

Challenges for Monetary Policy*

C Rangarajan**

It is a great honour and privilege to be invited to deliver the Kale Memorial Lecture. Rao Bahadur R.R. Kale was a well-known leader who played a notable role not only in the political but also in the social and economic life of Maharashtra. His contributions to the development of education are well known. His generous contribution helped to establish the Gokhale Institute of Politics & Economics at Pune, which has emerged as a leading research institution in the country in the field of economics, politics and sociology. Professor D. R. Gadgil and Professor V. M. Dandekar, to name only a few, who were associated with this Institute, have made landmark contributions to the development of economic policy in post-Independent India. Kale Memorial Lecture is a prestigious lecture series, which includes contributions by many distinguished and outstanding personalities of our country. I, therefore, feel greatly honoured to deliver this year's lecture.

I want to speak to you this morning on the challenges for monetary policy in general and in particular for India. These challenges have been changing over time, even though some basic issues have remained to be perennial concern. As the institutional environment (both domestic and global) changes, the tasks of monetary policy also undergo a change. The monetary and financial system is far more complex today than it has been in the past. Financial intermediation has reached a high level of sophistication. The menu of financial products available has expanded enormously. Derivative products, which were unknown till a few decades ago, have become common. All these changes have an important role to play in relation to the transmission mechanism. The impact of monetary policy action can be felt through a variety of channels some of which though recognized in the past have become more important. The speed with which funds can move across borders has raised issues regarding coordination of monetary policies among countries. Prices and interest rates are no longer determined by domestic factors. While traditional issues such as the objectives of monetary policy, the possible trade-off among them and appropriate intermediate targets remain relevant, they need to be related to the changing institutional environment at home and abroad.

At a theoretical level, in the classical tradition strict neutrality of money ruled out monetary influence on real output. The formal enunciation of money and price relationship was made in the form of the famous Quantity Theory of Money under which money influenced only price. The neutrality proposition underwent a change in the Keynesian analysis. The neutrality view was abandoned and money was seen to have an influence on output through a variety of channels. The Phillip's Curve depicting the inverse relationship between unemployment and wage inflation provided the empirical basis for the non-neutrality proposition. While several economists (Friedman, 1968 and

* Text of Rao Bahadur R. R. Kale Memorial Lecture delivered at the Gokhale Institute of Politics and Economics, Pune on 18th January 2004.

** Chairman, Twelfth Finance Commission, Jawahar Vyapar Bhawan, 1 Tolstoy Marg, New Delhi 110 001.

I am grateful to Dr. D.K. Srivastava for helpful discussions on deriving the relationship between real rate of interest and real rate of growth. I am thankful to Dr. Amaresh Samantaraya for his help in the preparation of this lecture.

1975; Phelps, 1967) have challenged the basic micro economic under-pinning of the wage and price mechanism that leads to the possibility of a trade-off between price stability and growth, the theoretical debate is far from settled. However, the general consensus is that while, in the short run, money can have an impact on output, in the long run it may not. In other words, in the long run repeated monetary shocks to bring about a sustained improvement in growth may result in accelerating levels of inflation.

There has also been continuing debate on the transmission mechanism both at the theoretical and empirical levels. This discussion has implications for appropriate intermediate targets. A crucial behavioral relationship in this context is the demand function for money. There have been many theoretical refinements of the original demand function for money as outlined by Keynes. A key concern has been in relation to the stability of the demand function for money. Against the background of a growing number of financial assets, which are becoming close substitutes to money, the identification of a suitable monetary aggregate has become an issue.

Historical Evolution

Monetary policy has had its ups and downs in the post-Second World War period. In industrially advanced countries, after decades of eclipse, monetary policy re-emerged as a potent instrument of economic policy, in the fight against inflation in the 1980s. Issues relating to the conduct of monetary policy came to the forefront of policy debates at that time. The relative importance of growth and price stability as the objective of monetary policy as well as the appropriate intermediate target of monetary policy became the focus of attention. Over the years, a consensus has emerged among the industrially advanced countries that the dominant objective of monetary policy should be price stability. Differences, however, exist among central banks even in these countries as regards the appropriate intermediate target. While some central banks consider monetary aggregates and, therefore, monetary targeting as operationally meaningful, some others focus on the interest rate. There is also the more recent practice of ignoring intermediate targets and focusing on the final goal such as inflation targeting.

A similar trend regarding monetary policy is discernible in developing economies as well. Much of the early literature on development economics focused on real factors such as savings, investment and technology as major sources of growth. Very little attention was paid to the financial system as a contributory factor to economic growth even though attention was paid to develop financial institutions, which would provide short term and long term credit. In fact, many writers felt that inflation was endemic in the process of economic growth and it was accordingly treated more as a consequence of structural imbalance rather than as a monetary phenomenon. However, with the accumulated evidence, it became clear that any process of economic growth in which monetary expansion was disregarded led to inflationary pressures with a consequent impact on economic growth. Accordingly, the importance of price stability and, therefore, the need to use monetary policy for that purpose also assumed importance in developing economies. Nonetheless, the debate on the extent to which price stability should be deemed to be the overriding objective of monetary policy in such economies continues.

The Reserve Bank of India was set up in 1935. Like all central banks in developing countries, the Reserve Bank has been playing a developmental and a regulatory role. In its developmental role, the Reserve Bank focused attention on deepening and widening the financial system. It played a major part in building up appropriate financial institutions to promote savings and investment. In the realm of agricultural credit, term finance to

industries and credit to export, the apex institutions that are now operating were essentially spun off from the Reserve Bank. Strengthening and establishing new institutions to meet the country's requirements is a continuing process. The promotional role had taken the Reserve Bank into the area of credit allocation as well. Pre-emption of credit for certain sectors and that too at concessional rates of interest became part of the overall policy. Commercial banks over time have been required to provide a certain percentage of their total credit to certain sectors which were regarded as 'priority sectors'.

An active role by the Reserve Bank of India in terms of regulating the growth in money and credit became evident only after 1950s (Rangarajan, 1988). During the 1950s the average annual increase in the wholesale price was only 1.8 per cent. However, during the 1960s, the average annual increase was 6.2 per cent and in the 1970s, it was around 10.3 per cent. In the early years of planning, there was considerable discussion on the role of deficit financing in fostering economic growth. The First Plan said: "Judicious credit creation somewhat in anticipation of the increase in production and availability of genuine savings has also a part to play". Thus, deficit financing, which in the Indian context meant Reserve Bank credit to the Government, was assigned a place in the financing of the plan, though its quantum was to be limited to the extent it was non-inflationary. Monetary growth, particularly in the 1950s, was extremely moderate. However, as each successive plan came under a resource crunch, there was an increasing dependence on market borrowing and deficit financing. These became pronounced in the 1970s and thereafter. The single most important factor influencing the conduct of monetary policy after 1970 had been the phenomenal increase in reserve money contributed primarily by the Reserve Bank credit to the Government.

To summarise, the system as it existed at the end of 1970s was characterised by the following features. The Reserve Bank of India as the central monetary authority prescribed all the interest rates on deposits and lending. The commercial banks were required to allocate a certain percentage of credit to what were designated as 'priority sector'. Credit to parties above a stipulated amount required prior authorisation from the central bank. After the nationalisation of major commercial banks in 1969, nearly 85 per cent of the total bank assets came under public sector. Apart from small private banks, foreign banks were allowed to operate with limited branches.

