

TESTING LONG-RUN MONETARIST PROPOSITIONS IN DEVELOPING ECONOMIES

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1. Introduction

The study on the relationship between money-output and prices attained much importance since the beginning of formal study in economics. The relation was tested in the case of different economies at different situation and at different periods with the help of established/updated econometric techniques. But still the end for the controversy over this relation was not found. Friedman is correct when he told that money-price nexus was put to test more times than any other economic relation except the downward sloping demand curve (Friedman, 1991). The controversy exists basically among monetarists, who give much importance to the role of money in the real economic activity, and the Keynesians, who attribute the increase in prices to cost-push phenomena through increase in real wages and real interest rates. The views of these groups have to be tested separately, as the refutation of one view may not lead to acceptance of the other. In this paper we attempt to test three basic monetarist propositions which will help in establishing the money-output-price relationship in the case of developing economies.

1.1 Testing Monetarist Propositions

The validity of a proposition or a theory depends on its empirical strength. Hence, to ascertain the effectiveness of any policy, it is necessary that it should undergo empirical verification. In the past, only simple correlation technique was used to establish the relation between two variables. Since, correlation cannot explain the causative relation between the variables, the studies used some time series techniques like cointegration, causality, and Vector Autoregressions. But still correlation technique is very much relevant in testing the basic monetarist propositions if and only if the exogeneity of money supply established with the help of variance decompositions derived from Vector Autoregressions.

Given the theoretical controversion over the role of quantity of money for any economy and its relationship with output and prices, the present study intends to test

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three important long-run monetarist propositions with the help of recent data for nine developing economies. We could select only nine countries due to lack of availability of long time series data, which is a basic feature of any developing nations.

The propositions are as follows:

1. 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. Monetarists are of view that there exist exact relationship between changes in money and changes in prices.
2. There is no correlation between money growth and real output growth even in the long run as against the neutrality of money in the short run as that advocated by classical economists. (Money super-neutrality proposition).
3. There is no correlation between real output growth and inflation rate.

Here we try to do the multi-country analysis with reference to the statement made by Milton Friedman (1958): "To the best of my knowledge there is no instance in which a substantial change in the stock of money per unit of output has occurred without a substantial change in the level of prices in the same direction. Conversely, I know of no instance in which there has been a substantial change in the level of prices without a substantial change in the stock of money per unit of output in the same direction. And instances in which prices and the stock of money have moved together are recorded for many centuries of history, for countries in every part of the globe and for a wide diversity of monetary arrangements". Intuitive in this statement is that irrespective of the monetary policies adopted by different countries and irrespective of money definitions considered, monetarist propositions holds good.

We consider only long run phenomena because in the short run monetary policy is ineffective as time delay between changes in the quantity of money and in other magnitudes are 'long and variable' and depend a great deal on surrounding circumstances.

We have taken nine developing economies into consideration and the countries are selected on the basis of availability of good data and reasonably long time series. And among the developing countries, we have chosen three SAARC countries i.e., India, Pakistan, Sri Lanka and the other developing countries being South Africa, Thailand, Korea Mexico, Philippines, and Venezuela. The study makes use of annual data for the period of thirty-one years i.e., from 1963 to 1993 and the data have been collected from various issues of the International Monetary Fund's publication of International Financial Statistics.

2. Review of Studies on Monetarist Propositions

The monetarist propositions were extensively tested in the past. Studies were conducted for many countries by using different methodologies and arrived at different conclusions. While a few studies had refuted the propositions, some supported them. We review here some major empirical studies.

Sims (1972) developed a test of causality between two variables and applied the same on quarterly data of United States economy for the post War period, 1949: III to 1968: IV and two of its sub-periods viz., (i) 1948: III to 1975: III and (ii) 1957: IV to 1968: IV. The variables considered were money supply (both M1 and monetary base) and nominal Gross National Product (GNP). Sims used $(1-0.75L)^2$, where L is the lag operator, as filter for achieving stationarity of the data series and carried out Likelihood Ratio test for obtaining white-noise residuals. The study estimated the regression coefficient of GNP on both M1 and monetary base with 8 past lags, then M1 and monetary base on GNP with 4 future and 8 past lags.

The study concluded that: "The main empirical finding is that the hypothesis that causality is uni-directional from money to income agrees with the post-war U.S. data, whereas the hypothesis that causality is uni-directional from income to money is rejected". (p. 540). And further concluded that: "...one clearly should not estimate a demand for money relation from these data (of GNP and money stock), treating GNP as exogenous with money on the left – hand side; no evidence appears to contradict the common assumption that money can be treated as exogenous in a regression of GNP on current and past money". (p. 550). There was no change in the conclusions drawn when the sub-periods were considered.

