Economic Stability and the Central Bank: Rule or Discretion

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I -- Introduction

Monetary policy rules with various complexities have a long history dating back to the gold standard. In recent years, due to empirical findings that central bank's independence and inflation are negatively correlated (Cukierman, 1992, chapter 20), central banks have been given greater independence from political authorities (Maxfield 1993, p. 3). At the same time, due to the successes and failures of central bankers around the world in recent years in controlling prices, we have witnessed an upsurge of interest among monetary analysts in discussing monetary rules -- simple, explicit and flexible rule-- for monetary policy. As a result of the recent studies two rules have emerged as guideline for policy makers: Taylor rule and McCallum rule.

Taylor rule requires the central bankers to adjust the nominal interest rate in response to the observed or predicated values of inflation rate and the percentage difference between actual output and its full-employment trend value (potential or capacity GDP). McCallum rule requires the monetary authorities to set the monetary base in reaction to the changes in the nominal GDP, average growth rate in the base velocity of money, and the deviation in the actual GDP and its potential level.

In section II of this chapter, literature related to various aspects of a simple, explicit, and flexible monetary rule for monetary stability will be provided. Since in the Iranian economy, interest rates are administratively set and are not, by and large, a reflection of market conditions, Taylor rule may not be a viable option. As a result, in section III only findings based on the McCallum rule simulations will be presented. In final section, summery and conclusions will be provided.

II -- Monetary rule versus discretion

Over the last few decades, one issue that has been the centerpiece of discussion and occupied a great deal of attention among the academics and central bankers pertains to the merits of monetary rules verses monetary discretion. Henry Simon (1936) and Milton Friedman (1960) spearheaded this discussion in modern times. Friedman argued that the length and variability of lags in the effects of monetary policy make it rather impossible for policy makers to consistently perform their duties in setting monetary goals for economic stabilization, growth, and development. Therefore, he suggested using a fixed monetary rule consistent with a certain level of growth in the nominal income as the most preferred *modus operandi* for the central bank. However, the socio-political-economic environment of the time put monetarism at odds with the prevailing mainstream theory that believed in the existence of a Phillips curve relationship where the central bankers could manipulate the interest rates to achieve some sort of balance between the inflation and the unemployment rates. This prompted a multi-pronged empirical and theoretical research on the subject. Tanner (1969) and Hamburger (1971) devoted much attention to the lag structure of monetary policy while Tucher (1966), Howrey (1969), Moore (1963), Svensson (1999), McCallum (1987 and 2000), Taylor 1993 and 1999) Stuart (1996) spent much

of their analysis on different theoretical and empirical issues related to rules versus discretion in monetary policy.

IIa -- Rules: A Monetarist Utopia!

The monetarists, led by Milton Friedman, Anna Schwartz, Karl Brunner, Allan Meltzer, and many others from Chicago school and the Federal Reserve Bank of St. Louis which have become bastions of monetarism, engaged in empirical studies that provided support for the quantity equation and the neutrality of money. In this process they showed that the demand for money (income velocity of money) to be very stable. As a result, they argued, any instability that arise would be due to excess money supply relative to the real output which is determined by the growth in the population, capital stock, and productivity. This delivered a hard blow at the heart of the prevailing economic theories that supported the existence of the Phillips curve trade off and economic activism at the time. That is, it implicated monetary activism in destabilization of the economy. It is the short run changes in the money supply rather than the inherent instability in the real sector of the economy, they maintained, that causes output and employment to deviate from their long-term trends. Therefore, in order to mitigate and shorten these deviations from the desired long-term trends, monetarists suggested that a monetary policy rule would be more advisable and preferable to monetary policy discretion. Accordingly, if we adopt a rule, there would be less uncertainty with regard to the future of monetary policy and people would not engage in speculations that are wasteful and inefficient.

IIb --Rules versus activism

The issue of rules versus discretion has also been discussed within the context of rules versus activism. Activists have argued that rules which, most of the time assumed to be rigid and mechanical, do not allow for unwelcome variations in the economic activities over business cycles. Therefore, they argue, as new information about the economy becomes available, policy makers must have the flexibility (discretion) to adjust their policy tools to correspond with new realities.

An argument against the necessity of discretion is the uncertainly that policy changes would have on private decision-makers. They must spend time and energy and try to read the "tea leaves" and extract the future course of action by the monetary authorities and undertake their own course of actions, knowing they could very well be wrong. This would lead to less than optimum decisions on their part.