The increase in the scale of borrowing by the Government resulted in (a) the steady rise in Statutory Liquidity Ratio (SLR) requiring banks to invest higher and higher proportion of their deposits in Government securities which carried less than 'market rates' and (b) the Reserve Bank of India becoming a residual subscriber to securities and Treasury Bills leading to monetisation of the deficit. The Reserve Bank had, therefore, to address itself to the difficult task of neutralising to the extent possible the expansionary impact of deficits. The increasing liquidity of the banking sector resulting from rising levels of reserve money had to be continually mopped up. The instrument of open market operations was not available for this task since the interest rates on Government securities were well below 'market rates'. The task of absorbing excess liquidity in the system had to be undertaken mainly through increasing the Cash Reserve Ratio (CRR). In fact, in mid-1991, the CRR was 25 per cent on incremental deposits. In addition, the SLR was 38.5 per cent. Thus, nearly 63.5 per cent of incremental deposits was pre-empted in one form or another.

In 1983, the Reserve Bank of India appointed a Committee under the Chairmanship of the distinguished economist Prof. Sukhamoy Chakravarty to review the working of the Indian Monetary System. I was a member of the Committee. The Committee's Report

(Reserve Bank of India, 1985) covered a wide range. One of its major recommendations was to regulate money supply consistent with the expected growth rate in real income and a tolerable level of inflation. Recognising the fact that Government borrowing from the Reserve Bank had been a major factor contributing to the increase in reserve money and therefore, money supply, the Committee wanted an agreement between the Central Government and the Reserve Bank on the level of monetary expansion and the extent of monetisation of the fiscal deficit. Without such a coordination, the Committee felt that Reserve Bank's efforts to contain monetary expansion within the limits set by expected increase in output could become impossible. While this recommendation of the Committee was accepted in principle, it could take a concrete shape only in the Nineties.

In the wake of the economic crisis in 1991 triggered by a difficult balance of payments situation, the Government introduced far-reaching changes in India's economic policy. Monetary policy was used effectively to overcome the balance of payments crisis and promptly restore stability. An extremely tight monetary policy was put in place to reap the full benefits of the devaluation of the rupee that was announced. However, it did not stop with that. Financial sector reforms became an integral part of the new reform programme. The reform of the banking sector and capital market was intended to help and accelerate the growth of the real sector. Banking sector reforms covered a wide gamut. The most important of the reforms was the prescription of prudential norms including the capital-adequacy ratio. In addition, certain key changes were made with respect to monetary policy environment which gave commercial banks greater autonomy in relation to the management of their liabilities and assets. First and foremost, the administered structure of interest rates was dismantled step by step. Banks in India today enjoy full freedom to prescribe the deposit rates and interest rates on loans except in the case of very small loans and export credit. Second, the Government began borrowing at market rates of interest. The auction system was introduced both in relation to Treasury Bills and dated securities. Third, with the economic reforms emphasising a reduction in fiscal deficit, pre-emptions in the form of CRR and SLR were steadily brought down. Fourth, while the allocation of credit for the priority sector credit continued, the extent of cross subsidisation in terms of interest rates was considerably brought down because of the reform of the interest rate structure.

Monetary policy in the 1990s in India had to deal with several issues, some of which were traditional whereas others were totally new and attributable to the increasingly open economy in which the country had to operate. In the first few years, monetary policy had to contend with the consequences of devaluation and the need to quickly restore price stability to obtain the full benefits of devaluation. While the fiscal deficit was being brought down, the question of monetisation of the deficit continued to remain an issue and a solution had to be found. This eventually led to a new agreement between Government and RBI on financing deficit. The system of ad-hoc Treasury Bills, under which the Government of India could replenish its cash balances by issuing Treasury Bills in favour of the Reserve Bank and which had the effect of monetising deficit, was phased out. It was replaced by a system of Ways and Means Advances which had a fixed ceiling. The Reserve Bank of India continued to subscribe to the dated securities at its discretion. During 1993 and 1994, for the first time monetary policy had to deal with the monetary impact of capital inflows with the foreign exchange reserves increasing sharply from \$ 9.2 billion in March 1992 to \$ 25.1 billion in March 1995. In fact we face in a similar situation today. The problem is of a larger magnitude. Our capability in those days to stabilize was limited as the available government securities at market or near market rates

were limited. The RBI also faces a similar situation today even though all government securities at the disposal of the RBI are at market related interest rates. The issue is one of adequacy. In 1995-96, the change in perception with reference to the exchange rate after a prolonged period of nominal exchange rate stability vis-a-vis the US dollar brought into play the use of monetary policy to stabilize the rupee - an entirely new experience for the central bank. Similar situations arose later on also at the time of the East Asian crisis.

Monetary Policy has begun to operate within a changed institutional framework brought about by the financial sector reforms. It is this change in the institutional framework that has given a new dimension to monetary policy. New transmission channels have opened up. Indirect monetary controls have gradually assumed importance. With the progressive dismantling of the administered interest rate structure and the evolution of a regime of market determined interest rates on Government securities, open market operations including 'repo' and 'reverse repo' operations emerged for the first time as an instrument of monetary control. The Liquidity Adjustment Facility, introduced first in 1999 and refined later, is emerging as a principal operative instrument to manage market liquidity on a daily basis. The Bank Rate acquires a new role in the changed context. So too the repo and reverse repo rates. The Nineties have paved the way for the emergence of monetary policy as an independent instrument of economic policy (Rangarajan, 2002).

Issue of Concern

Monetary Policy acts through influencing the cost and availability of credit and money. As an instrument of economic policy, it has certain advantages. "Inside Lag" which refers to the lag between the time when action is needed and when action is actually taken is shorter in the case of monetary policy than fiscal policy. Monetary policy has thus the ability to respond quickly to changes in the short term.

Let me now turn to some of the issues relating to monetary policy which have come to be debated extensively in the last few decades. These issues are not specific to India or developing economies. They have been debated in the context of the developed countries also. Nevertheless, these issues which I want to highlight have a special significance for developing countries like India.

Objective

The first question that needs to be addressed relates to the objective or objectives of monetary policy. A recurring question is whether monetary policy should be concerned with all the goals of economic policy. The issue of 'objective' has become important because of the need to provide a clear guidance to monetary policy makers. Indeed, this aspect has assumed added significance in the context of the increasing stress on the autonomy of Central Banks. Autonomy goes with accountability and accountability in turn requires a clear enunciation of the goals (Tarapore, 2000).

The various enactments in setting up the central banks normally specify the goals of central banks. The Federal Reserve Act in the United States requires the central bank to pursue both "maximum employment" and "stable prices". In fact the Act specifies a third goal - "moderate long term interest rates". The Reserve Bank of India Act requires the Reserve Bank to conduct its operations "with a view to securing monetary stability in India and generally to operate the currency and credit system of the country to its advantage." Most Central Bank legislations are not helpful in clearly charting out the path that a central bank should pursue as multiplicity of objectives mentioned in the legislations

tends to obfuscate the issue. In the last few decades, most central banks in the industrially advanced countries have accepted price stability as the most important objective of monetary policy. According to George, Governor of Bank of England (1996), "It is true that most central banks at least would traditionally have regarded controlling inflation as a core responsibility. In some cases – most famously in the case of Bundesbank – the duty of preserving the value of the currency has long been written into the central bank's statutes. But what is remarkable today is the extent of the international consensus on effective price stability – in the sense of eliminating inflation as a factor in economic decisions – as the immediate aim of monetary policy; and this is increasingly reflected in more or less explicit targets for low rates of inflation against which monetary policy performance can be measured." This is clearly built into the mandate of the European Central Bank (Duisenberg, 2003). The inflation picture has changed dramatically over the last 20 years in the industrial countries. Gone are the days of high and variable inflation rates. Since the early 1990s, these countries have entered a period of relatively low or stable inflation. However, currently the high level of unemployment prevailing in many of these countries has raised certain questions as to how to balance the objectives of growth and stability. It may also be noted that central banks think of price stability more in terms of stabilizing inflation, that is the rate of increase, rather than the price index at a certain level.