The Sims' test was used by Williams, Goodhart and Gowland (1976) for the United Kingdom's quarterly data for the period 1958: I to 1971: III by using two monetary series M_n (defined as notes and coin plus current accounts with the London clearing banks) and M_b (defined as M_n + deposit accounts with the London clearing banks) which were taken as proxies for narrow (M_1) and broad money (M_3) respectively, and the Gross Domestic Product (GDP) at current prices. The study used $(1-L)$ $(1-a_1L-a_2L^2)$ as filter for attaining white noise residuals.

The conclusion drawn from this study was that neither the causal relationship from money to income nor from income to money was significant. However, the study found that the causation from income to money is marginally significant at 5% level. Based on these results, the study suggested the possibility of an uni-directional cau-

sality from income to money for U.K. The study also found some evidence of unidirectional causality running from money to price (GDP deflator).

Dwyer Jr. and Hafer (1988) tried to clarify the doubts raised by some Federal Reserve people whether money is relevant. The study was based on the cross-country analysis for 62 countries for the shorter period i.e., from 1979 to 1984. They used the data of nominal income, real income, price level and the money stock (not specified which definition of money they used). The growth rates used by them being average of annual growth rates for 1979 to 1984 for the long run. For the short-run growth rates, annual growth rates for individual years were considered.

The study showed that there exists a loose linkage between the growth rate of money supply, income and prices in the short run. But in the long run, the linkage between growth rate of money supply and inflation was proved to be strong and cautions that importance of money should not be studied in the short run.

McCandless Jr. and Weber (1995), with the help of simple correlations, tried to test three monetarists' propositions in the long run. The proportions are i) High correlation between the rate of growth of the money supply and rate of inflation, ii) No correlation between the growth rates of money and real output, and iii) No correlation between inflation and real output growth. This was a cross-country analysis for large number of countries. The study considered 110 countries for a period of 30 years from 1960 to 1990. The variables chosen in this study were M0, M1, and M2 as monetary indicators, Gross Domestic Product adjusted for inflation (real GDP) and the CPI as the price proxy. They calculated long run geometric average rate of growth for all the variables and for every country. In the case of real GDP, growth rate is calculated by subtracting the growth rate of CPI from that of nominal GDP. Two sub samples i.e. 21 OECD countries and 14 Latin American countries, were examined separately in study.

The study generated evidences in support of the monetarists' claim. That is, it found high correlation (close to one) between growth rate of money supply (for all the money definitions) and the CPI. Another conclusion was that the growth rate of money (for all the money definitions) and the growth rate of real GDP were uncorrelated except for the sub sample of OECD (some positive correlation was found). And finally the study concluded that the inflation rate and the growth rate of real GDP were uncorrelated.

Sims (1980) carried out one of the earliest study using Vector Autoregressions (VAR). He tested the monetarists' claim as set forth by Friedman and Schwartz.

Sims in his 1972 paper, using Granger's causality test, concluded that money stock is exogenous to income for the post-war period using only three variables viz., money supply, industrial production and the whole sale price index. But in his 1980 paper, two separate periods i.e., post-war period (1948-78) and the inter-war period (1920-41) were considered. He used the monthly data for the same variables, as in his 1972 paper, in its logarithmic terms with twelve lags of each variable. It was shown that money stock was exogenously determined, and it explained a substantial change in the industrial production in both the periods, more significantly in the inter-war period. Changes in prices were explained by money stock but smaller than what he had found out when he used quarterly data rather than that of monthly data. Since, the industrial production and wholesale price index responded positively to the change in the money stock in both the periods, this model suited the monetarists' framework.

Sims further estimated the VAR system by introducing the short-term interest rates (the rate on 4-6 months prime commercial paper) for both the periods and concluded that money stock is no longer exogenous. When the system without interest rate was used for forecasting innovation in money stock explained 37% of the forecast error variance of industrial production at the forty eighth month horizon for the post-war US data. But when interest rate included in the model, then this proportion fell to 4% which is a non-monetarist explanation for the same data. This study further showed that changes in industrial production and money stock were mostly attributed to common responses to changes in interest rate in the post-war period. And changes in production variance were not due to changes in money stock.

