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Monetary Policy and Economic Activity in a Low-Income Country: An Empirical Investigation

by

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Abstract

The paper is an empirical investigation of the output effects of some aspects of monetary policy in a low-income setting. It is argued that the existing political institutions render the fiscal authority dominant over the monetary authority. Using some parsimonious representations of output growth, there is evidence supporting the proposition that unanticipated monetary policy matters. Holding private credit constant, currency in ciculation has negative output effects. The econometric evidence is rationalized by invoking choice-theoretic based models of monetary economies that deliver propositions consistent with the evidence.

Monetary Policy and Economic Activity in a Low-Income Country: An Empirical Investigation

by Dante B. Canlas*

1. Introduction

In 1984, the Philippine economy experienced a general contraction in real output at a negative rate of about 5.5 percent. It was the first time during the entire postwar era that the economy experienced a recession. The unprecedentedness of the 1984 experience, among others, served to create an atmosphere of crisis. To be sure though, the recession had some dimensions of a financial crisis. The recession was accompanied by the failure of some savings and loan associations, rural banks, and nonbank financial intermediaries, prompting the Central Bank to open its discount window to some troubled banks.

To place the 1984 phenomenon in context, it should be noted that the economy was already experiencing a slowdown in output growth beginning 1977. In that year, real gross domestic product grew by about 6.9 percent. In 1981, after the oil price shock of 1979-80, output growth decelerated to 3.7 percent. In October 1983, the government declared a moratorium on the repayments of its external debts totalling about 26 billion U.S. dollars and at year-end, the growth rate of output was estimated at 1.0 percent. By 1984, the negative downturn in output growth could not be arrested.

My objective in this paper is to empirically determine the extent to which monetary policy can account for the behavior of output just described. Fearing a contraction as an aftermath of the 1974-75 recessions experienced by the U.S. and Western European economies, Philippine monetary authorities stepped up the growth rate of money. Throughout the decade of the seventies, money supply grew by 17 percent per annum on the average, compared to about 10 percent in the sixties. The economy appeared to have responded positively to the money stimulus: from a 5.3 percent in 1974, output grew by 6.6 percent in 1975, then by 6.7 percent in 1976. The growth rate of output peaked at 6.9 percent in 1977 and decelerated thereafter.

The empirical work opens up with an econometric investigation of the effects of money surprises on output. Using a measure of unanticipated money in the sense of Robert Barro (1977, 1978) to capture money surprises, I find support for the proposition that unanticipated money matters. I then bring in an additional perspective to the empirical model by examining if some components of the money supply have added explanatory powers. I find that growth rate of currency in circulation carries a negative effect on output growth. I find insignificant, however, the effect on output of net domestic credit, that part of money supply created by commercial and other deposit-taking banks.

The immediate motivation for this paper stems from the recent slowdown and recession experienced by the Philippine economy. Though the timing may differ, these problems, however, appear to be shared by other low-income countries where the prevailing technology of government rests on a so-called constitutional authoritarianism, a curious blend of institutions that are observed in both domestic and militarist states. It is argued that this governmental set-up gives rise to an environment where the fiscal authority is dominant over the monetary authority, and monetary policies generate the aggregate demand shocks that are later revealed to have nonneutral effects on output. It might also be pointed out that the empirical procedure pursued in this paper seems general enough for examining the role of some aspects of monetary policy in economies with a similar fiscal and monetary environment, and level of development as the Philippines.

The approach in this paper is empirical in the following sense: I start with an examination of historical time-series data using the minimum of restrictions on some regression models. Given these facts, I then proceed to do a selective review of choice-based models of monetary economies that deliver the econometric evidence.[1/]

The paper is organized as follows: Section 2 lays out a stylized representation of the fiscal and monetary environment in the Philippines. Section 3 presents the stages in the econometric analysis and the evidence. In Section 4, I present a selective review of some theoretical models of monetary economies that yield propositions consistent with the econometric evidence. Section 5 makes concluding remarks.