In talking of the objectives of monetary policy in India, I had said on an earlier occasion "In a broad sense the objectives of monetary policy can be no different from the overall objectives of economic policy. The broad objectives of monetary policy in India have been: (1) to maintain a reasonable degree of price stability and (2) to help accelerate the rate of economic growth. The emphasis as between the two objectives has changed from year to year, depending upon the conditions prevailing in that year and in the previous year" (Rangarajan, 1997). In fact what I had said is a version of the Taylor's rule (Taylor, 1993) in its most discretionary form.

The choice of a dominant objective arises essentially because of the multiplicity of objectives and the inherent conflict among such objectives. Faced with multiple objectives that are equally relevant and desirable, there is always the problem of assigning to each instrument the most appropriate objective. This "assignment rule" favours monetary policy as the most appropriate instrument to achieve the objective of price stability (Chakravarty, 1986).

The crucial issue that is being debated in India as elsewhere is whether the pursuit of the objective of price stability by monetary authorities undermines the ability of the economy to attain and sustain high growth. A considerable part of the relevant research effort has been devoted to the trade-off between economic growth and price stability. Empirical evidence on the relationship between growth and inflation in a cross country framework is somewhat inconclusive because such studies include countries with an inflation rate as low as one to two per cent to those with inflation rates going beyond 200 to 300 per cent. These studies (Barro, 1995; Sarel, 1996; Khan and Senhadji, 2000), however, clearly establish that growth rates become increasingly negative at higher rates of inflation.

The case of price stability as the objective of monetary policy rests on the assumption that volatility in prices creates uncertainty in decision-making. Rising prices adversely affect savings while they make speculative investments more attractive. The most important contribution of the financial system to an economy is its ability to augment savings and allocate resources more efficiently. A regime of rising prices vitiates the

atmosphere for promotion of savings and allocation of investment. Apart from all these, there is a social dimension particularly in developing countries. Inflation adversely affects those who have no hedges against it and that includes all the poorer sections of the community. The fiscal consolidation also becomes easier in an environment of reasonable degree of price stability. In a period of rising prices, the gap between revenues and expenditures widens (Rangarajan and Arif, 1990). Expenditures tend to grow at a faster rate than revenues because many components of expenditures such as employees' compensation are closely linked to variations in prices.

The question that recurs very often in the minds of the policy makers is whether in the short run, there is a trade-off between inflation and growth which can be exploited. In the industrial countries, a solution is sought through the adoption of Taylor's rule which prescribes that the signal interest rate be fixed taking into account the deviations of inflation rate from the target and actual output from its potential. The Taylor's rule is written as:

$$i_t = i_t^* + \lambda_1 (Y_t - Y^*) + \lambda_2 (\pi_t - \pi^*)$$

where,

i_t = the signal interest rate

i_t^* = the equilibrium nominal interest rate

Y_t = logarithm of level of actual output

Y^* = logarithm of level of trend output

π_t = actual inflation rate

π^* = target inflation rate, and

λ_1 and λ_2 are the respective coefficients.

The rule requires the federal funds rate to be raised, if inflation increases above the target or if real GDP rises above trend GDP. In the original version, the weights of deviation from target inflation and potential output were assumed to be the same at 0.5. However, it was subsequently felt that the coefficient of inflation deviation term must be higher than one. Taylor himself did not want the rule to be applied in a mechanical way. While the rule is intuitively appealing, there are serious problems in determining the value of the coefficients. There is also a lot of judgment involved in determining the potential output and target inflation rate. However, the rule offers a convenient way of determining when the Central Bank should act.

Another way of reconciling the conflicting objectives of price stability and economic growth in the short run is through estimating the "threshold level of inflation". It is this inflation threshold which provides some guidance to the policy makers. Below and around this threshold level of inflation, there is greater flexibility for the policy makers to take into account other considerations. Interestingly, the Chakravarty Committee regarded the acceptable rise in prices as 4 per cent. This, according to the Committee, will reflect changes in relative prices necessary to attract resources to growth sectors. I have myself indicated that in the Indian context, inflation rate around 6 per cent may be acceptable (Rangarajan, 1998). Some studies have estimated the level of threshold inflation in India to be in the range of 5 to 7 per cent (Vasudevan *et al.*, 1998; Samantaraya and Prasad, 2001 and Reserve Bank of India, 2002). There is some amount of judgment involved in this, as econometric models are not in a position to capture all the costs of inflation. This approach provides some guidance as to when policy has to become tight or when it has to

be loosened. It is also necessary for the policy makers to note that this order of inflation is higher than what the industrial countries are aiming at. This will have some implications for the exchange rate of the currency. While the open economy helps to overcome domestic supply shocks, it also imposes the burden to keep the inflation rate in alignment with other countries. Price stability thus remains a major objective of monetary policy.

Transmission Mechanism

An understanding of the transmission mechanism is critical to the conduct of monetary policy. The transmission mechanism explains how the actions taken by the monetary authorities influence the key macro economic variables in the economy. The literature on monetary economics talks of four transmission channels. They are (i) quantum channel, especially through money supply and credit; (ii) interest rate channel; (iii) the exchange rate channel and (iv) the asset price channel (Mishkin, 1996; Kamin *et al.*, 1998). The quantum channel focuses on changes in money supply and credit brought about by monetary authorities while tracing the impact on output and price. The difference between the classical approach and the Keynesian approach on how money supply works through the system is well-known. The interest rate channel traces the impact of changes in interest rate initiated by monetary authorities on output and price through changes in aggregate demand. The exchange rate channel emphasizes the impact on the outflow or inflow of funds from abroad resulting from monetary actions. The asset price channel traces the impact of interest rate changes on aggregate demand through the changes in the prices of assets principally those of bonds, equities and real estate.

While several distinct channels have been identified, in the real world all the channels work simultaneously. Which of the channels is more effective in a particular country depends on the institutional environment. With the development of financial markets and closer integration of such markets, domestically and globally, the balance sheet effects, as well as, the exchange rate effects assume as much importance as the direct interest rate effect. The transmission channel has important implications for monetary authorities in terms of determining what the appropriate intermediate target should be for the central bank.