James Fackler and John Rogers (1995) estimated a small open-economy macro model for two countries viz., Bolivia and Brazil, which undertook stabilisation programmes to control inflation. The study used the quarterly data 1980: I to 1990: IV of Bolivia, and monthly data 1983: 1 to 1990: 9 of Brazil, to establish the sources of fluctuations in output and inflation. The variables considered in the study were Government spending/tax ratio, output, inflation rates, real exchange rate and real money balances. Impulse response functions, variance decompositions and historical decompositions were estimated for this purpose. They followed an approach that combines both structural and reduced form analysis and was implemented by a two-step process. In the first process, an unconstrained Vector Autoregression was estimated. In the second process, a just identified structural model of VAR residuals from the first stage was specified and then estimated using a method of moments estimator.

From the residuals of the second stage, impulse response functions, variance decompositions were obtained.

From the estimated impulse response functions, the authors concluded that the responses of output were very similar in both the countries. There existed a long-run positive change in output in response to output, money, and exchange rate shocks, but negative response to fiscal and asset shocks. They also found that the responses of inflation to the various shocks differ across Bolivia and Brazil. Fiscal view of inflation which asserts that budget deficits are the fundamental cause of inflation in countries, was established in Bolivia where the response of inflation to the fiscal shock was inconsistent with the fiscal view, but consistent with the monetarists' view. Variance decompositions also gave the same results. In the case of Bolivia, mainly monetary shock and its own shock affected output, and the variance of inflation was explained by several shocks, with the money shock having the strongest influence. The authors claimed that monetary shocks likely represented the effects of monetizing the deficit, hence variance decomposition results for Bolivia were consistent with the fiscal view. But for the Brazilian economy, output was affected by its own shock, although each shock was influential. For the variance of inflation, all the shocks contributed approximately equally in the long run.

In India, the relationships between money, output, and prices were widely studied by using different econometric and time series models, which arrived at different conclusions. Saini (1984) did one of the earliest studies. He tested the causes of inflation by considering the annual time series data for the period 1955 to 1982 and estimated inflation (both from WPI and CPI) on monetary growth variable (both M1 and M2) with all possible combinations. The study also tested the effects of import prices and Government budget deficits on the price level.

A major findings of the study was that inflation is not a monetary phenomenon in India, since money indicator and its one lag change were not explaining the behaviour of price changes. Even import prices and Government budget deficit were also not seen as causative factors of inflation. Though this study refuted the monetarist claim, it couldn't come out with any concrete measure to control inflation in India where structural changes were taking place.

Further, using the causality tests developed by Granger and Sims, the study concluded that the causation from M1 to WPI was much stronger than the reverse causation and there existed bi-directional causality between M2 and WPI. The study also concluded that the results from these tests were insensitive to the lag length.

By using Haugh-Pierce test, Bhattacharya and Sharma (1985) attempted to investigate the causal relationship between money supply and price. The study used the monthly time series data on money supply, defined as currency plus demand deposits (M1) and the wholesale price index for the period April 1960 to June 1983. The tests were applied to two time periods separately to see the structural change in the series, the periods being (i) April 1960 to February 1978 and (ii) March 1978 to June 1983. This division was due to changes in the definitions of monetary aggregates.

The study concluded that there was an uni-directional causality from money to price with money affecting price with a lag of about 2 months in period (i). In period (ii), the study found out a reverse causation running from price to money with price affecting money with a lag of about 8 months, and questioned the exogeneity of money supply in India.

Nachane and Nadkarni (1985) tried to test three monetarists' propositions through causality tests. The three propositions were i) Central Bank actions dominate the movements of the monetary base over time, ii) movements of the monetary base dominate the movements of the money supply over the business cycle and iii) accelerations/decelerations of money supply are clearly followed by accelerations/decelerations in economic activity. That is they attempted to test the ability of monetary authorities in controlling the money stock and its impact on the economic activity. This study was based on the quarterly data for the period 1960-61 to 1981-82. Since the quarterly estimates for Gross National Product (GNP) at both current and fixed prices was not available, it used three intrapolative methods to estimate the quarterly estimates for GNP. The three methods are i) Lisman-Sandee method, ii) Minimum Squared first difference method and iii) the Minimum squared second difference method. Four major tests based on Granger's causality were used in the study. They are Sims' test, McClave-Hsiao test, Cross-Correlation test and the Transfer function test.