The argument against rules hinges on the assumption that the rule must be observed which leaves not room to maneuver for the monetary authorities. At least the newer generation of rules advocates propose a reaction function that policy makers could employ which takes the new information into consideration and responds to the new environment within the prescribed rules of the game. That is, there is room for discretion within the confines of the set rules.

IIc -i- Policy changes: do they matter?

Economists have been discussing and evaluating alternative monetary and exchange rate regimes in terms of their theoretical and empirical efficacy, appropriateness, and their desirability in achieving certain targets and thence some economic goal(s) for a long time. This is a result of the policy makers desire to protect or insulate the economy from internal and external-- real and monetary -- shocks or direct it toward what is considered to be the proper destination. Choosing a tool is, therefore, sensitive and open to questions on several grounds. On one level, the instrument must necessarily be observable, measurable, controllable, and have a very tight association with the target and/or the goal. This requires solid theoretical as well as empirical foundations to guide us. On another level, we need to be sensitive to the argument that fiscal and monetary authorities do not have a significant role to play, at least in the long run, in determining or affecting the real sector of the economy. That is, people would adjust their behavior to counter policy variations and hence nullify any attempt to influence the economy in one way or another. Here, therefore, we have uncertainty on the part of the policy makers as well as private decision-makers. Private individuals must guess the policy-makers' behavior while policy-makers must guess the reaction of the private individuals to the new information and policies. We have a conundrum that require a great deal more empirical research on the behavior of the private individuals or reduce private decision-makers' uncertainly by avoiding shocks to the system through policy changes. It is important to recognize the fact that uncertainty could not be eliminated, policy-makers could only reduce it.

IIc -i- Recent developments: the monetary response (feedback) rules

The monetary feedback rules, first suggested by McCallum (also referred to as a loss function or McCallum rule), breathed a new life into the monetary rule that had been suggested by Milton Friedman. The main objection to Friedman's rule was its rigidity. It was attacked as being mechanical and risky because it could not account for variations in the velocity of money and therefore, it was judged to be unsuitable for policymaking. In contrast, these "new rules" link the controllable rates of interest such as the federal fund rate or a monetary aggregate such as the monetary base to deviations of the nominal GDP or inflation rate from their target values. So, the central bank uses whatever information they have available to ascertain the state of the economy and whether or not the inflation rate, unemployment rate, or nominal GDP are at or close to their desired trends. If they were not, then the central bank would respond by changing the interest rates or the monetary reserves.

These models assume, in general, that the central banks have or should have an explicit or implicit target inflation rate that could be achieved by following these rules. These models also assume that monetary policy does not have a long run affect on the real sector of the economy, i.e., on unemployment rate, output, etc. However, in the shorter run, there is a Phillips curve trade-off and therefore, monetary policy in not neutral in the short run.

IId -ii-Interest Targeting: Taylor rule:

$$R_t = \delta + \Delta \pi^{a} + 0.5 (\Delta \pi^{a} - \pi^{e}) + 0.5 (Y^{a} - Y^{*}) \qquad (1)$$

In this specification, the real interest rate, R_t, is explained by the real interest rate, δ ; the inflation gap (the deviation of the current inflation rate, $\Delta \pi^{a}$, from the targeted rate, π^{e}); and the output gap (the deviation of the rate of growth in the nominal output, y^{a}, from the targeted rate, y*). This rule shows that when the economy is in equilibrium, ($\pi^{a} = \pi^{e}$) and ($Y^{a} = Y^{*}$), then the rate of interest is at its long run level. On the other hand if Y^{a} and/or π^{a} are greater or less than their target values, (π^{e}, Y^{*}), interest rates must be increased or deceased, respectively to nudge the economy back toward equilibrium.

This specification has its advantages and disadvantages. It is more realistic in countries where there is a reasonably active and market oriented bond market and the central bank use some nominal interest rate as their instrument or operating target. This, however, is not relevant to a country like Iran where fiat rather than the market set interest rates. It is also shown (Taylor, 1993) that western central banks do follow some sort of interest rate targeting in their monetary policies. The shortcoming of this rule is the need for contemporaneous information about income at time t to set interest rates for time t. Also, a rule must be changed rather infrequently and that is not the case for interest rate targeting.