2. The Fiscal and Monetary Environment

To get an idea of the fiscal and monetary environment in the Philippines, it seems useful to provide a brief sketch of the underlying political structure. The country has been ruled by the same president since 1965, when he was elected by popular elections. In 1972, he declared martial law and this act set into motion a political process which granted legislative powers to the president or the executive branch. Though a legislative assembly has since been established, the president has retained his powers to promulgate laws through presidential decrees.

In this governmental setting, the president is the fiscal authority. The finance minister serves as an agent of the president. Monetary authority is embodied in the monetary board and the Central Bank governor who are also in a principal-agent relation with the president. It seems safe to assume that the fiscal authority is dominant over the monetary authority. The latter stands ready to

accommodate any level of government indebtedness determined by the former and it is up to the monetary authority to plan the portfolio composition of the government debt. The portfolio choice has been a mix of interest-bearing and non interest-bearing debt issues.

Given the dominance of the fiscal authority, it can be conjectured that the monetary authority is in no position to formulate a policy based on a set of rules, unless the path of public indebtedness obeys one. If no such rules exist, discretionary actions which tend to generate random aggregate demand shocks can be expected from the monetary authority.

The dominance of the fiscal authority over the monetary authority may have been more pronounced during the period 1973-1983 than in the period 1965-1972; in the latter, the president did not wield any extra legislative powers. In this sense, the two periods may be thought of as distinct regimes even if the same person ruled during the period 1965-1983. If the above conjecture is to make some sense, monetary policy should be more unpredictable in 1973-1983 than in 1965-1972.

Tables 1 and 2 present money growth and output growth for the periods 1965-1972 and 1973-1983, respectively. It is observed that average annual growth rate of money for 1973-1983 exceeded the same for 1965-1972. The standard deviation for 1973-1983 was 9.8, compared to 6.6 for 1965-1972. This implies that monetary policy

Table 1

Money and Output Growth: 1965-1972

Year	Δ M1/M1 (percent)	Δ Y/Y (percent
1965	7.3	5.2
1966	8.1	4.4
1967	12.6	6.1
1968	4.8	5.5
1969	18.3	4.8
1970	4.6	4.6
1971	10.3	4.9
1972	24.9	4.8
Mean	11.4	5.0
S.D.	6.6	0.4

Table 2

Money and Output Growth: 1973-1983

Year	Δ M1/M1 (percent)	Δ Y/Y (percent)
1973	12.3	8.6
1974	24.0	5.3
1975	14.5	6.6
1976	17.1	6.7
1977	23.7	6.9
1978	13.4	6.2
1979	11.2	6.0
1980	19.6	5.8
1981	3.5	3.7
1982	0.8	3.0
1983	38.1	1.0
Mean	16.2	5.4
S.D.	9.8	2.0

for 1973-1983 was more unpredictable and carried more surprises when compared to that of 1965-1972. In terms of output growth, the average annual growth rate of real GDP in 1973-1983 was 5.4 percent compared to 5.0 percent in 1965-1972. The fluctuations in 1973-1983 had larger magnitudes as shown by the standard deviation of 2 in 1973-1983 compared to 0.4 in 1965-1972.

3. Some Econometric Evidence

In this section I report the econometric evidence from a model purporting to discover aspects of money growth that influence real output, using annual time-series observations for the period 1950-1983 obtained from the National Income and Product Accounts and the Central Bank Statistical Bulletins. I consider a longer period in my analysis in order to avoid viewing the recent economic slowdown as an isolated phenomenon. The starting period represents a year after the Central Bank commenced operations. The choice of 1983 as the ending period was made to minimize the intrusion of additional output shocks occasioned by the declaration of a debt moratorium in October 1983.