The study concluded that nominal income and the price level influenced the monetary base, in other words, monetary policy in India was not independent. The main monetarists' proposition that money supply causes nominal income and also prices in the long run was proved for Indian data only when M1 (narrow money) was used for money supply. When M3 (broad money) was used the results were inconclusive. Given the limitations of the intrapolative methods used, these conclusions cannot be taken for granted. The authors rightly said in the paper that the conclusions arrived in the present study as a 'half-hearted vindication of monetarism'.

Singh (1989) concluded that in the case of India there was a bi-directional causa-

lity between money supply and prices. Particularly causation from prices to money supply was more significant than from money supply to prices. It also concludes that price variation in India was highly due to structuralist variation rather than the monetarists' variation. Given the dilemma over whether M1 or M3 is the better indicator of monetary policy, we cannot take one of these two and come to this type of conclusions. We should take both into consideration while studying the impact of money supply on other variables.

The study concluded that price level was responding positively to monetary expansion and no response for changes in the real output and hence the steady growth of money supply is not a good policy measure given the trade-off in terms of inflation.

Ramachandran and Kamaiah (1992) tested the causal relationship between money and prices with the help of quarterly data of the period 1961: I to 1987: IV. The study considered four definitions of money supply viz., base money, M1, M2, and M3 and two price proxies viz., WPI and CPI (with the base 1970-71). The data set was deseasonalised with the help of X - 11 variant method. The study used co-integration and error correction models. The data were taken at first differences to maintain stationarity. Then Granger test was used in which the lag length was selected through Akaike's FPE criterion. The study showed that there existed a bi-directional causality between M3 and price proxies (both WPI and CPI) and uni-directional causal flow running from the remaining money definitions (base money, M1 and M2) to price (both CPI and WPI).

Thacker (1993) used the co-integration and the error correction mechanism (ECM) model (through Engle-Granger two step procedure) to make all the time series data stationary and applied the Granger's causality test to establish the relationship between money and prices. The study used the monthly data for the period January 1962 to October 1990. The monetary indicators selected for this purpose were M1 and M2. WPI and CPI as price proxies were selected. For determination of lag length for Granger test, the study used Likelihood ratio test.

The study showed that there existed an uni-directional causality from monetary indicators (both M1 and M2) to CPI but bi-directional causality between WPI and monetary indicators (both M1 and M2). Thacker explained that this bi-directionality was due to the control of Government over Reserve Bank of India.

Most of the studies that are reviewed here are basically done to study the efficiency of the statistical techniques by experimenting with monetary theory. Only a few studies like Friedman and Kuttner (1992), McCandless and Weber (1995), Dwyer and

Hafer (1988) were focused purely on monetarist propositions. Albeit, the conclusions drawn from these studies are sensitive to the technique employed.

Keeping aside the methodology and its limitations adopted by these studies, one gap we find out here is that no study examined the basic monetarist propositions in the multi-country framework with different definitions of monetary aggregates. Since, monetarists claim that the propositions are valid in all the economies irrespective of money definitions and monetary policies adopted, the study tries to examine three basic long-run monetarist propositions in the multi-country context, i.e., for nine developing economies, and considers two definitions of money i.e., M1 and M2.

3. Methodology

To test the three long run monetarist propositions, as it is mentioned in Section 1, we use simple correlations and the VAR model and that will be discussed detail in this section. VARs are used to analysis the dynamic relationship among variables in the model. In this section, a brief description of the methods used in this study, viz., simple correlation and vector auto regressions are presented.

3.1 Vector Autoregressions

A Vector Autoregressive system is the reduced form of a linear dynamic simultaneous equation model in which all the variables are treated as endogenous. This is atheoretical in nature as it compared to common macro econometric models.

Let ' y_t ' is the (Nx1) vector of the N variables in the system.

The model for the process of ' y_t ' can be written as.

$$y_t = \sum_{i=1}^M A_i y_{t-i} + u_t \quad [3.1]$$

where A_i is an (NxN) matrix of coefficients, u_t is the (Nx1) vector of white noise residuals and 'M' refers to the number of lags fixed in the system. The number of coefficients to be estimated in the system will be N^2M . In a VAR model each variable is regressed on lagged values of it and on lagged values of all other variables in the model.

A VAR model must also satisfy the stationarity properties of a time series (same as in the case of univariate time series). The properties are

$$\begin{aligned} E(u_t) &= 0 \\ E(u_t u_s') &= \Sigma \\ E(u_t u_s') &= 0, t \neq s \\ E(y_t u_s') &= 0, t < s \end{aligned}$$

Where ' Σ ' is the error covariance matrix.