Intermediate Target

The next issue relates to the intermediate target. In India since the mid-Eighties the target chosen has been broad money. The Chakaravarty Committee recommended a system of flexible monetary targeting. It is true that central banks in several countries in the industrial world have abandoned intermediate targets and have focussed on the final target such as inflation control. While this has the advantage of specifying the ultimate objective in clear and precise terms, it must be admitted that there is not enough clarity regarding the channel through which this will be achieved. One of the reasons for the abandonment of intermediate targets in these countries has been the breakdown of the relationship between monetary aggregates and inflation rate. The demand function for money has been found to be unstable. However, in India, studies (Nag and Upadhyay, 1993; Joshi and Sagar, 1995 and Arif, 1996) show that the money demand function is a stable function of select variables and it can be used to reasonably predict inflation. Several statistical functions of the demand for money estimated by using equilibrium and disequilibrium analysis provide strong evidence on the long run stability of the money demand function. Perhaps some of the factors that have contributed to the instability of the demand function for money in the industrially advanced countries such as financial

innovations and large movements of funds across the border are yet to have the same impact in India. In the demand function for money in India, income emerges as the most dominant variable. This is partly due to the reason that interest rate, which is the other relevant variable, had been until recently an administered rate, with changes occurring in discreet steps. Such a function enables the authorities to estimate the appropriate growth in money supply, given the expected increase in real output and the acceptable level in price increase. The inverse money demand function, in which price is related to money supply and income shows that the average of price changes over a period of three years are predicted with reasonable accuracy by such an equation¹. Even, a simple correlation between money supply growth and inflation rate is high². However, without bringing in output, the relationship is not complete. As we move into an era of openness, the impact of money supply on price can diminish, as supply bottlenecks are eased. So far, money supply has proved to be an appropriate target. Such a target is relatively well understood by the public and signals unambiguously the stance of monetary policy. However, with the freeing of the interest rate structure, interest rate can also become an appropriate intermediate variable. It is already happening. This has also been facilitated by the reduced direct monetisation of fiscal deficit. It appears from our experience that while money supply may be an appropriate intermediate target while inflation rate remains high, interest rate may be more appropriate when inflation remains low and fluctuates within a narrow range. It must, however, be noted that at the equilibrium both quantity and price are determined. Changes in interest rates cannot be ordained. The appropriate quantitative changes in money will have to be brought about even though the signal for change may be given by price variables like the interest rate.

Level of Interest Rate

Another question of importance that has arisen relates to the appropriate level of interest rate. The nominal interest rate comprises of three elements: (i) the real rate of interest, (ii) inflation expectations and (iii) a discount factor for uncertainties. The effectiveness of monetary policy to bring down the nominal interest rate will depend on the impact that this policy will have on inflation expectations and on the perception of uncertainty in the economy. A monetary policy that is geared to maintain reasonable price stability, if it is successful, can help to bring down the interest rate in sympathy with the downward drift in inflation. Inflationary expectations can be broken, if the monetary authority enjoys high credibility. However, this leaves the real rate of interest to be determined.

The real interest rate is not an observed variable. The real interest rate is influenced by several long-term factors such as saving and investment balance in the economy and the rate of return on capital. Theory tells us that in a closed economy, this rate should equal the real rate of growth³. This is the well-known Phelps' golden rule. An economy in which this equality is not met is treated as 'dynamically inefficient'. However, allowance has to be made for the impact of capital flows and in an open economy, this equality does not strictly hold. Only in a completely open system with no frictions, will there be a convergence of growth rates and real interest rates among countries. This will also take a long time to reach. In the meanwhile, in fast growing economies the real rate of interest will have to be higher. In South Korea during the years of very rapid economic growth the real rate of interest was around six to seven per cent in several years. The real rate of interest is thus related to the rate of growth of the economy. In the famous Taylor's rule, the constant term refers to the 'equilibrium' real rate, which is assumed to be equal to the steady state growth rate. For US, he assumed this rate to be 2.2 per cent. The real rate of

interest will have to be substantially higher in developing economies which seek to maintain a high savings rate and which aim at growing at more than six to seven per cent per annum. This is typically the situation in India.

A situation of high real rate of interest accompanied by high growth rate must be distinguished from other situations when real rates of lending may remain high because of market imperfections. In this context, it is worth noting that the high level of nominal lending rates in developing economies may also be due to high intermediation costs. Improved efficiency can reduce the spread between the deposit rate and lending rate and bring the lending rate in closer alignment with fundamental factors. While the interest rate may be adjusted upwards or downwards depending on the nature and extent of output gap and inflation gap, the rate should also be maintained at an appropriate level consistent with the real rate of growth of the economy. Most importantly, the real interest rate should be kept at a level necessary to generate savings and investment that are needed to support rapid economic growth.

Exchange Rate Management

The role of monetary authority in exchange rate management in India came into focus in the 1990s. Since 1975, the exchange rate of the rupee was determined with reference to the daily exchange rate movements of a selected number of currencies of the countries which were India's major trading partners. The Reserve Bank of India was required to maintain the exchange rate within a band on either side of a base 'basket' value. This allowed the achievement of a medium-term Real Effective Exchange Rate (REER) objective through changes in the NEER. Such a regime could be maintained only with the support of extensive exchange controls and import controls. The reform measures introduced in 1991 included significant changes in the foreign trade regime and exchange rate management. The devaluation of the rupee in mid 1991 was followed by a system of dual exchange rate system in March 1992. A year later, the dual system was abolished and the country moved towards a unified market determined exchange rate system. The monetary authority does not intervene in the market process of rate determination as long as orderly conditions prevail in the exchange market and the exchange rate reflects macro economic fundamentals.

The approach to exchange rate by the monetary authorities in the developed world generally has been to let the market determine the rate. However, there have been several exceptions. There have been occasions when central banks in these countries have intervened, some times in a concerted way, when exchange markets became volatile. The Indian experience with market determined exchange rate system is that there have been several occasions when the RBI had to intervene strongly to prevent volatility. This happened in 1995 and 1996 and later in 1997 and 1998 at the time of the East Asian crisis. The impact of the East Asian crisis on the Indian market was minimal. This was partly due to the reason that while India subscribed to current account convertibility under Clause VIII of the IMF agreement, the capital account liberalisation was undertaken cautiously. Besides, India's current account deficit during this period was low. In fact, in 1993, a High Level Committee on Balance of Payments (Government of India, 1993) had made specific recommendations regarding the level of current account deficit, the size and composition of capital flows, the management of external debt including short-term debt and the quantum of foreign exchange reserves. Implementation of these recommendations stood India in good stead at the time of the East Asian crisis. The management of the exchange rate in 1998 was clearly a success story.

In narrow underdeveloped markets like in India, there is a tendency for the herd instinct which amplifies the fluctuations. This can cause volatile and destabilizing movements in the exchange rate which may go beyond any correction, required by the fundamentals. Even in developed markets there is a tendency for the market to "overshoot", when a critical mass in terms of the perception of overvaluation in the exchange rate is reached. With narrow markets, the danger is greater. On such occasions, the monetary authority has to step in to ensure orderly market conditions (Jalan, 2000). The monetary authority must, however, recognize that integration of markets is inevitable and, therefore, action must be spread across the markets to achieve results.

In countries like India trade flows both visible and invisible, dominate the balance of payments. That is why for the exchange rate regime in India, continuous monitoring of the real exchange rate with an appropriate base becomes important. It provides valuable information to the authorities on the behaviour of the current account to which it is intrinsically linked. A monetary policy geared to domestic price stability in this situation helps to avoid disruptive adjustments in the exchange rate. In that sense monetary policy and exchange rate management become intertwined. However, on occasions, there can be conflicts between domestic considerations and external stability. The doctrine of 'Impossible Trinity' holds that monetary independence, exchange rate stability and full financial integration cannot be achieved simultaneously. One of the three will have to be sacrificed. Even in the current situation in India, one can observe the opposite pulls. If the interest rate goes down because of capital flows well below what is considered desirable from the domestic point of view, a choice becomes inevitable. Even now, there is a divergence between the real rate of interest and the real rate of growth. In times of conflict, the Central Bank will have to decide which should be the dominant concern and give priority to it.