3.1 Money Growth

I begin with ordinary least squares (OLS) estimates of various specifications of the equation:

$$(1) \quad DM_t = \alpha_0 + \alpha_1 t + \beta(B)\, DM_t + u_t$$

where M_t is nominal money supply in year t consisting of currency plus demand deposits (M1), $DM_t = \ln M_t - \ln M_{t-1}$, t is time trend, $\beta(B)$ is $\beta_1 B + \beta_2 B^2 + \ldots$ with B as the backward shift operator defined as $B^n x_t = x_{t-n}$ and u_t is an error term that is assumed to resemble a white-noise process.

Following Barro (1977, 1978), the first stage of my analysis is to decompose actual money-supply changes into their anticipated and unanticipated components.[2/] The anticipated component is the systematic part of equation (1), while the unanticipated component refers to the residual of equation (1). The unanticipated part is meant to capture surprises in the money-supply process. The residuals generated in equation (1) are used as regressors with a lag structure in an output-growth equation and their coefficients serve to capture the effects on output of money surprises.

Using annual observations from 1950-1983 I settle for the following money-growth equation:

$$(2) \quad DM_t = 0.050 + \underset{(2.45)}{0.004}\, t$$

$$\bar{R}^2 = 0.147 \qquad F = 6.00 \qquad s.e. = 0.070 \qquad D\text{-}W = 2.18$$

where $\bar{R}^2$ is the coefficient of determination adjusted for the number of degrees of freedom and s.e. is the standard error of the estimate. The F-statistic enables me to reject the null hypothesis

that t has no effect on DM. From the Durbin-Watson statistic, D-W, I can reject the presence of serial correlation in the data.

I experimented with a 3-period lag structure for DM but I could not reject the null hypothesis that the estimated coefficients are all equal to zero. Roger Kormendi and Philip G. Meguire (1984) have reported an estimate of the money-supply equation using annual observations from 1949-1977 that is similar to equation (2) above.

From equation (2), I generate the residuals RM_t where RM_t = actual DM_t - estimated DM_t.[3/] Whether or not RM significantly affects real output is tested next.

3.2 Output Growth

I consider next a parsimonious representation of output growth, and estimate specifications with different lag structures for RM of the following equation:

$$(3) \qquad DY_t = \gamma_0 + \gamma_1 t + \gamma_2 DY_{t-1} + [\beta_0 + \beta(B)] RM_t + v_t$$

where Y is real gross domestic product, $DY_t = \ln Y_t - \ln Y_{t-1}$, and v_t is an error term that cannot be distinguished from white noise. A one-period lag for DY is added as a regressor to capture possible autoregressivity of output.[4/]

OLS estimation using annual observations from 1950-1983 yielded the following equation:

$$(4) \quad DY_t = 0.071 + \underset{(1.89)}{0.0006\,t} + \underset{(2.18)}{0.072\,RM_t} + \underset{(4.88)}{0.223\,RM_{t-1}}$$

$$+ \underset{(3.30)}{0.147\,RM_{t-2}} - \underset{(-2.85)}{0.595\,DY_{t-1}}$$

$$\bar{R}^2 = 0.479 \qquad F = 5.77 \qquad s.e. = 0.011 \qquad D\text{-}W = 1.63$$

From the F-statistic of 5.77, I can reject the null hypothesis that all the coefficients are equal to zero. The Durbin-Watson statistic, 1.63, leads me to reject the presence of serial correlation in the residuals.

I cannot reject the hypothesis that unanticipated money matters. The sum of the coefficients of RM is 0.44. If there is an unanticipated growth in the money supply of 1 percent per year that persists for a period of 3 years, output growth would tend to rise by about 0.44 percent. I tried a 3-year lag structure but the coefficient of RM_{t-3} turned out insignificant.