3.2 Exogeneity of VARs

In a model, the exogeneity of a set of variables with respect to another set can be defined in terms of zero restrictions on the coefficient matrix in the VAR model. Let the VAR system consist of two components say Y and Y . Then the system in equation (3.3) can be written as,

$$\begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \quad [3.4]$$

In this two variable system, considered here, " Y_1 " is said to be exogenous with respect to variable " Y_2 " if and only if A_{12} is not significantly different from zero. If the exogeneity conditions are imposed on the model, then the VAR representation will be

$$\begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} = \begin{bmatrix} A_{11} & 0 \\ A_{21} & A_{22} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \quad [3.5]$$

4. Empirical Results: Discussion and Interpretation

As discussed in the previous section, the study estimates simple correlation coefficients between the three variables in question i. e., growth rate of money supply, real income growth rate and the rate of inflation, for all the nine sample countries. In

the case of money supply, the study considers both M1 (money easily used in transactions) and M2 (money easily used in or converted into use for transactions). To estimate inflation rates, the study uses different price deflators for different countries. Real output is estimated by adjusting the GDP at current prices with price index.

The study estimated a simple three variable VAR model, the variables being money supply growth, growth rate of real income and inflation rate, for all the nine countries.

The VAR model estimated in the present study is as follows:

$$GM_t = a_{10,t} + a_{11,t} \sum_{i=1}^M GM_{t-i} + a_{12,t} \sum_{i=1}^M GY_{t-i} + a_{13,t} \sum_{i=1}^M GP_{t-i} + u_{1t} \quad [4.1]$$

$$GY_t = a_{20,t} + a_{21,t} \sum_{i=1}^M GM_{t-i} + a_{22,t} \sum_{i=1}^M GY_{t-i} + a_{23,t} \sum_{i=1}^M GP_{t-i} + u_{2t} \quad [4.2]$$

$$GP_t = a_{30,t} + a_{31,t} \sum_{i=1}^M GM_{t-i} + a_{32,t} \sum_{i=1}^M GY_{t-i} + a_{33,t} \sum_{i=1}^M GP_{t-i} + u_{3t} \quad [4.3]$$

where 'M' is the lag length to be fixed in the model, 't' is the time and 'a' are the coefficients to be estimated, and GM, GY, and GP are the log first differences of money supply (both M1 and M2), real output and price level respectively. The study considers log first differences because it is established in the literature that almost all the time series data, particularly of macro economic variables, are nonstationary in nature. Hence, It is important to ensure stationarity by taking log first differences of the series. The present study assumes two as lag length for all the countries.

The ordering chosen for the model is [GM, GY, GP]. The reason for choosing this order is to find out whether the growth rate of money supply (both M1 and M2) is exogenously determined in the model. This ordering can also be interpreted as that innovations in the present money supply enter the GM, GY, GP equations, the present income innovations enter only the GY and GP equations, and the present inflation innovations are allowed only to enter in the GP equation. With the help of the VAR results we can explain the forecast error variance of all variables in the system which can be explained by shocks in any of the component variables. In this study, 6-period ahead forecast error variances were calculated to determine the exogeneity of the variables. The present study consider only the forecast error variance decompositions (FEVD) of each country to check whether the money supply variable is exoge-

nously determined in the economy or not. The estimated FEVDs are tabulated for each country separately for both the definitions of money (M1 and M2) in table-4.4 and the F-statistics are given in table- 4.5.

4.1 Empirical Results

We analyse the empirical results of correlation coefficients and the forecast error variance decompositions of each country individually in the following paras.

4.1.1 Pakistan

There exists negative correlation between money growth (M1 and M2), and inflation rate (-0.042 and -0.13 respectively) (table 4.1). Though both the correlation coefficients are negligible, but at least there is no positive correlation between the two variables as the monetarist's claim. The growth rates of money supply, both M1 and M2, are positive correlated with output growth, i.e., 0.19 and 0.28 respectively (table 4.2). There exists a positive correlation between output growth and inflation rate (0.23) (table 4.3).

The exogeneity tests show that both M1 and M2 are exogeneously determined in the model. In the case of M1, more than 85% forecast error variation in GM is explained by shocks in GM itself and for M2, it is more than 88%.

4.1.2 Philippines

There is no correlation between M1 growth rate and inflation rate (0.03). But there is a weak positive correlation between M2 growth and inflation (0.16). The results show that there exists significantly positive correlation between money growth and output growth (0.24 with M1 and 0.22 with M2). The results also reveal a strong negative correlation between inflation rate and output growth rate (-0.48).