Financial Stability

Increasingly macroeconomic stability as an objective of central banking is closely linked to financial stability. It is easy to see how the two are interlinked. Financial stability broadly implies the stability of the important institutions and markets forming part of the financial system. Financial stability requires that the key institutions in the financial system are stable, in that, there is a high degree of confidence about meeting contractual obligations without interruption or outside assistance (Crockett, 1997). While the complementarity between the objectives of macro stability and financial stability is easily recognised, the one question that needs to be addressed is whether there can be a conflict between the two objectives. It is not inconceivable to have situations in which the price stability objective might call for a restrictive policy, while the financial market conditions may demand a somewhat liberal policy to provide relief (Goodhart, 2001). The Reserve Bank of India was extremely conscious of this dilemma. Banking sector reforms were in full swing in the 1990s, which necessarily put the banking system under strain. While facilitating the smooth transition, RBI took care so that there was no dilution of the basic objectives of monetary policy. However, viewed as part of overall economic stability, financial stability need not run at cross-purpose with other dimensions of macro economic stability. Normally, price stability should provide an environment favourable for financial stability. If on occasions dealing directly with financial stability becomes necessary, it must be done as in the case of intervention in the foreign exchange markets. Actions to maintain financial stability in those circumstances may be in the long run interest of economic stability.

Autonomy of Central Banks

Autonomy of central banks has become an article of faith in the industrial countries. It has been written into the constitution setting up the European Central Bank. The literature on this subject is growing. A distinction has to be made between operational and target independence. Buitter (2000) advocates usefulness of operational independence while leaving the target to be set by the government. There is a general consensus to give operational or instrument independence to central banks in countries that have decided that the key objective of monetary policy is inflation control. Autonomy implies discretion to central banks to decide on the timing and nature of monetary policy intervention. It also calls for transparency in relation to both objectives and strategies. The increased use of explicit targets by central banks is part of the broader move to build credibility through transparency. It is quite true that in India, monetary policy has been very much conditioned by the stance on fiscal policy. The system or the scheme of *ad hoc* Treasury Bills facilitated monetisation of the fiscal deficit without limit and without prior approval (Rangarajan, 1993). The 1990s saw the phasing out of the system and the introduction of the scheme of Ways and Means Advances. This was a major step towards the achievement of greater discretion. The Fiscal Responsibility and Budget Management Act takes this to its logical conclusion. Two associated comments may be made in this context. First, an autonomous central bank does not mean lack of coordination with the Government. Nor does it imply lack of harmony. In fact, harmony in the sense in which it is used in classical symphonic music will be achieved. In a symphony, different artistes play different notes simultaneously but in effect create a blend that produces the best of music. However, the stances of monetary policy and fiscal policy cannot run at cross-purposes. For example, a lax fiscal policy accompanied by a tight monetary policy can lead to a sharp increase in interest rate. On the other hand, an accommodative monetary policy in a period of lax fiscal policy can lead to explosive increase in prices. While monetary and fiscal coordination is desirable, it is important at the same time that the monetary authority, which has its own specific agenda, must have the institutional autonomy and should not be burdened with functions which may come in conflict with its own special objective. It is in this context that the issue of delinking the management of public debt from RBI becomes relevant. Second, the emergence of an autonomous central bank does not mean that the 'state of bliss' has arrived (Rangarajan, 1993). It only enables the central bank to pursue a consistent monetary policy over a long time. Then the onus of responsibility for the conduct of monetary policy will rest on the shoulders of the Reserve Bank, where it should logically rest. In an open economy, the task of the central bank will be rendered more difficult if it does not have the autonomy and discretion to make changes quickly in response to external shocks.

There was a time when it was said that central banking was neither a science nor an art but a craft. This is at best a half-truth. Central banking has never been a case of applying well-known remedies to well known problems. 'Rules versus discretion' has been a subject of long-standing debate in monetary policy. Rigid rules such as those implicit in gold standard will give central banks no room for maneuverability. On the other hand, total discretion with respect to objectives and instruments will make monetary policy indeterminate. That is why a new phrase called 'constrained discretion' has been coined. This will require the central banks to be transparent and explicit with respect to objectives and strategies, while leaving them free to choose the timing and nature of their actions. This is the type of autonomy towards which every central bank should move.

Conclusion

The institutional environment in which the Indian monetary policy operates underwent a significant change in the 1990s. The administered structure of interest rate was dismantled. Governments at the Centre and in States borrow at market rates. Reserve requirements have been drastically reduced. The relationship between Government and Reserve Bank of India is changing with the latter acquiring a greater maneuverability. All these changes have provided the Reserve Bank with enhanced ability to influence the economic variables. Direct instruments of control are getting substituted by indirect controls. Bank Rate and repo rates send appropriate signals to the market.

Among the objectives of monetary policy, price stability has to remain the dominant one. The "Assignment Rule" in policy analysis favours monetary policy as the most appropriate instrument to achieve the objective of price stability. At the same time, concerns relating to growth have to be kept in view. One way of reconciling the twin objectives of price stability and economic growth in the short run is through estimating the threshold level of inflation. If the actual inflation runs above the threshold level, price stability becomes the more dominant objective. Below and around this threshold, there is greater maneuverability for the policy makers to take into account other considerations. In an increasingly open economy, it also becomes necessary to keep the domestic inflation rate in alignment with the level in other countries.

In India so far, money supply has been the target variable. An objective such as price stability was sought to be achieved by bringing about changes in money supply. However with the dismantling of the administered interest rate structure, the induction of new instruments and the creation of new financial markets, interest rate is also becoming an appropriate intermediate variable. Perhaps the lesson that can be drawn from our experience is that while money supply may be an appropriate immediate target when inflation rate remains high, interest rate may be the more appropriate target when inflation remains low and fluctuates within a narrow range.

Monetary authorities also need to pay attention to the level of interest rate. While interest rate may be adjusted upwards and downwards depending on the nature and extent of output gap and inflation gap, the rate requires to be maintained at an appropriate level consistent with the real rate of growth of the economy. The real rate of interest will have to be substantially higher in developing economies like India which seek to maintain a high savings rate and aim at growing at more than 6 to 7 per cent per annum. Lending rates must be brought down through improved efficiency and reducing the spread between the deposit rate and lending rate.

Changes in the exchange rate and foreign trade regimes have added an additional dimension to India's monetary policy. External considerations have now to be taken into account in the conduct of monetary policy. There have been years in which the Reserve Bank had to fight the impact of capital outflows and there have also been years in which the major concern is how to deal with the large capital inflows. The current year is a good example of this latter phenomenon. When a conflict arises between domestic considerations and external stability, the central bank will have to decide which should be the dominant concern.

Financial stability has also become a major concern of central banks including Reserve Bank of India. Normally price stability should provide an environment favourable for financial stability. However, there could be occasions when dealing directly with financial stability becomes necessary. Maintenance of financial stability is in the long run interest of economic stability.

Phasing out the *ad hoc* Treasury Bills system was an important step towards the autonomy of the Reserve Bank. The Fiscal Responsibility and Budget Management Act, if implemented in its true spirit, will be a great step forward not only in fiscal but monetary management. While monetary and fiscal coordination is desirable, it is important that the monetary authority, which has its own specific agenda, must have the institutional autonomy to decide on the timing and nature of monetary policy intervention.