IId -iii-Monetary Base Targeting: McCallum Rule:

McCallum's Rules

$$\Delta B_t = \Delta Y_t^{*} - \Delta V_t^{a} - \lambda (\Delta Y_t^{*} - \Delta Y_{t-1}^{*}) \qquad (2)$$

McCallum's Specification relates change in the log of monetary base (growth rate of the monetary base, ΔB) to the change in the log of nominal GDP, ΔY^{*}, the average growth rate of the velocity of the monetary base, ΔV^{a} , and finally, a feedback mechanism that relays the deviation of the nominal GDP from its desired level in the previous period, $\Delta Y_t^{*} - \Delta Y_{t-1}^{*}$. Average growth rate of the velocity over a three year period is defined as $V_t = (Y_t - B_t)$. This term is expected to capture changes in the demand for monetary base due to permanent technological or structural shifts (such as the 1979 revolution or the Islamicization of banking) rather than cyclical variations. Value of λ determines the speed of adjustment in the monetary base (the instrument). High values of λ imply complete adjustment of the instrument to deviations of the target variable from its long run path and low values imply partial or slower response to the deviations. Therefore, the value of λ depends on the tolerance of the policy makers to deviations of the target from its path, i.e., how long could they allow the value of the target variable to go and stay above or below its preset levels. High tolerance of these deviations means low values of λ and low tolerance means high values for λ . The level of λ and policy makers' tolerance of deviations also determines the frequency of adjustment in the instrument. High tolerance of deviations, therefore, means low λ and less frequent adjustment in the instrument. While low tolerance implies high values of λ and hence more frequent adjustment in the instrument.

The choice of the monetary base as the instrument is analogous to the choice of price versus quantity. You could not control both the price and quantity without creating shortages or

surpluses in the market. Here, we also need to be cognizant of another important factor in choosing the monetary instrument. The choice of monetary base rather than other monetary aggregates such as the money supply M_1 or M_2 is based, in principle, on the controllability of the instrument, monetary base, Meltzer (1969). The central bank could collect information on the monetary base very frequently, say daily, if not hourly. An advantage that is not feasible for other monetary aggregates such as the money supply. Also, monetary base has a very high correlation with the nominal GDP. Therefore since the central bank has a greater short term and long term control over the monetary base and it has high correlation with the target variable, nominal income, it is a better candidate as the monetary instrument.

It is important to note that, based on either theoretical or empirical available tools, we have no way of convincingly dividing the growth in the nominal GDP into real growth and inflation. However, since the real output grows according to the growth in factors of production, a steady growth in the nominal output, say 3% or 5% a year or, whatever is historically achievable for the economy in real terms, would not leave much room for inflation. Accordingly, a steady 3% or 5% growth in the nominal GDP would minimize both inflationary potentials as well as business cycle fluctuations.

III-- Empirical results of McCallum rule

IIIa-- The data: All of the data were downloaded from the International Monetary Funds' financial statistics CDs. Missing values were obtained from the Iran Statistical Yearbooks. As is the case for all aggregate data, most Iranian time series are subject to stationarity problem. Before the simulation of the model, each of the variables of the model was tested for stationarity. It seems, according to the Dickey-Fuller and Perron's unit root tests, for the most parts, rates of changes in the log of variables are stationary at least by one of the tests. Below are the results:

Augmented Dickey-Fuller and Phillips Perron Unit Root Tests

Variable name	**ADF statistic**	**PP statistic**
DLCPI =change in the log of Consumer Price Index	-4.44a	-3.7b
DLEXPP = change in the log of exports revenues	-6.47a	-8.46a
DLIMPP = change in the log of imports price index	-2.63c	-2.25*
DLMRES = change in the log of monetary reserves	-2.95b	-4.62a
DLY = change in log of Gross Domestic Product (GDP	-3.15*	-3.63b
DLYSTAR = change in the log of trend GDP	-14.2a	-13.13a
GDP GAP (DLYSTAR - DLY)	-2.74a	-4.22a

DLVEL =change in the log of velocity (LY/LMRES)	-6.7a	-5.4a

a=1%, b=5%, c=10% level of significance. *=not significant

IIIb--The estimated system: The specification of the model is rather eclectic. Inflation rate (DLCPI) is a function of rate of changes in the import price level (DLIMP), growth rates of real income (DLY), and the rates of changes in the monetary base (DLMRES). Output of goods and services, rate of growth in GDP, depends on the inflation rate, lagged government expenditures, growth rate of total exports, and rate of growth in the monetary reserves (base).

We used the Eviews software to estimate the following model. In order to eliminate the simultaneity associated with macro-models, we used the two stage least square estimation method. We used log of population and three dummy variables for the 1979 revolution, introduction of Islamic banking, and the 1973 oil price increase.