In the case of Philippines, the FEVD results concluded that M1 is not exogenous as nearly 40% of forecast error is attributable to other variables in the model. But M2 seems to be exogeneously determined as only 15% of its forecast error is attributable to other variables in the model, i.e., 85% of forecast error in M2 is attributable to innovations in same variable.

4.1.3 India

The estimated correlation coefficients between money growth and inflation rate indicate that M1 growth and inflation are positively correlated (0.36) but in the case of M2 growth there exists no relation between the variables (0.019). Between money growth and output growth, the data satisfies the monetarist claims that there is relation between money supply growth and output growth for both M1 and M2 (-0.09 and 0.02 respectively). But there exists a negative correlation between output growth and inflation (-0.51).

The results from FEVD explain that M1 is not exogenously determined in the country as more than 35% of variation in M1 is explained by other variables in the model. But M2 is exogenous as only 5% of forecast error variation in M2 is explained by other variables that is 95% of forecast error variation is explained by itself.

4.1.4 Mexico

There exists a strong positive correlation between the growth rates of both money definitions and inflation rate, the coefficients being 0.68 and 0.50 in the case of M1 and M2 respectively. Comparatively, M1 growth is highly correlated than M2 growth with inflation. In the case of money and output relation, the results confirm that there is a weak negative relationship for both the money supplies (-0.25 and -0.21 in the case of M1 and M2 respectively). Between output growth and inflation the results show that there exists a strong negative relationship between the variables, the coefficient being -0.42.

The exogeneity results shows that both the money definitions are exogenously determined as more than 75% of forecast error variation is attributable to the money definitions itself.

4.1.5 South Africa

There exists a strong positive correlation between money growth (both the definitions) and the inflation growth (0.42 and 0.40 respectively). And between money growth and output growth, both the money definitions exhibit superneutrality as the

correlation coefficients obtained are negative (-0.04 and -0.08). Even between output growth and inflation, the data exhibits negative but weak relation (-0.17).

The FEVD results for the South Africa data indicate that both M1 and M2 growth rates are exogenous. It shows that more than 95% for M1 and 89% for M2 of forecast error variation is attributable to their own variation.

4.1.6 Korea

For both the definitions of money supply, the data shows positive correlation between money and inflation rate and the magnitude being 0.37 and 0.42 when M1 and M2 used respectively. The study also found that money supply and output growth was not correlated and hence supporting the property that money is neutral. The third proposition that there is no correlation between output growth and inflation was also supported by the Korea's data.

Further, the exogeneity tests showed that only M2 exogenous as more than 89% of variation in M2 was attributed to shock in M2 itself. But M1 was found to be endogenous as more than 34% of forecast error variance was explained by variation in other variables in the system.

4.1.7 Thailand

There exists a positive correlation between money growth and inflation rate (0.31 for M1 and 0.38 for M2). The results also show that money growth (both M1 and M2) is positively correlated with output growth, the relation being comparatively high when M1 is used. Between output growth and inflation rate, though the coefficient is positive but degree very small.

The FEVD results shows that M1 is not exogenous as more than 32% of forecast error variation is explained by innovations in other variables. In the case of M2, the results show that only 20% of variation are due to innovation in other variables and are exogenous.

4.1.8 Venezuela

There exists a strong positive correlation between M2 growth and inflation (0.57) and when M1 is used in place of M2, the degree of relation is reduced to 0.22, though positive. Between money growth and output growth, M1 shows some positive correlation (0.13) but M2 shows that there is no correlation and the coefficient being estimated as 0.04. Negative correlation between output growth and inflation was found for this country (-0.31).

Both the money definitions were found out to be exogenous as more than 88% variations were due to shocks in the same variables.

4.1.9 Sri Lanka

Growth rate of M2 shows high positive correlation with the inflation rate i.e., 0.47 compared to growth rate of M1 which is also showing positive correlation i.e., 0.36. The results also show that there is absolutely no correlation between money growth and the output growth. The relation between output growth and inflation rate is also negligible i.e., 0.005.

The estimated variance decompositions results show that both the money definitions are exogenously determined in the country as, in both the cases, almost 80% of forecast error variation is due to innovations in itself.