Notes

1. Using the data for the period 1970-71 to 2002-03, the price equation, i.e. the inverted money demand function for India correcting for the serial correlation was estimated in double log form as

$$P_t = 4.83 + 0.38 M_t - 0.57 Y_t + 0.57 P_{t-1} \quad \dots(i)$$

(1.58) (1.97) (-1.70) (2.08)

$$\text{Adjusted } R^2 = 0.99$$

where,

P_t = Log of Wholesale Price Index (average of weeks)

M_t = Log of Broad Money i.e. M3 (outstanding as on 31st March)

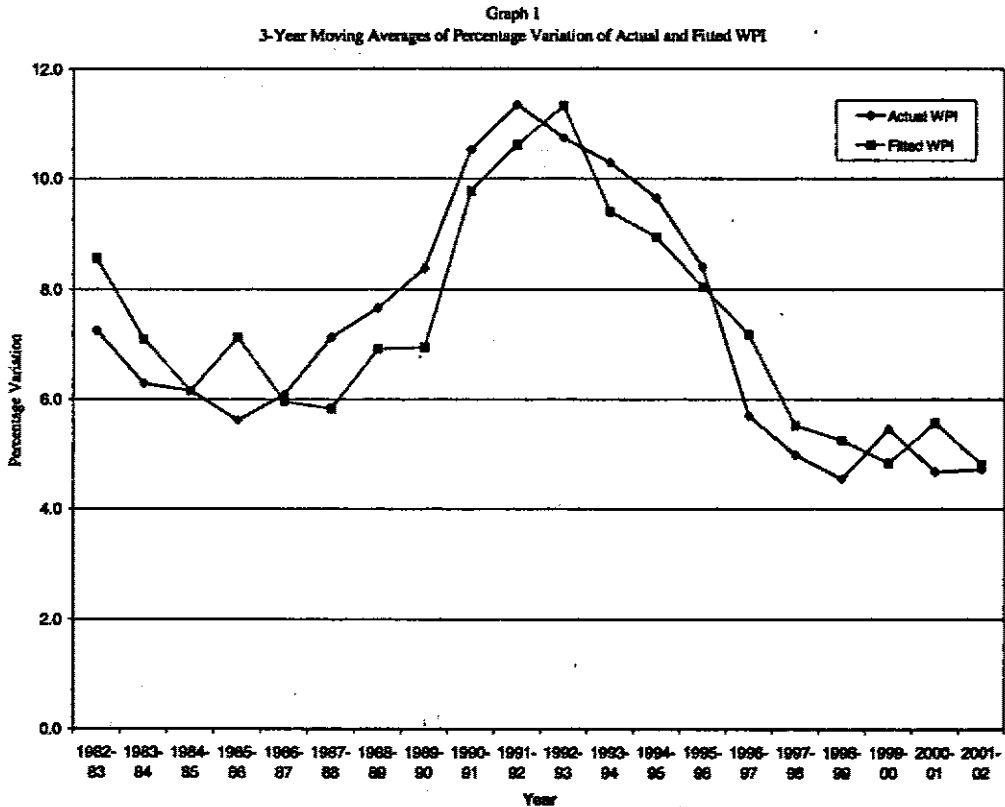
Y_t = Log of GDP at factor cost at constant prices (1993-94=100)

In the above equation, all the variables are found to be non-stationary of order 1 but co-integrated. It is observed that, the percentage variation of actual WPI and that of estimated values from the inverted money demand function show a very close fit, particularly, when 3-year moving averages are taken (Table 1, Graph 1). However, one can notice contrary movements between the actual and fitted in the four years following 1997-98. Even in these years, the differences, particularly, in the case of 3-year moving averages is small. The rate of interest should be a relevant variable in the equation. However, the impact of interest rate has not so far been significant because of the system of administered structure of interest rates. However, its relevance will assume importance now.

Table 1: Percentage Variation of Actual and Fitted WPI

Year	Year to Year			3-Year Moving Averages		
	Actual WPI	Fitted WPI	Error=2-3	Actual WPI	Fitted WPI	Error=5-6
1981-82	9.5	14.5	-5.0			
1982-83	4.7	8.8	-4.1	7.3	8.6	-1.3
1983-84	7.6	2.4	5.2	6.3	7.1	-0.8
1984-85	6.6	10.1	-3.5	6.2	6.2	0.0
1985-86	4.3	6.0	-1.6	5.6	7.1	-1.5
1986-87	5.9	5.3	0.6	6.1	6.0	0.1
1987-88	8.0	6.6	1.4	7.1	5.8	1.3
1988-89	7.4	5.6	1.9	7.7	6.9	0.8
1989-90	7.6	8.6	-1.0	8.4	6.9	1.4
1990-91	10.2	6.7	3.5	10.5	9.8	0.8
1991-92	13.8	14.0	-0.2	11.3	10.6	0.7
1992-93	10.0	11.1	-1.1	10.7	11.3	-0.6
1993-94	8.3	8.8	-0.5	10.3	9.4	0.9
1994-95	12.5	8.3	4.2	9.6	8.9	0.7
1995-96	8.1	9.7	-1.6	8.4	8.0	0.4
1996-97	4.6	6.1	-1.5	5.7	7.2	-1.5
1997-98	4.4	5.7	-1.3	5.0	5.5	-0.5
1998-99	5.9	4.8	1.2	4.5	5.3	-0.7
1999-00	3.3	5.3	-2.1	5.5	4.8	0.6
2000-01	7.2	4.4	2.7	4.7	5.6	-0.9
2001-02	3.6	6.9	-3.3	4.7	4.8	-0.1
2002-03	3.4	3.1	0.3			

Note: The Fitted WPI is based on the estimation results of Equation (i).

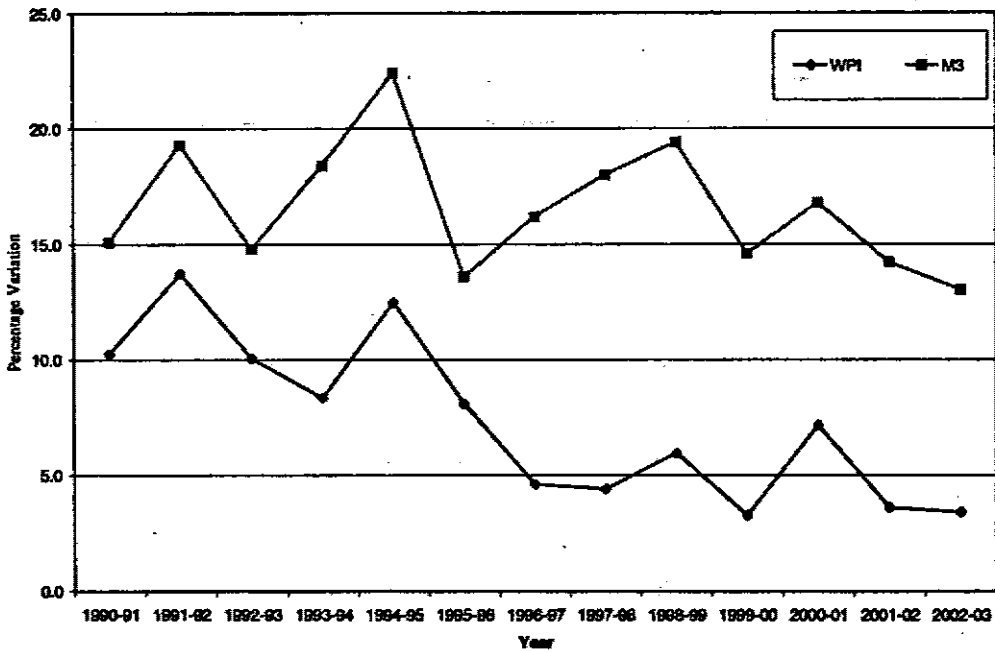


From the estimated price equation as given above, the short run elasticity of price with respect to money and output are 0.38 and 0.57, respectively. The long run elasticity of price with respect to money and output can be estimated to be 0.088 and 1.32, respectively. The implicit income elasticity of demand for money is worked out to be 1.50.