Import prices have a significant positive impact of the inflation rate. The higher import prices lead to higher inflation rate. Higher output means less shortage and lower pressure on prices. Monetary reserves, of course, have a positive impact on the inflation rate, as one would expect.

In order to see whether the 1979 Iranian revolution, oil price levels, and the introduction of Islamic banking have had some impact on the inflation rates, we included some dummy variables in the equations. They, not only were not significant, they made other variables insignificant.

Estimated Equations

DLCPI = 0.559 DLIMP - 0.091 DLY 0.263 DLMRES + 0.059 DUMWAR

t-stat (3.8) (-.569) (2.2) (1.51)

Adjusted R-Squared = .83

DW =2.21

DLY = -.141 + 0.638 DLCPI + 0.555 DLGE(-1) + 0.084 DLEXPO + 0.521 DLMRES

t-stat (-1.91) (2.59) (2.97) (2.11) (1.55)

Adjusted R-Squared = .61

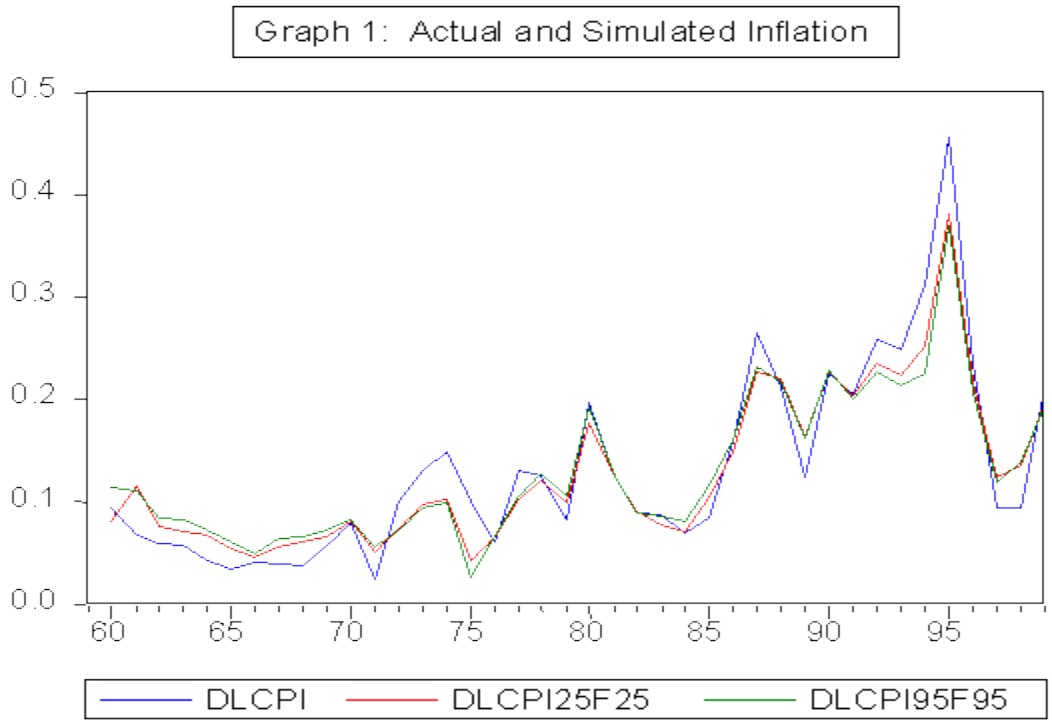
DW =2.023

Instruments: Log (population), Dumoil, Dumib, Dumrev

IIIc-- Simulation results:

The estimated system was run for two different values of λ (.25, 0.95) in the McCallum's response Rule [$\Delta B_t = \Delta Y_t^* - \Delta V_t^a - \lambda (\Delta Y_t^* - \Delta Y_{t-1}^*)$]. That is, we assumed that the central bank would respond to changes in the real GDP, velocity of money, and the GDP gap with low sped (λ =0.25) or high speed (λ =0.95). It is more reasonable to assume high levels of λ to be appropriate in this case because of the annual data. In studies that use quarterly data, a lower speed of adjustment would be more warranted to prevent undesirable severe shocks to the system. McCallum found a value closer to 0.25 to be appropriate for the US economy. The following graphs show the simulation results.