5. Conclusions

From the results obtained and as analysed above, the interrelationship between money growth, real output growth and inflation rate are not consistent across countries and for different definitions of money supply. The findings of this study may be summarised as under:

(1) The proposition that there exists a strong positive correlation between growth rate of money supply and the inflation rate in the long run has been refuted by the economies like India, Pakistan, and Philippines. Particularly Pakistan shows negative relation between the two variables. This result is not consistent when we use different money definitions. For example, in the case of India, the results show that when M1

is used the relation is positive though not strong. But when M2 is used, the results show that there is no correlation between the variables.

(2) The second proposition that there is no correlation between money supply growth and output growth was found only in the economies like India, South Africa, Korea, Iran, Sri Lanka, for both the money definitions. In Venezuela, this proposition is valid only in the case of M2. Remaining countries refute this proposition. It can also be concluded that money supply in these countries is adjusting for output in the long run. The long run money neutrality as claimed by the monetarists has not been found in most of the sample countries.

(3) The third proposition that there is no correlation between output growth and inflation holds only in few economies like South Africa, Korea, Thailand and Sri Lanka. Pakistan shows positive correlation. The remaining countries show strong negative relation and hence refuting the monetarists' claim of no correlation, either positive or negative, between output growth and inflation in the long run.

From the above results, one can easily conclude that the monetarist claim that 'inflation is always and every where a monetary phenomena' is not valid as very few developing countries corroborated to this proposition. In few countries, it was found that there exists relation between output growth and the price growth. Neutrality of money in the long-run has also been rejected in some countries. These results clearly show that Milton Friedman's claim of monetarist propositions in each and every part of the globe and for a wide diversity of monetary arrangements. The behavior of real output and prices will certainly depend on the monetary arrangements and other conditions in the economy. This 'over confidence' on the role of money may certainly lead to the downfall of its own theories. But money has its own role to play in the economy which cannot be ruled out by any serious mainstream economists and it cannot be substituted by any other instrument.

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Appendix

Table 4.1: Correlation Coefficients for Money Growth and Inflation

Country	M1	<i>t</i>	M2
Pakistan	-0.042	<i>t</i>	-0.13
Philippines	0.03	<i>t</i>	0.16
India	0.30	<i>t</i>	0.019
Mexico	0.68	<i>t</i>	0.50
South Africa	0.42	<i>t</i>	0.40
Korea	0.37	<i>t</i>	0.42
Thailand	0.31	<i>t</i>	0.38
Venezuela	0.21	<i>t</i>	0.57
Sri Lanka	0.36	<i>t</i>	0.49

Table 4.2: Correlation Coefficients for Money Growth and Output Growth

Country	M1	<i>t</i>	M2
Pakistan	0.19	<i>t</i>	0.28
Philippines	0.24	<i>t</i>	0.22
India	-0.09	<i>t</i>	0.02
Mexico	-0.25	<i>t</i>	-0.21
South Africa	-0.04	<i>t</i>	-0.08
Korea	0.08	<i>t</i>	0.02
Thailand	0.32	<i>t</i>	0.20
Venezuela	0.13	<i>t</i>	0.04
Sri Lanka	-0.025	<i>t</i>	0.002

Table 4.3: Correlation Coefficients for Output Growth and Inflation

Country	
Pakistan	0.23
Philippines	-0.42
India	-0.51
Mexico	-0.42
South Africa	-0.17
Korea	-0.18
Thailand	0.1
Venezuela	-0.31
Sri Lanka	0.005

Table 4.4: *Variance Decompositions*

Country	GM	GY	GP
Pakistan			
GM	85.1/88.5	2.5/5.0	12.3/6.5
GY	21.4/1.2	76.6/96.8	2.0/2.0
GP	15.6/0.3	18.4/17.0	66.0/82.7
Philippines			
GM	63.8/84.3	28.9/8.6	7.3/7.2
GY	20.4/33.9	74.0/60.9	5.6/5.2
GP	39.5/55.8	14.5/8.8	46.0/35.4
India			
GM	64.5/94.3	10.5/4.3	25.0/1.5
GY	20.6/53.9	68.7/40.9	10.7/5.1
GP	8.5/65.3	18.5/10.6	73.0/24.1
Mexico			
GM	77.6/75.7	0.7/6.4	21.7/17.9
GY	6.5/1.3	63.6/70.9	29.8/27.7
GP	11.4/8.1	29.2/24.9	59.4/67.0
South Africa			
GM	95.7/89.1	1.8/7.4	2.5/3.5
GY	31.5/34.8	51.8/53.2	16.7/12.0
GP	11.0/15.1	7.2/6.8	81.8/78.1
Korea			
GM	66.8/89.1	22.3/4.5	9.9/6.4
GY	47.7/42.4	47.4/55.1	4.8/2.5
GP	33.4/39.8	18.2/25.7	48.3/34.5
Thailand			
GM	68.4/78.6	5.1/3.4	26.5/18.0
GY	40.1/20.8	47.1/60.1	12.8/19.1
GP	16.2/30.8	11.9/4.3	71.9/64.9
Venezuela			
GM	87.7/89.4	1.4/3.4	10.9/7.2
GY	15.1/21.1	53.2/50.5	31.7/28.4
GP	57.1/46.7	7.7/8.5	35.4/44.9
Sri Lanka			
GM	79.9/78.7	18.4/20.9	1.7/0.4
GY	5.7/13.6	92.3/85.1	2.1/1.3
GP	39.9/22.6	18.0/9.3	42.1/68.1

