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**Market-Based Systems of Monetary Control in Developing
Countries: Operating Procedures and Related Issues 1/**

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Abstract

This paper reviews issues in the development of a market-based system of monetary control in developing countries. It focuses on the appropriate sequencing of financial reform that would facilitate the transition toward a market-based system and measures required to strengthen the effectiveness of market-based operations. The paper also assesses the effects of financial reform on the demand for money function and discusses the implications for policy formulation and implementation.

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Summary

This paper reviews issues in the development of a market-based system of monetary control in the context of financial reform in developing countries. It discusses the appropriate sequencing of financial reform measures that would facilitate the transition toward a market-based system. It emphasizes the implementation of the basic reforms of monetary control procedures and prudential regulation prior to the enhancement of banking competition and the removal of direct instruments.

After examining central bank operating procedures that employ market-based instruments, the paper focuses attention on measures required to strengthen the effectiveness of market-based operations. In this connection, it discusses the coordination of monetary policy with fiscal and external sector policies, concern about interest rate stability, and the establishment of secondary and repurchase markets. The paper also assesses the effects of financial reform on the demand for money function and stresses the importance of developing up-to-date economic indicators for policy formulation and implementation when the demand for money is unstable.

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Introduction

In recent years, many developing countries have begun to reform their central bank operating procedures in favor of a more active use of indirect or market-based instruments to achieve macroeconomic objectives. The introduction of a market-based system of monetary control, together with financial liberalization, is generally aimed at strengthening savings mobilization and improving the efficiency of resource allocation, which has often been inhibited by direct interest rate and credit controls. This paper reviews issues in the development of a market-based system of monetary control in the context of financial reform in developing countries.

The plan of the paper is as follows. Section I discusses the interaction between monetary policy reform and financial liberalization, the appropriate sequencing of financial reform measures, as well as the role of public policy in developing financial markets. Section II examines the policy framework and central bank operating procedures under a system of indirect monetary control and discusses several related issues that have arisen during various stages of financial reform. Emphasis is placed on policy coordination and measures required to strengthen the effectiveness of open market operations and to prevent a financial crisis while liberalizing the financial system. Section III assesses the effects of financial reform on the demand for money function and the implications for the formulation and implementation of monetary policy. Conclusions are drawn in Section IV.

I. The Transition Toward a Market-Based System of Monetary Control

Financial sector reform normally covers measures aimed at making the financial system more responsive to market forces in order to promote saving and improve the efficiency of resource allocation. These measures can be divided into two broad categories. The first category consists of changes in supervision and regulation of the financial sector. Measures in this category include, inter alia, a lowering of entry barriers, an easing of restrictions on the scope of bank activities, the privatization of state-owned commercial banks, raising capital requirements, limiting loan concentration, loan classification and provisioning, recapitalization and restructuring of weak financial institutions, and reform of the supervisory system. The second category is the reform of monetary control instruments and procedures, which includes, inter alia, the establishment of open market operations or other market-based operations, the development of secondary and repurchase markets, unifying and lowering of reserve requirements, reform of rediscount and refinancing facilities in favor of generalized rather than selective rediscounts from the central bank, liberalizing interest rates, and the removal of quantitative credit controls.

The development of a market-based system of monetary control both affects and is affected by the liberalization of the financial sector. Effective market-based operations such as treasury bill auctions, for instance, require that interest rates on treasury bills be allowed to reflect market conditions and that commercial banks be allowed to adjust their lending and deposit rates according to their liquidity positions and money market conditions. In turn, the effective use of such indirect monetary instruments would encourage the development of a market-oriented financial system.

To facilitate the management of commercial bank liquidity, as well as to avoid a widening of interest rate spreads, reserve requirements should be reduced and kept as low as possible. Observance of reserve requirements may also be changed from a day-to-day or specific-date basis to a period-average basis. Likewise, the ready and reliable access to liquidity at the rediscount window would prevent excessive fluctuations in short-term interest rates. Both of these policy reforms are important in making an orderly transition to a more liberal financial system and in promoting financial market development, which, in turn, will contribute to the effectiveness of monetary policy.