Graph 1 shows the actual and simulated result of inflation rate. As one would have expected, the actual inflation rates are different in a predictable way from the simulation results. Since our purpose was to achieve a same level of nominal income at the end of the simulation range, simulated inflation rates are higher than the actual rates when actual rates were falling and lower than actual inflation rates when they were rising. That is, following a response rule such as the McCallum's would stabilize the inflation rates and prevents wide fluctuations similar to the historical data. A desirable outcome for monetary policy as well as for economic agents who need to make decisions based on the inflation forecast.



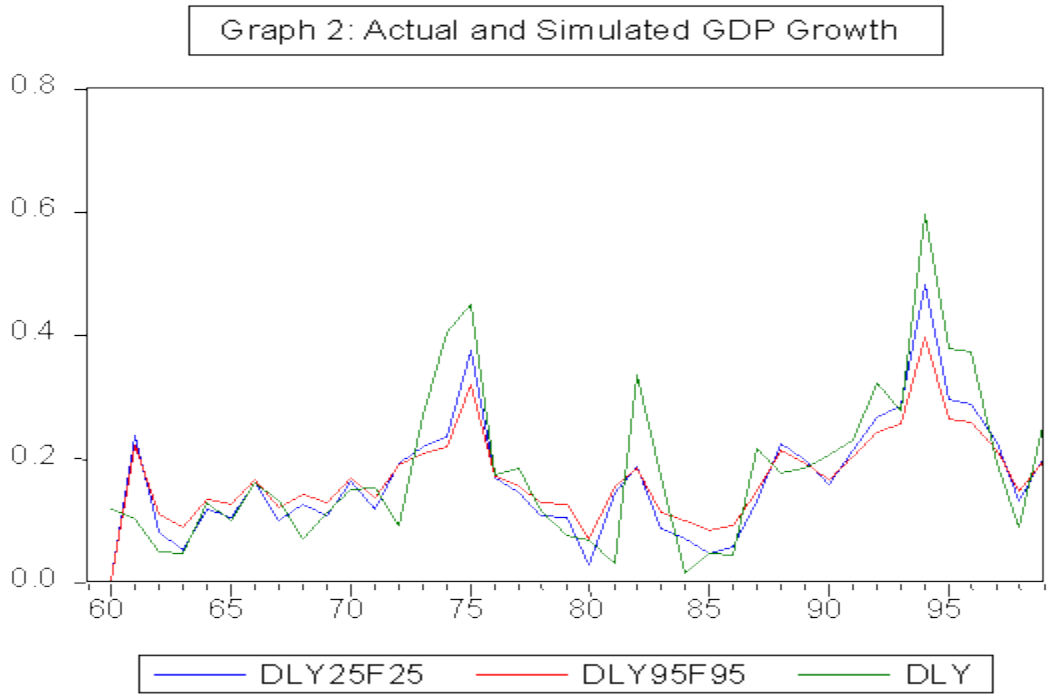
The simulation results for the GDP growth, shown in the graph 2, are also promising. They show a lesser fluctuation than the actual growth rates. Again the more aggressive response by the central bank (i.e., higher λ) the smaller is the fluctuations in the GDP growth rate.

Finally, comparing the historical changes in the monetary base with a policy rule would highlight the benefits of a response rule. One could see wider fluctuations in the monetary base

compare to what was warranted according to the response function. They also show that in most of the cases, monetary base moved the opposite of what should have been done according to the response function. That is, in most years, they reduced the money supply when they should have increased it and increased the money supply when they should have decreased it. At times, its seems that they made a wrong monetary policy and the next year, found their mistake and over compensated for the mistake by overshooting or undershooting.

IV-- Summery and conclusions

The history of monetary policy in Iran, judging by their performance in keeping the value of the currency, maintaining a steady growth in the Gross Domestic Product, faltering investment, show that monetary policy has not been a portrait of consistent successes, to say the least. It has been employed in an on-again-off-again manner rather than as a tool



for proactive decision making. If this undesirable tendency (i.e., use of monetary policy to direct or redirect short-run ups and downs) were to be overcome, this study shows that we need to overhaul the monetary policy making process. That is, we need to undertake three initiatives.

