1}$	0.0151
	(2.037)*
$\ln UN_{t-1}$	-0.0136
	(-1.408)
$\ln UN_{t-2}$	0.0183
	(1.879)*
$R^2 = 0.684$, S.E. = 0.126845,	Durbin h = 0.2839

t-values are in parentheses.
* indicates significance at the 5% level.

8 The main justification for selection the midpoint as the spliting date was based on the finding by Farley, Hinich and McGuire (1975) who suggested that the Chow test was excellent at the midpoint.

previous authors the real output equation to be estimated for Iraq can be represented as follows:

$$(2) \qquad Y_t = a + b\, Y_t^* + \sum_{i=0}^{n_1} c_i\, PDMT_{t-i} + \sum_{i=0}^{n_2} d_i\, DMR_{t-1} + u_t$$

where

Y_t = real natural logarithim of real output at time t;

Y_t^* = the natural level of real output at time t (this variable will be estimated as a function of time trend variable (t) and inflation rate (CHP). The first is assumed to recover the secular movement of normal output[9] and the second is supposed to permit for the potentiality of the inefficiency of the economy proceeding from changing inflation rate);[10]

PDMT = the anticipated money growth, i.e., the predicted values of money growth obtained from equation (1);

DMR = the unanticipated money growth, i.e., the residual from equation (1), residual = actual–predicted values of money growth; and

u_t = the disturbance term.

Following Mishkin (1982), to decide the dimension of lag on anticipated and unanticipated money growth variables I attempted several lag spans and a lag length of 5, 7 and 20 quarters for both anticipated and unanticipated money growth variables which were discovered to yield the most desirable empirical results based on the degree of significance of $\alpha = 0.05$.

With a different lag length of both anticipated and unanticipated money growth equation (2) has been estimated by ordinary least squares (OLS) method. As the ordinary least squares (OLS) estimate of equation (2), with a lag length of 5 and 7 quarters of both anticipated and unanticipated money growth, is characterized by autocorrelation with a Durbin-Watson and values of 0.445 and 0.621, I reestimated equation (2) utilizing a maximum likelihood method.[11] In Tables 2 and 3 the empirical estimates of the output equation, (2), are reported. The results reveal that both anticipated and unanticipated money growth have a significant and positive effect on the level of real output. The results further suggest that the magnitude of all the lagged coefficients on the anticipated component of money growth is larger than the magnitude of the

9 See Barro (1981).

10 See Attfield, Demery and Duck (1981).

11 This procedure is discussed in SAS User's Guide.

Table 2

MAXIMUM LIKELIHOOD ESTIMATES OF EQUATION (2)
THE DEPENDENT VARIABLE IS $\ln Y_t$

	Anticipated Money Growth	Unanticipated Money Growth
a = 6.71	$c_0 = 2.98$ (3.96)*	$d_0 = 0.04$ (0.25)
(150.2)*	$c_1 = 5.52$ (8.11)*	$d_1 = 0.21$ (0.72)
t = .0004	$c_2 = 5.57$ (8.57)*	$d_2 = 0.66$ (1.74)*
(0.692)	$c_3 = 5.26$ (7.55)*	$d_3 = 1.07$ (2.54)*
CHP = −.007	$c_4 = 4.84$ (6.98)*	$d_4 = 0.97$ (2.68)*
(−.082)	$c_5 = 2.74$ (3.98)*	$d_5 = 0.48$ (2.18)*
	$\rho_1 = -1.71$ (−9.63)	
	$\rho_2 = 0.98$ (3.33)	
	$\rho_3 = -0.03$ (−.19)	

$R^2 = 0.996$, S.E. = 0.056351, D–W = 1.87.

t-values are in parentheses.
* indicates significance at the 5% level.
ρ's represent autoregressive parameters.
t represents time trend variable.
CHP represents inflation rate.

lagged coefficients on the unanticipated component of money growth.

Table 4 comprises the ordinary least squares (OLS) estimates of equation (2) in which longer lags (20) of anticipated and unanticipated money growth are used as independent variables. The results indicate that some of the coefficients on both anticipated and unanticipated money growth are significantly different from zero at the 5 percent level of significance.