To check whether anticipated money carries an output effect or not, I estimated an output-growth equation where I replaced RM by $\widehat{DM}$, the anticipated or the systematic part of the money-growth equation. The following equation resulted:

$$(5) \quad DY_t = -0.283 - \underset{(-0.031)}{0.015\,t} + \underset{(0.464)}{14.54\,\widehat{DM}_t} + \underset{(9.22)}{14.07\,\widehat{DM}_{t-1}}$$

$$- \underset{(-0.197)}{24.56\,\widehat{DM}_{t-2}} + 0.076\,DY_{t-1}$$

$$\bar{R}^2 = -0.234 \qquad F = 0.013 \qquad s.e. = 0.018 \qquad D\text{-}W = 1.82$$

Equation (5) is obviously inferior to equation (4): with an F-value of 0.013 I can accept the null hypothesis that all the coefficients are zero. Among the $\widehat{DM}$ terms, only the one with a one-year lag turns out significant. The coefficient 14.07 is about 9.22 standard errors away from zero. At a glance, this suggests dropping the contemporaneous term for $\widehat{DM}$ as well as the one with a 2-year lag. Doing that yielded the equation:

$$(6) \quad DY_t = 0.535 + \underset{(0.086)}{0.036\,t} - \underset{(-0.088)}{10.51\,\widehat{DM}_{t-1}} + \underset{(0.138)}{0.074\,DY_{t-1}}$$

$$\bar{R}^2 = -0.125 \qquad F = 0.037 \qquad s.e. = 0.017 \qquad D\text{-}W = 1.82$$

From equation (6), I find that the coefficient of $\widehat{DM}_{t-1}$ is not significantly different from zero.[5/]

The econometric evidence just presented tends to support the proposition that unanticipated money matters. Alternatively, I cannot reject the null hypothesis that the effects of anticipated money on output is zero.[6/]

3.3 Output and Components of Money Supply

In this section, I resume the marshalling of econometric evidence bearing on the impact of the money-supply process on output. I investigate if additional explanation of the observed behavior of output can be derived from extending equation (4) using some components of money supply as additional regressors. The two components of money supply I work with are currency in circulation and net domestic credit created by commercial and other deposit-taking banks. It will be useful to find out empirically if currency and credit are relevant to output.

Using OLS on annual observations from 1950-1983, I obtained the following equation:

$$(7) \quad DY_t = \underset{}{0.074} + \underset{(2.94)}{0.001}\, t + \underset{(3.32)}{0.164}\, RM_t + \underset{(4.15)}{0.189}\, RM_{t-1} + \underset{(2.90)}{0.133}\, RM_{t-2} - \underset{(-2.72)}{0.548}\, DY_{t-1} - \underset{(-2.52)}{0.110}\, DN_t - \underset{(-0.298)}{0.009}\, DC_t$$

$$\bar{R}^2 = 0.568 \qquad F = 5.88 \qquad s.e. = 0.010 \qquad D\text{-}W = 2.13$$

where N is currency in circulation, $DN_t = \ln N_t - \ln N_{t-1}$, C is domestic credit, and $DC_t = \ln C_t - \ln C_{t-1}$. Comparing equation (7) to equation (4), I find an improvement in terms of $\bar{R}^2$ and the F-statistic.

Currency in circulation is shown to have a significantly negative effect on output when domestic credit is held constant.

The coefficient -0.11 of DN_t is about -2.52 standard errors away from 0. In turn, I find the coefficient of domestic credit, DC, uninformative about the distribution of DY when currency is held constant.

3.4 Test of Causality

Could it be that a change in currency leads to a change in output, or is it the case that a change in output leads the monetary authority to revise currency?

Using a procedure developed by Clive W.J. Granger (1969) and Christopher A. Sims (1972), I first estimate a regression of current output growth on past, contemporaneous, and future values of currency growth to test the null hypothesis that there is no feedback from current output to future currency growth rate. For the reverse hypothesis that present currency does not cause output, I regress present currency growth rate on past, contemporaneous, and future values of output growth. I use a two-year lag structure for both regressions.