2. RBI in its Annual Report 1998-99 points out: "While M3 growth closely tracked the movement in inflation up to 1996-97, it deviated from it in the subsequent period, providing an indication of a certain degree of overprediction of inflation rate by the M3 growth. This deviation has been particularly significant in 1998-99 and during the next financial year up to June 1999". This relationship is further examined in the light of the data available till 2002-03.

Table 2 provides the growth rates of M3 and inflation rate based on WPI. M3 series refers to outstanding figures as on March 31. Being a stock, it is appropriate to use outstanding figures. WPI inflation rate is based on weekly averages. Average figures are preferred over the point-to-point because they are more inclusive. The growth rates of M3 and WPI are also shown in Graph 2. From this graph, it can be observed that, since 1991-92 money supply growth rate and inflation move in tandem. Since 1991-92 in 9 out of 12 years, money supply and inflation move in the same direction. Since 1998-99 they are consistently moving together.

Graph 2
Annual Growth Rate of M3 and WPI



From Table 2, it can also be observed that, during the period 1992-93 to 1998-99, the average growth rates of M3 and WPI were 17.5 per cent and 7.7 per cent, respectively. In the next four years (1999-2000 to 2002-03) average inflation has come down to 4.4 per cent. This is consistent with lower average M3 growth rate at 14.7 per cent during the period 1999-2000 to 2002-03.

Table 2: Growth Rate of M3 and WPI

Year	WPI	M3
1971-72	5.6	15.2
1972-73	10.0	18.3
1973-74	20.2	17.4
1974-75	25.2	10.9
1975-76	-1.1	15.0
1976-77	2.1	23.6
1977-78	5.2	18.4
1978-79	0.0	21.9
1979-80	17.1	17.7
1980-81	18.2	18.1
1981-82	9.3	12.5
1982-83	4.9	16.6
1983-84	7.5	18.2
1984-85	6.5	19.0
1985-86	4.4	16.0
1986-87	5.8	18.6
1987-88	8.1	16.0
1988-89	7.5	17.8
1989-90	7.5	19.4
1990-91	10.3	15.1
1991-92	13.7	19.3
1992-93	10.1	14.8
1993-94	8.4	18.4
1994-95	12.5	22.4
1995-96	8.1	13.6
1996-97	4.6	16.2
1997-98	4.4	18.0
1998-99	5.9	19.4
1999-00	3.3	14.6
2000-01	7.2	16.8
2001-02	3.6	14.2
2002-03	3.4	13.0

Note: (1) M3 refers to outstanding as on 31st March; (2) WPI refers to average of weeks.
Source: Handbook of Statistics on Indian Economy, 2002-03, RBI.

3. In the literature, many writers have examined the relationship between real interest rate and growth rate. For example, Phelps' golden rule (Phelps, 1961) establishes the equality between real interest rate and the growth rate of the economy. The rule can be derived as follows:

Let us denote, $\alpha = K / Y$ (Capital-Output Ratio)

$$\Rightarrow K = \alpha \cdot Y$$

$$\Rightarrow dK = \alpha \cdot dY$$

... (1)

Let $S = s \cdot Y$ (Saving Function)

In equilibrium, $S = s \cdot Y = I = dK$

$$\Rightarrow dK = s \cdot Y$$

... (2)

From Equations (1) and (2), $\alpha \cdot dY = s \cdot Y$

$$\Rightarrow dY / Y = s / \alpha$$

... (3)

Also, from Equation (1) $dY / dK = 1 / \alpha$

... (4)

From Equations (3) and (4), $dY / Y = s \cdot (dY / dK)$

... (5)

Phelps (1961) has shown,

$$s = F_k(K_0, N_0) \cdot \{ K_0 / Y_0 \}$$

where, $F_k(K_0, N_0)$ = marginal productivity of capital which can be denoted as 'r'

Thus,

$$dY / Y = r \cdot (K_0 / Y_0) \cdot (dY / dK)$$

$$= r \cdot [(dY / dK) / (Y_0 / K_0)]$$

... (6)

Now, $[(dY / dK) / (Y_0 / K_0)]$ is output elasticity w.r.t capital which can be denoted as 'e'. Further, dY / Y can be denoted as 'g'.

Thus, Equation (6) can be rewritten as

$$g = r \cdot e$$

In a steady state equilibrium $e = 1$ i.e., the ratio of output growth rate and growth rate of investment is unity.

Thus, $g = r$ i.e., the rate of growth of output is equal to rate of return on capital or real rate of interest.

There are others who have analysed the relationship between real interest rate and growth rate with different types of growth models. Koyck and Hooft-Walvaars (1966) write, "An optimum rate of investment can be found which maximizes per capita consumption at every point of time on the equilibrium path. The optimum rate of interest corresponding with this optimum rate of investment appears to be equal to the rate of growth of gross output." Robin Matthews (1960) using typical Harrod-Domar growth model says, "It may seem paradoxical that a high r is associated with high g . But this is as

it should be: a high r means a low K/Y , and a low K/Y means a given rate of saving is able to support a high rate of growth of output." Sen (1970) has argued that in the framework of neo-classical growth theories, a rise in the real interest rate seems to induce a higher rate of growth because in such models there is no investment function and investment is assumed simply to be determined by savings behaviour. Khan and Vbillanueva (1991) support the positive association between high interest rate and high growth rate based on the argument that the real interest rate is a good proxy for the efficiency (productivity) of capital accumulation. However, if the high real interest rate does not reflect efficiency of investment and is caused by market imperfections, there may not be a positive association with the growth rate. Thus, a situation of high real rate of interest accompanied by high growth rate must be distinguished from other situations.

References

- Arif, R. R. (1996), Money Demand Stability: Myth or Reality – An Econometric Analysis, *Development Research Group Study*, No. 13, Reserve Bank of India.
- Barro, Robert (1995), Inflation and Economic Growth, *Bank of England Quarterly Bulletin*, Vol. 35 (2), May.
- Bergo, Jarle (2003), *The Role of the Interest Rate in the Economy*, speech at AON Grieg Investors, Zurich, 19 October.
- Buiter, Willem H. (2000), *Targets, Instruments and Institutional Arrangements for an Effective Monetary Authority*, 7th L.K. Jha Memorial Lecture delivered in Mumbai on 16 October, RBI, Mumbai.
- Chakravarty, Sukhamoy (1986), Analytical Base, in *Monetary Policy: Review of the Sukhamoy Chakravarty Report*, IIC Monograph Series No. 10, India International Centre, New Delhi.
- (1986), *Report of the Committee to Review the Working of the Monetary System – A Re-examination*, Sir Purushotamdas Thakurdas Memorial Lecture, The Indian Institute of Bankers, Mumbai.
- Crockett, Andrew (1997), Why is Financial Stability a Goal of Public Policy, paper presented at the Federal Reserve Bank of Kansas City's 1997 Symposium, *Maintaining Financial Stability in a Global Economy*, in Jackson Hole, Wyoming, August 28-30.
- Duisenberg, Willem F. (2003), *Maastricht and the Future of Europe*, at the presentation of a stamp commemorating the ten-year anniversary of the Maastricht Treaty, Bundesfinanzministerium, Berlin, 22 October.
- Fischer, Stanley (1994), Modern Central Banking, in Forrest Capie, Charles Goodhart, Stanley Fischer and Nibert Schnadt (Eds), *The Future of Central Banking: The Tercentenary Symposium of the Bank of England*, Cambridge University Press, Cambridge.
- Friedman, Milton (1975), The Role of Monetary Policy, *American Economic Review*, Vol. LVII, No. 1, pp. 1-17.
- *Unemployment versus Inflation? An Evaluation of the Phillips Curve*, Occasional Paper 44 (The Institute of Economic Affairs, London).