These empirical findings are inconsistent with the implication of the policy ineffectiveness hypothesis, which claims that the elementary impacts of anticipated money growth on the level of real output must be smaller than the elementary impacts of unanticipated money growth.[12] The empirical findings of the present study tend to deny the policy ineffectiveness hypothesis. The results show that the initial impacts of the anticipated money growth is statistically more significant than that of unanticipated money growth.

12 See Makin (1982), p. 129.

Table 3

MAXIMUM LIKELIHOOD ESTIMATES OF EQUATION (2)
THE DEPENDENT VARIABLE IS $\ln Y_t$

	Anticipated Money Growth	Unanticipated Money Growth
$a = 6.72$	$c_0 = 1.15$ (1.24)	$d_0 = 0.03$ (0.18)
(169.1)*	$c_1 = 3.69$ (4.37)*	$d_1 = 0.29$ (1.18)
$t = .0003$	$c_2 = 4.68$ (6.40)*	$d_2 = 0.78$ (2.30)*
(0.402)	$c_3 = 5.23$ (8.28)*	$d_3 = 1.25$ (3.18)*
$CHP = -.005$	$c_4 = 4.34$ (6.95)*	$d_4 = 1.23$ (2.82)*
(−.068)	$c_5 = 3.94$ (5.08)*	$d_5 = 0.88$ (2.05)*
	$c_6 = 2.72$ (3.28)*	$d_6 = 0.32$ (0.99)
	$c_7 = 1.70$ (2.25)*	$d_7 = 0.11$ (0.57)
	$\rho_1 = -1.58$ (−8.85)	
	$\rho_2 = 0.73$ (2.37)	
	$\rho_3 = 0.13$ (0.70)	

$R^2 = 0.997$, S.E. = 0.037692, D–W = 1.91

t-values are in parentheses.
* indicates significance at the 5% level.
ρ's represent autoregressive parameters.
t represents time trend variable.
CHP represents inflation rate.

Additionally, the R^2 values suggest that variation of the regressors of the output equations explain a high percentage of changes in the level of real output. The structural stability of the output equations were investigated by means of the Chow (1960) test, using the mid-point as the spliting date. The stability of the output equations, with a lag length of 5, 7 and 20 quarters of both anticipated and unanticipated money growth, would be accepted at the 5 percent level of significance. The results of this test are reported in Table 5.

Furthermore, to determine whether the increase in oil revenue in 1974 may have caused a structural shift in Iraq's economy I applied the Gujarati (1970) test. This test involves multiplying all the independent variables of equation (2), including the intercept, (with a lag length of 5, 7 and 20 quarters of both anticipated and unanticipated money growth) by the dummy variable (i.e., D). D is coded "zero" from 1961:1 to 1973:4, "one" from 1974:1 to 1977:3. The results of this test indicate that neither the intercept nor the slope of the output equation (2) differ

Table 4

ORDINARY LEAST SQUARES (OLS) ESTIMATES OF EQUATION (2)
THE DEPENDENT VARIABLE IS $\ln Y_t$

	Anticipated Money Growth	Unanticipated Money Growth
a = 6.47	c_0 = 10.6 (0.24)	d_0 = −0.69 (−0.95)
(15.9)*	c_1 = 19.7 (1.41)	d_1 = −2.83 (−1.24)
t = 0.039	c_2 = −13.9 (0.39)	d_2 = −2.94 (−1.02)
(1.287)	c_3 = −0.44 (−0.15)	d_3 = −0.72 (−0.18)
CHP = −.702	c_4 = 51.4 (4.13)*	d_4 = 1.87 (0.96)
(−.953)	c_5 = 1.22 (0.02)	d_5 = 5.81 (1.92)*
	c_6 = −23.32 (−1.2)	d_6 = −2.89 (−0.33)
	c_7 = 32.26 (1.38)	d_7 = −1.56 (−0.41)
	c_8 = 7.18 (0.144)	d_8 = −5.81 (−1.49)
	c_9 = −2.93 (−0.16)	d_9 = −2.88 (−0.31)
	c_{10} = 10.79 (3.12)*	d_{10} = −0.78 (−0.18)
	c_{11} = −1.88 (−0.13)	d_{11} = −3.75 (−0.91)
	c_{12} = −8.38 (−0.87)	d_{12} = 5.11 (0.84)
	c_{13} = 13.72 (1.39)	d_{13} = 4.22 (0.89)
	c_{14} = −0.17 (−0.09)	d_{14} = 5.78 (1.90)*
	c_{15} = −9.02 (−0.98)	d_{15} = 6.29 (0.93)
	c_{16} = 1.22 (0.10)	d_{16} = −3.49 (−0.45)
	c_{17} = 4.07 (0.71)	d_{17} = −3.92 (−0.65)
	c_{18} = −3.45 (−1.08)	d_{18} = −4.12 (−0.59)
	c_{19} = 2.05 (0.36)	d_{19} = 0.58 (0.11)
	c_{20} = −1.83 (−0.61)	d_{20} = 0.46 (0.34)