The results of this estimation are reported below with the constants omitted:

$$(8) \quad DY_t = \underset{(0.77)}{0.037}\, DC_{t-2} + \underset{(1.78)}{0.091}\, DC_{t-1} + \underset{(0.91)}{0.050}\, DC_t - \underset{(-0.12)}{0.007}\, DC_{t+1} - \underset{(-0.66)}{0.023}\, DC_{t+2}$$

$$F = 1.07 \qquad \bar{R}^2 = 0.01 \qquad s.e. = 0.01$$

$$(9) \quad DC_t = \underset{(0.72)}{0.791}\, DY_{t-2} + \underset{(.56)}{0.623}\, DY_{t-1} + \underset{(0.62)}{0.751}\, DY_t$$

$$+ \underset{(1.32)}{1.38}\, DY_{t+1} + \underset{(0.16)}{0.155}\, DY_{t+2}$$

$$F = 0.69 \qquad \bar{R}^2 = -0.07 \qquad s.e. = 0.07$$

In equation (8) there is no evidence that output causes currency. The coefficients of DC_{t+1} and DC_{t+2} are both not different from zero. In equation (9), there is a little bit of evidence that currency causes output. The coefficient of DY_{t+1} is about 1.32 standard errors away from zero. From this, we infer that the procedure whereby output is regressed on currency is not invalidated.

3.5 Open Economy Considerations

The possible output effects of the openness of the economy is tested by estimating an extension of equation (7), putting in a terms-of-trade variable as an added regressor. The result of this estimation is reported below:

$$(10) \quad DY_t = 0.074 + \underset{(4.03)}{0.001}\, t + \underset{(3.09)}{0.140}\, RM_t + \underset{(3.51)}{0.147}\, RM_{t-1} + \underset{(2.01)}{0.085}\, RM_{t-2}$$

$$- \underset{(-3.74)}{0.658}\, DY_{t-1} - \underset{(-1.71)}{0.070}\, DN_t - \underset{(-0.59)}{0.015}\, DC_t + \underset{(1.51)}{0.032}\, DPX_t$$

$$F = 5.17 \qquad \bar{R}^2 = 0.58 \qquad s.e. = 0.009 \qquad D.W. = 2.36$$

where PX is the ratio of the price of exports to imports and $DPX_t = \ln PX_t - \ln PX_{t-1}$. It is observed that the coefficient of DPX_t is significantly different from zero only at a 20 percent level.[7/] Some explanation is called for.

Suppose from an initial equilibrium position a favorable terms of trade leads to an excess supply of money; then under fixed exchange rates, the capital account of the balance of payments can change. The excess supply of money can be disposed of by private agents through purchase of foreign assets. This is possible because the local economy is linked to capital markets abroad. If the permanent income stream backed by the foreign assets is not reinvested in the local economy, the money expansion induced by the favorable terms of trade will have no output effects.

4. Some Theoretical Models of Money and Output

In this section, I present a very selective review of some theoretical models with propositions that deliver the econometric evidence discussed in section 3. Specifically, I want some theoretical support for the findings that money surprises are nonneutral

and currency has negative output effects when credit is held constant. In line with the notion that things in the large are better understood by analyzing them in the small, I limit this review to models with a choice-theoretic basis. Additionally, since the monetary setting in the Philippines is such that money can be regarded as intrinsically useless and inconvertible in the sense described by Neil Wallace (1980), [8/] I limit further this review to models that do not rely on money being in the utility or production function.

4.1 A Market-Clearing Model with Imperfect Information

To study the output effects of money in an idealized economy, Robert E. Lucas (1973) has built a model where producers or suppliers of a single homogenous good are located in spatially separated markets, and where no trading among suppliers takes place. These producers are rational in the sense that their decisions depend only on relative prices. However, imperfect information leads them to confuse the general price level for relative prices.

The demand for the homogenous good is distributed unevenly among markets. This enables prices to vary across markets. A random money shock produces random demand shock.

The relationship between actual and expected price is posited to be based on rational expectations rather than on adaptive expecta-

tions. Under rational expectations, private agents' expectation of future price given current information available to them is precise but subject to error.

In equilibrium, all markets clear. The implication for aggregate supply and aggregate demand of the setting described above is sketched below.