Note: Entries gives the percentage of the 6-step ahead forecast error variance when GM is calculated from M1/M2 respectively.

Table 4.5: *F-Statistics Calculated from VAR*

Country	GM	GY	GP
Mexico			
GM	0.255/0.614	2.223/0.81	2.684/5.94
GY	0.635/0.592	1.993/0.53	2.02/2.79
GP	2.759/3.139	5.07/3.46	12.43/19.1
Korea			
GM	3.338/4.018	1.825/2.213	0.483/0.142
GY	6.119/0.370	0.469/0.693	1.351/2.677
GP	1.519/0.845	0.205/0.140	7.907/7.66
India			
GM	1.117/0.555	2.890/1.901	0.483/0.775
GY	0.691/0.243	0.954/0.893	2.47/0.491
GP	2.583/0.287	0.994/0.910	0.942/0.039
South Africa			
GM	1.96/2.50	2.69/1.66	1.57/0.34
GY	0.15/0.79	1.40/0.98	3.29/2.55
GP	0.19/0.89	4.38/4.35	77.69/73.06
Philippines			
GM	5.471/1.327	0.678/2.854	0.994/1.551
GY	2.728/1.337	7.331/8.963	0.224/0.785
GP	0.994/0.862	1.074/0.981	0.497/0.468
Thailand			
GM	0.090/0.527	1.362/0.491	2.379/0.275
GY	0.107/0.813	0.857/0.121	0.367/0.500
GP	3.781/2.138	0.853/1.243	8.725/4.274
Pakistan			
GM	2.585/5.305	0.412/0.139	4.605/0.038
GY	0.366/0.384	0.229/0.625	2.898/1.298
GP	3.576/0.842	0.407/0.194	12.79/5.944
Venezuela			
GM	0.42/0.50	2.51/4.09	0.82/1.68
GY	0.67/0.69	3.15/3.44	0.40/0.62
GP	1.47/1.14	5.12/6.18	2.31/4.21
Sri Lanka			
GM	1.124/0.449	0.239/0.11	3.252/7.38
GY	2.531/2.301	0.659/0.54	0.58/3.23
GP	0.138/0.037	0.22/0.19	6.032/5.46

Note: Entries gives the F- statistics when GM is calculated from M1/M2 respectively.

1' denotes that the statistic is significant at 1% level

2' denotes that the statistic is significant at 5% level

3' denotes that the statistic is significant at 10% level

n' denotes that the statistic is not significant

Abstract

The present study attempts to test the basic long-run monetarists' propositions in the case of nine developing countries by using the annual data for the period 1963 to 1993. Using simple correlation coefficients and the Vector Autoregressions method, the study refutes the monetarists claim of universal acceptance of its propositions as very few countries supported the monetarists' view that 'inflation is always and everywhere monetary phenomenon'. The study also refutes the 'neutrality of money in the long-run'.

UN TEST DES PROPOSITIONS MONÉTARISTES DANS LES ÉCONOMIES EN DÉVELOPPEMENT

Résumé

Cet étude se propose de tester les propositions fondamentales de longue période des monétaristes dans les cas de neuf pays en voie de développement sur la base des données annuelles pour les années de 1963 à 1993. En utilisant des coefficients de corrélation simple et la méthode de l'autorégression vectorielle, l'étude réfute la thèse monétariste d'une acceptation universelle de ses propositions car très peu de pays ont supporté l'idée monétariste qu'"à n'importe quel moment et n'importe où l'inflation n'est qu'un phénomène monétaire" et réfute aussi la "neutralité à la longue de la monnaie".