- George, Edward (1996), *Economic Policy Approaches: Some Reflections*, 9th C.D. Deshmukh Memorial Lecture delivered in Mumbai on 14 October and included in C.D. Deshmukh Memorial Lecture Series - Centenary Commemorative Volume, RBI, Mumbai.
- Goodhart, Charles A. E. (2001), Whither Central Banking?, *RBI Bulletin*, January.
- Government of India (1993), *Report of the High Level Committee on Balance of Payments* (Chairman: C. Rangarajan), New Delhi.
- Jadav, Narendra (2003), Central Banking Strategies, Credibility and Independence: Global Evolution and the Indian Experience, *RBI Occasional Papers*, Vol. 24, Nos. 1 and 2, pp. 1-104.
- Jalan, Bimal (2000), Monetary Policy: Is a Single Target Relevant?, in Jalan (2002), *India's Economy in the New Millennium: Selected Essays*, UBSPD, New Delhi.
- Joshi, Himansu and Mridul Sagar (1995), The Demand for Money in India: Stability Revisited, *RBI Occasional Papers*, Vol. 16, No. 2, June.
- Kamin, Steven, Philip Turner and Jozef Van 't dack (1998), The Transmission Mechanism of Monetary Policy in Emerging Market Economies: An Overview, *BIS Policy Papers*, No. 3, January, BIS, Basle.
- Khan, Mohsin S. and A. S. Senhadji (2000), Threshold Effects in the Relationship between Inflation and Growth, *IMF Working Paper*, WP/00/110, IMF, Washington, D.C.
- Khan, Mohsin S. and Daleno Villanueva (1991), Macroeconomic Policies and Long-term Growth: A Conceptual and Empirical Review, *IMF Working Paper*, WP/91/28, IMF, Washington, D.C.
- King, Mervyn (1999), *Challenges for Monetary Policy: New and Old*, paper prepared for the Symposium on New Challenges for Monetary Policy sponsored by the Federal Reserve Bank of Kansas City at Jackson Hole, Wyoming, 27 August.
- Koyck, L. M. and Maria J. 't Hooft-Welvaars (1966), Economic Growth, Marginal Productivity of Capital and the Rate of Interest, in *The Theory of Interest Rates*, Ed. by F.H. Hahn and F.P.R. Brechling, MacMillan, New York.
- Krugman, Paul (1996), Stable Prices and fast Growth: Just Say No, *Economist*, 31 August, pp. 15-18.
- Matthews, R. C. O. (1960), *The Rate of Interest in Growth Models*, Oxford Economic Papers, Vol. 12.
- McCallum, Bennett T. (2000), Alternative Monetary Policy Rules: A Comparison with Historical settings for the United States, the United Kingdom and Japan, *Economic Quarterly*, Federal Reserve Bank of Richmond.
- Mishkin, Frederic S. (1996), *The Channels of Monetary Transmission: Lessons for Monetary Policy*, NBER Working Paper No. 5464, February.
- (1999), International Experience with Different Monetary Policy Regimes, *Journal of Monetary Economics*, Vol. 43, pp. 579-605.
- Nag, Ashok K. and G. Upadhyay (1993), Estimating Money Demand Function: A Co-integration Approach, *RBI Occasional Papers*, Vol. 14, No. 1, March.
- Phelps, Edmund S. (1961), The Golden Rule of Accumulation, in A. K. Sen (1970) (Ed.), *Growth Economics*, Penguin Modern Economic Readings.

- Phelps, Edmund S. (1967), Phillips Curves, Expectation of Inflation and Optimal Unemployment Over Time, *Economica*, 34, (August), pp. 254-281.
- Poole, William (1999), *Monetary Policy Rules?*, Review, March/April, Federal Reserve Bank of St. Louis.
- Rangarajan, C. (1988), Issues in Monetary Management, in Rangarajan, C. (1998), *Indian Economy: Essays on Money and Finance*, UBSPD, New Delhi.
- (1993), Autonomy of Central Banks, in Rangarajan, C. (1998), *Indian Economy: Essays on Money and Finance*, UBSPD, New Delhi.
- (1997), Dimensions of Monetary Policy, in Rangarajan, C. (1998), *Indian Economy: Essays on Money and Finance*, UBSPD, New Delhi.
- (1998), Development, Inflation and Monetary Policy, in Ahluwalia, I. J. and I.M.D. Little (1998) (Ed.), *India's Economic Reforms and Development: Essays for Manmohan Singh*, OUP, Delhi.
- (2002), *Leading Issues in Monetary Policy*, Sukhamoy Chakravarty Memorial Trust and Bookwell, New Delhi.
- Rangarajan, C. and M. S. Mohanty (1997), Fiscal Deficit, External Balance and Monetary Growth – A Study of the Indian Economy, *RBI Occasional Papers*, Vol. 18, No. 4, pp. 583-653.
- Rangarajan, C. and R. R. Arif (1990), Money, Output and Prices: A Macro Econometric Model, *Economic and Political Weekly*, 21 April, pp. 837-852.
- Reddy, Y. V. (2000), Monetary Policy in India: Objectives, Instruments, Operating Procedure and Dilemmas, in *Monetary and Financial Sector Reforms in India: A Central Banker's Perspective*, UBSPD, New Delhi.
- (2002), Parameters of Monetary Policy in India, *RBI Bulletin*, February, pp. 95-109.
- Reserve Bank of India (1985), *Report of the Committee to Review the Working of the Monetary System* (Chairman: Sukhamoy Chakravarty), Mumbai.
- (1999), *Annual Report 1998-99*, Mumbai.
- (2002), *Report on Currency and Finance, 2000-01*, Mumbai.
- Samantaraya, A. and A. Prasad (2001), Growth and Inflation in India: Detecting the Threshold Level, *Asian Economic Review*, Vol. 43, No. 3, pp. 414-428.
- Sarel, Michael (1996), Nonlinear Effects of Inflation on Economic Growth, *IMF Staff Papers*, Vol. 43, No. 1 (March), pp. 199-215.
- Sen, A. K. (1970), Interest, Investment and Growth, in *Growth Economics*, Ed. by A. K. Sen, Penguin Modern Economic Readings.
- Sterne, Gabriel (1999), The Use of Explicit Targets for Monetary Policy: Practical Experiences of 91 Economies in the 1990s, *Bank of England Quarterly Bulletin*, August.
- Tarapore (2000), Monetary Policy: Today, Tomorrow and the Day After, in Tarapore (2003), *Capital Account Convertibility: Monetary Policy and Reforms*, UBSPD, New Delhi.
- Taylor, John B. (1993), *Discretion versus Policy Rules in Practice*, Carnegie-Rochester Conference Series on Public Policy 39, North-Holland, pp. 195-214.

Vasudevan, A.; B. K. Bhoi and S. C. Dhal (1998), Inflation Rate and Optimal Growth – Is there a Gateway to 'Nirvana'? in Vasudevan, A. *et al.* (Ed.), *Fifty Years of Development Economics: Essays in Honour of Prof. Brahmananda*, Himalaya Publishing House, Mumbai.

White, William (2002), *Changing Views on How Best to Conduct Monetary Policy*, speech at the Central Bank Governors' Club Meeting held at Nafplio, Greece, 18 October.