The aggregate supply function drawn from these considerations, plus others, takes the form (see Lucas 1972, 1974):

$$(11) \quad y_t = y_{nt} + a(p_t - p_t^*) + \varepsilon_t$$

where y_t is real output at time t, y_{nt} is the normal or natural output component of y_t, p_t is price, p_t^* is expected price, and ε_t is a normal error term with mean 0 and constant variance σ^2. Suppliers are assumed to know the distribution of p_t.

The aggregate demand curve is assumed to be of the form:

$$(12) \quad y_t + p_t = x_t$$

where x_t is a government policy instrument like money supply which shifts the aggregate demand schedule.

Under rational expectations, p_t^* is taken to be a forecast of p_t conditional on available information. This can be written as:

(13) $p_t^* = E(p_t \mid I_{t-1})$

where I_{t-1} is information available at time t-1.

In equilibrium, aggregate demand equals aggregate supply. Equating (11) and (12) and eliminating y_t yields:

(14) $p_t = \frac{1}{1+a}(x_t + a\, p_t^* - y_{nt} - \varepsilon_t)$

Using equation (13) the following is obtained:

(15) $p_t^* = \frac{1}{1+a}(E\, x_t + a\, p_t^* - y_{nt})$

Subtracting (15) from (14) and substituting $p_t - p_t^*$ in (11) yields the equation:

(16) $y_t - y_{nt} = \frac{a}{1+a}(x_t - E\, x_t) + \frac{1}{1+a}\varepsilon_t$

From equation (16), it is seen that deviation of output from its natural trend depends only on the unsystematic part of government policy.

The systematic part of government policy can be shown to be irrelevant. Suppose, for instance, that the government obeys the following policy rule:

(17) $x_t = \rho_0\, x_{t-1} + \rho_1\, y_{t-1} + \rho_2\, p_{t-1} + \delta_t$

where δ_t is a random variable with mean 0.

Taking $E x_t$, the following expectation is obtained:

(18) $E x_t = \rho_0 x_{t-1} + \rho_1 y_{t-1} + \rho_2 \rho_{t-1}$

Subtracting (18) from (17):

(19) $x_t - E x_t = \delta_t$

Substituting in (16):

(20) $y_t - y_{nt} = \frac{a}{1+a} \delta_t + \frac{1}{1+a} \varepsilon_t$

From (20), it is shown that deviation of output from trend is purely random.

Equation (16) forms the basis of a regression model. By positing that $y_{nt} = \beta_0 + \beta_1 t$ where t is time, and adding an autoregressive term for y_t, equation (16) delivers the regression model reported in equation (4).

4.2 Money, Credit and Economic Activity

In an economy with private credit, currency should not limit economic activity on condition that private agents can trade off claims to future resources with current resources.

Robert M. Townsend (1983) has built theoretical examples of three economies with varying degrees of opportunities for trade. In Townsend's own words: "The key idea is that the degree of interconnectedness of traders determines both the amount of production and trade as well as the type of assets which are used to facilitate exchange."

His simplest example of an economy is a Robinson-Crusoe or autarkic type of economy. Households are spatially separated and do not trade with each other. They consume what they produce. A second type of economy allows households to trade. However, some types of exchange are precluded such as households of type i do not trade with household of type $i+1$ because the former has no goods which the latter values. This creates the possibility for fiat money. This economy is a pure-currency economy. In his third example, Townsend introduces into the pure-currency regime credit or private debt. Households can finance current consumption by current labor-output decision. If they have no currency in the present, they can resort to a centralized credit system which will enable them to trade future claims on output with current resources.

Comparing the three economies in terms of output, the economy with trade credits is shown to dominate the one with pure fiat money, which in turn dominates the autarkic regime. The intuition behind this result is that in the fiat money regime,

output-labor decision cannot be used immediately for purchase of market-produced commodity; it has to be stored for one period. This is not so in the trade credit regime where credit derived from the sale of the produced commodity is used immediately to buy the market-produced commodity.