R^2 = 0.999, S.E. = 0.000708, D−W = 2.01

t-values are in parentheses.
* indicates significance at the 5% level.
t represents time trend variable.
CHP represents inflation rate.

Table 5

CALCULATED F-STATISTICS FOR STRUCTURAL
STABLITY FOR THE OUTPUT EQUATION (2)

No. of Lags	Calculated F-Value	Critical F-Value
5	1.42	1.98
7	1.63	2.07
20	1.81	1.94

significantly between the two time periods. This implies that the economy of Iraq endured no structural shift in 1974.[13]

A. The Irrelevance of Anticipated-Unanticipated Money

Frydman and Rappoport (1987) provided empirical evidence that the anticipated and unanticipated money growth distinction is statistically irrelevant in explaining the movements of aggregate output.[14] The IAUD hypothesis contends that the level of real output depends only on the raw growth rate of money supply. Therefore, the distinction between anticipated and unanticipated monetary policy does not matter.

If the IAUD hypothesis is valid, output does not rely on agents' expectations of money growth.[15] Therefore, the output equation (2) can be written as follows:

$$(3) \qquad Y_t = a + b\, Y_t^* + \sum_{i=0}^{n_1} c_i\, MG_{t-i} + u_t$$

where MG represents the growth rate of the money supply, and the rest of variables are defined as in equation (2).

Following Frydman and Rappoport (1987) I call this the trend stationary (TS) method of detrending.

To determine the length of lag on MG, following Barro (1977, 1978) and Barro and Rush (1980), I kept expanding the length of lag until the coefficient of additional lag variable is no longer statistically significant. Accordingly, 10 lag values on the growth rate of money supply were found to be empirically relevant for Iraqian data.[16]

I estimated equation (3) by ordinary least squares (OLS) method. As the OLS estimates of equation (3) showed a positive serial correlation in the residuals with a Durbin-Watson value of 0.778, I reestimated equation (3) using the Yule-Walker noniterative procedure.[17] The empirical estimates of equation (3) are shown in Table 6.

The empirical results clearly indicate that the growth rate of raw

13 These results are not reported here to economize on space.

14 For a more detailed description and discussion of this model, see Frydman and Rappoport (1987), pp. 693-703.

15 See Frydman and Rappoport (1987), p. 694.

16 Additional lagged values of MG were found to be statistically insignificant when added to equation (3).

17 This procedure is discussed in SAS User's Guide.

Table 6

THE YULE-WALKER NONITERATIVE PROCEDURE
ESTIMATES OF EQUATION (3). THE DEPENDENT IS $\ln Y_t$

Variables	Estimates
Intercept	6.6761 (132.19)*
time	0.0134 (7.04)*
CHP	−0.1761 (−0.64)
$\ln MG_t$	0.399 (1.27)
$\ln MG_{t-1}$	0.851 (2.48)*
$\ln MG_{t-2}$	1.196 (3.22)*
$\ln MG_{t-3}$	1.653 (4.36)*
$\ln MG_{t-4}$	0.989 (2.63)*
$\ln MG_{t-5}$	0.806 (2.26)*
$\ln MG_{t-6}$	0.543 (1.47)
$\ln MG_{t-7}$	1.359 (3.76)*
$\ln MG_{t-8}$	1.446 (4.04)*
$\ln MG_{t-9}$	1.552 (4.31)*
$\ln MG_{t-10}$	1.593 (4.16)*
ρ_1	−0.619 (−3.87)
ρ_2	0.087 (0.461)
ρ_3	0.019 (0.119)
$R^2 = 0.985$, S.E. = 0.180952	

t-values are in parentheses.
* indicates significance at the 5% level.
ρ's represent autoregressive parameters.
CHP represents inflation rate.

money supply (MG) exert a significant and positive effect on the level of real output.