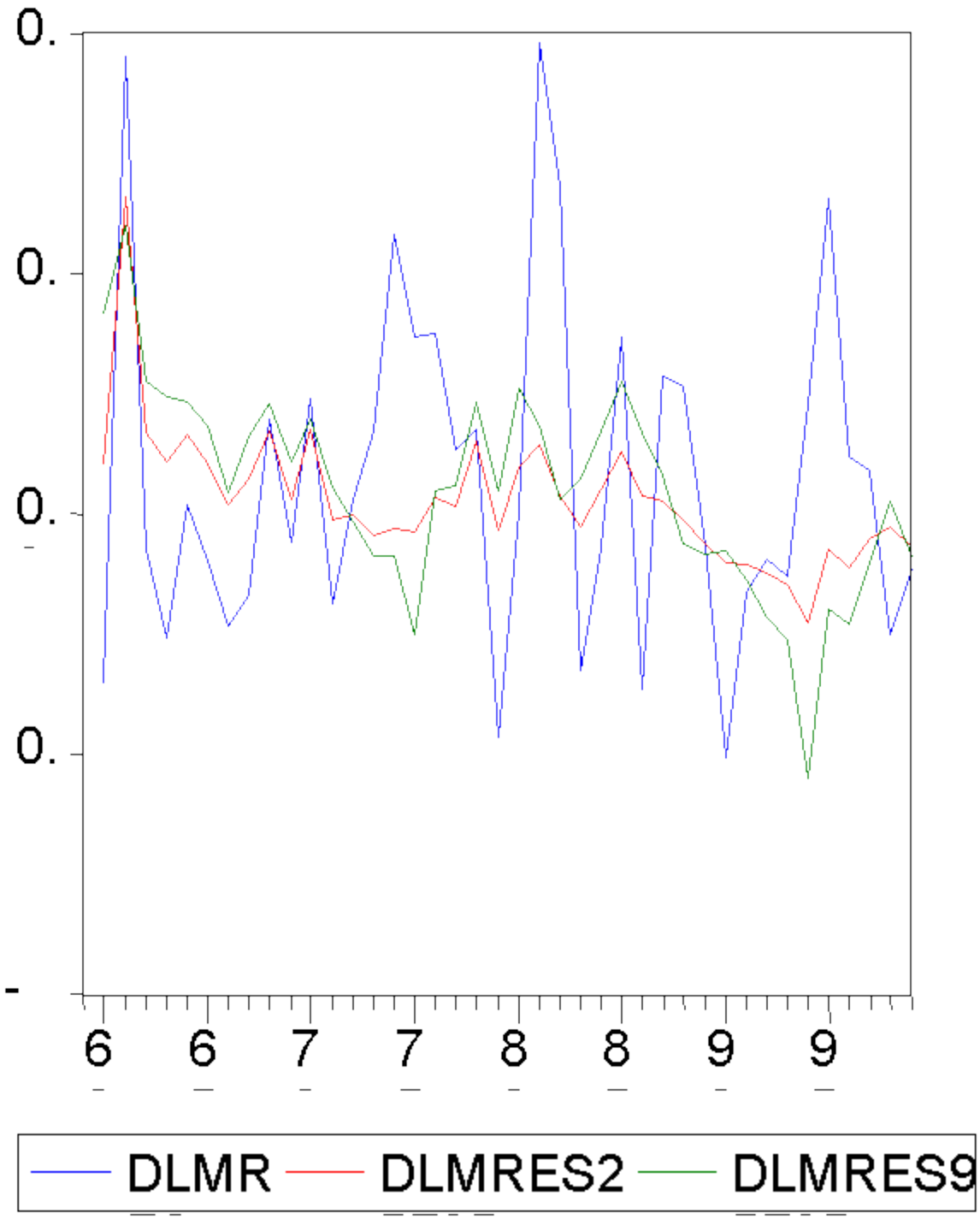
First and foremost, the central bank must be given independence from all centers of the government. It must be given the authority and immunity to make monetary policy. An authority and independence similar to those available to the central bankers in the United States, New Zealand, and Germany. This would take the central bank out of politics and therefore eliminates vacillation in its monetary policy decisions.

Second, given the limited usefulness of monetary policy in directing and influencing the real variables of the economy such as real output of goods and services and employment in the long

run, the central bank must be directed to strive in achieving the *only one objective that it does have much control over; price stability*. This would allow the central bank to use its resources and power in achieving the only thing it can achieve in the best of circumstances.

Third, the central bank must adhere to a set of explicitly and publicly announced quantitative targets for inflation (or nominal income) and also a set of rules designed to achieve those quantitative targets. These would go far in cooling the speculative minds of the bazaaris. They would know that they no longer could profit from hoarding and speculation about the future higher prices.

Graph 3:Actual and Policy Rule



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