The insights from these examples of idealized economies turn on possible explanations for the insignificant effect of credit on output when currency is held constant. If the credit market is sufficiently limited, the added efficiency in exchange made possible by a trade-credit regime over a pure-currency regime is offset.

In the Philippines, there is a variety of evidence and anecdotes indicative of a very limited credit and financial market. Commercial banks hold slightly over 50 percent of the assets of the financial system and government financial institutions, among them the Philippine National Bank (PNB) and the Development Bank of the Philippines (DBP), hold about 40 percent of total commercial bank assets.[9/] It has been suggested that the large concentration of financial resources in PNB and DBP has led to a form of credit rationing whereby the granting of loans was made on the basis of political considerations rather than on a proper assessment of the default risks of potential borrowers.[10/] It is now a fact that both PNB and DBP are in serious financial trouble, with a number of loans given to a few large borrowers relegated to nonperforming accounts.

Inference about the ability of small borrowers to obtain credit from commercial banks must perforce be made. Normally, banks are more assiduous in getting information about big borrowers than small ones. The latter, about whom there is less information, will tend to be more credit constrained than the former. Dennis Anderson's (1981) study on small enterprises in the Philippines shows that the proportion of loans given by banks to home, small, and medium scale industries as of end 1977 amounted to 2, 11, and 11 percent, respectively.

Finally, one may ask: If there is credit rationing by banks, is there not a nonbank credit market to which borrowers rationed by banks may turn? There are nonbank financial intermediaries but the market is very thin. The stock market, which is a source of equity capital, is likewise very limited.

5. Concluding Remarks

I have set out to investigate the output effects of some aspects of monetary policy in the Philippines for the period 1950-1983. The econometric evidence reported here showed support for the following conclusions: (1) Unanticipated money has nonneutral effects on output while anticipated money has neutral effects; (2) when private credit is held constant, currency exerts a negative effect on output; (3) credit is insignificant.

The question arises whether or not the output effects of unanticipated money should be exploited for policy purposes. The dynamics stressed in Lucas' models reviewed here offer a negative answer. Actions based on continual money surprises eventually become anticipated and their output effects are soon dissipated, while yielding only a permanent inflation rate. I have not touched on the price effects of monetary policy but I hope to work on it as a natural extension of this paper.

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Footnotes:

1/ See Orley Ashenfelter and David Card (1983) for a similar strategy. Arnold Zellner (1982, p. 113) has put it aptly: "We want to have models that fit the data reasonably well, describe the major movements in series, and forecast well. If such models are empirical time series models, the economic theorists can attempt to rationalize their good performance. Thus, instead of always starting with a full blown economic theory before analyzing data, it may be fruitful to determine what works well from the data and then rationalize the results."

2/ To see Barro's technique in a more general econometric context, the reader is referred to Adrian Pagan (1984). Pagan discusses the properties of the estimators when generated regressors are used.

3/ An empirical conditional that is implicit in the forgoing is that the time series data display stationarity and that first-order differencing yields a white-noise structure.

4/ The inclusion of DY_{t-1} may be justified in that it adds to the information available in period t-1, knowledge relevant to people's formation of expectation about the future behavior of output.

5/ I also estimated equation (5) using only a contemporaneous term for DM and the estimated coefficient is not significantly different from zero.

6/ Frederick S. Mishkin (1982a, 1982b) has reservations about Barro's procedure and proposed a technique which I have not been able to implement.

7/ This result is consistent with some of the findings of Sebastian Edwards (1983). Using a variant of Barro's equation, the terms of trade variable in his output-growth equation was insignificant for Brazil, Colombia, and Peru, and significant for Chile and Mexico.

8/ It is intrinsically useless because people desire money not per se but for the consumption it will buy. The inconvertibility arises from the idea that the Central Bank is not ready to convert notes and coins into something real; in other words, money does not represent real claims on the Central Bank.

9/ For a lengthy treatment of commercial banking in the Philippines, see Hugh Patrick and Honorata Moreno (forthcoming).

10/ See, for example, Emmanuel de Dios (1984).

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