The results from the Chow (1960) test, taking the mid-point as the breaking date, suggest that the hypothesis of structural stability cannot be rejected at the 5 percent level of significance (calculated F-value = 1.2, and the critical F-value = 1.93).

I further estimated equation (3), following Nelson and Plosser (1982), by replacing the natural level of real output (Y_t^*) with the lagged value of the dependent variable which is used to represent the nonstationary in output. Nelson and Plosser (1982) call this the difference stationary (DS) method of detrending.

To decide the length of lag on money growth variables (MG), I followed the above mentioned procedure and I discovered that a lag length of 3 quarters turned out to be empirically most appropriate. Additional lagged values of MG were found to be statistically insignificant.

I estimated the DS version of equation (3) by ordinary least squares (OLS) method. As the OLS estimate is characterized by autocorrelation with Durbin's h-statistic value of 2.3, I reestimated the output equation (3) using the Yule-Walker noniterative procedure. The empirical results are shown in Table 7.

Table 7

THE YULE-WALKER NONITERATIVE PROCEDURE
ESTIMATES OF EQUATION (3). THE DEPENDENT IS $\ln Y_t$

Variables	Estimates
Intercept	0.130 (0.84)
$\ln Y_{t-1}$	0.982 (45.03)*
$\ln MG_t$	0.067 (0.55)
$\ln MG_{t-1}$	0.219 (1.54)
$\ln MG_{t-2}$	0.325 (2.23)*
$\ln MG_{t-3}$	0.258 (2.01)*
ρ_1	−0.702 (−5.32)
ρ_2	−0.018 (−0.11)
ρ_3	0.243 (1.34)
$R^2 = 0.996$, S.E. = 0.049649	

t-values are in parenthese.
* indicates significance at the 5% level.
ρ's represent autoregressive parameters.

The empirical results suggest that raw money growth has a significant and positive effect on real output.

The structural stability of the output equation is investigated by means of the Chow (1960) test, utilizing the midpoint as the spliting date. The estimated F-statistic is 1.5, which is smaller than the critical F-value. (The critical F-value at the 5 percent level of significance is 2.3). Therefore, the hypothesis of the structural stability of the DS version of the output equation (3) would be accepted.

It is clear from the empirical results shown in Tables 6 and 7 that raw money growth exerts a significant and positive effect on the level of real output in the short run.

III. Summary and Some Concluding Remarks

This study has examined empirically the validity of the policy ineffectiveness hypothesis in Iraq over the quarterly period 1961:1 to 1977:3. I specified an equation to predict money growth. With a different lag length, the anticipated and unanticipated components of money growth were then used in the output equation (2). The empirical results indicate that both anticipated and unanticipated components of money growth exert a significant and positive effect on the level of real output. The results further suggest that the anticipated component of money growth has a stronger impact on the level of real output than the unanticipated component of money growth. The results also indicate that both anticipated and unanticipated components of money growth stimulate a positive deviation of real output from the natural rate. These empirical findings were discovered to be inconsistent with the tenor of the policy ineffectiveness hypothesis, which contends that only the unanticipated money growth matters. This suggests that anticipated monetary policy could play a significant role in affecting the level of real output.

Furthermore, the empirical findings suggest that raw money growth has a significant and positive impact on the level of real output. This implies that (anticipated) monetary policy is not neutral.

Appendix

Definition of the Variables and Sources of Data

ln $(M_t/M_{t-1}$ = The proportional growth in the money supply. M represents the M1 concept of the money stock.

GOV = The real expenditure of federal government (I used government consumption as a proxy for this variable).

RES = The value of international reserves.

Y = Real gross national product.

EXCH = The exchange rate.
CUR = The current account of the balance of payments.
P = Domestic price level, 1975 = 100.

All the data have been obtained from various issues of the International Financial Statistics.

UN = The quarterly average of the unemployment rate in the total labor force. Data for this variable have been obtained from the Year Book of Labor Statistics (various issues).

PDMT = The anticipated money growth, i.e., the predicted values of money growth obtained from equation (1).

DMR = The unanticipated money growth, i.e., the residual from the forecasting money growth equation.

In order to derive the quarterly figures of gross national product (GNP), government consumption (GOV), the unemployment rate (UN) and the current account of the balance of payments (CUR), a mathematical linear interpolation due to Diz (1970) was used to obtain the corresponding quarterly data.

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