Both monetary policy reform and financial liberalization take time; it is unlikely that all reform measures can be implemented at the same time. The questions arise as to which reform measures should be taken first and to what extent it matters. The answers to these questions depend very much on the circumstances faced by the country authorities, the existing institutional arrangements, and the efficiency with which organizational and legislative changes can be made. Country experiences have shown, however, that the following sequencing of financial reform measures is desirable. 1/

1. Development of indirect monetary instruments

Several key reforms of monetary control procedures should be implemented very early in the reform process to enable the central bank to anticipate reserve developments and to absorb or provide bank liquidity at its own initiative and in a flexible manner. Initial steps may include the introduction of new monetary instruments, e.g., treasury bills, auctioning procedures for the instruments, and changes in the rules of access to central bank refinancing facilities. Such reforms would be conducive to the development of financial markets and would facilitate the removal of direct instruments. In this connection, interest rates in an interbank market or a

1/ Bisat, Johnston, and Sundararajan (1990) review the experiences of Argentina, Chile, Indonesia, Korea, and the Philippines in this regard. Villanueva and Mirakhor (1990) also discuss the sequencing and modality of financial sector liberalization and interest rate strategies in countries with various initial conditions.

bill market should be made flexible even if interest rates elsewhere in the system remain controlled.

2. Prudential reforms

A program of prudential reforms and bank restructuring should be instituted before embarking on major policies to enhance banking competition. Financial liberalization is often followed by a period in which credit growth exceeds deposit growth, which increases resource imbalances. At the same time, rapid credit growth tends to strain the credit approval process and result in an increase in lending to more risky projects. This situation, in the absence of proper prudential rules and guidelines--regarding loan classification and provisioning for bad debts, interest capitalization, capital adequacy, and limits on loan concentration--is likely to result in bank insolvency and financial crisis, which will seriously undermine monetary control and disrupt the development of financial markets. Bank restructuring, together with prudential reforms, will ensure the soundness of financial institutions, which will, in turn, enhance the effectiveness of monetary policy on the one hand, and strengthen public confidence in, and hence facilitate the operations of, money markets, on the other.

3. Development of financial markets

The extent to which financial markets are developed and well-functioning is an important factor determining the effectiveness of indirect monetary control. As soon as the basic reforms of monetary control procedures and prudential regulation are implemented, efforts should be devoted to the development of financial markets. Generally speaking, the successful development of financial markets would require a favorable environment and, at times, deliberate policy intervention. ^{1/}

Appropriate financial reform would provide an environment conducive to financial market development as already mentioned. Indeed, a transition from a heavily regulated monetary policy system to a market-based system, involving active management of liquidity in an environment of flexible interest rates, is perhaps the most important contribution public policy can make to financial market development. It should be stressed, however, that macroeconomic stabilization is, in general, a prerequisite to successful financial reform. In the case where large fiscal deficits have given rise to a high rate of inflation, for example, attempts to diminish the costs of financial intermediation through a reduction in reserve requirements or

^{1/} Country experiences in financial reform and development of financial markets can be found in, e.g., Bisat, Johnston, and Sundararajan (1990), Johnston and Brekk (1989), Kafle (1990), Lin (1988 and 1989), Sundararajan and Molho (1988), and Supinit (1985). World Bank (1989) examines the role of finance in development and reviews the steps taken by various countries to address the problems of their financial sectors.

other deregulations, without the prior elimination of the fiscal deficit, could result in an acceleration of inflation. Additionally, higher interest rates that result from financial liberalization and the large domestic financing requirement of the government may exacerbate the budget deficit. Again, in a deteriorating balance of payments situation, financial reform that results in either rapid credit expansion or excessive capital inflows would run counter to the objective of improving the external current account. ^{1/}

Aside from maintaining economic stability and ensuring a proper sequencing of reforms, both monetary and fiscal authorities should stand ready to undertake corrective actions to deal with financial market irregularities. For example, the resource imbalances at the initial stage of financial liberalization may require a reduction in the fiscal deficit, in addition to a restrained monetary policy. If excessive credit growth continues, the imposition of guidelines that link credit expansion to deposit growth may be considered. ^{2/} At the same time, external financing through concessional loans should be sought in order to further reduce the domestic borrowing requirement of the government.

While the existence of well-functioning short-term financial markets provides a convenient means by which indirect monetary control is introduced at the beginning of financial reform, it also eases the development of capital markets. The experience and expertise gained by market participants in dealing with short-term instruments, where the price risks are relatively lower, can be used to develop long-term markets. For example, after the treasury bill market is well established, the authorities may start auctioning longer-term government securities on a regular basis. Thus, a whole array of debt instruments with different maturities is provided on a regular basis that would appeal to all categories of investors. Regular trading in longer-term government securities may serve as a catalyst in developing markets for other, more risky, securities, such as corporate bonds and equities.

In any case, a central bank can play a major role in developing both short-term and long-term financial markets by maintaining a favorable environment as well as by providing liquidity and regulatory support to the market participants. Concerning the latter, detailed rules and regulations

^{1/} For discussions on the issues of sequencing structural reforms in the various sectors of an economy, see, e.g., Blejer and Sagari (1987) and Edwards (1984). Based on the experiences, mainly in Latin American countries, it has been suggested that fiscal reform and a significant reduction of the fiscal deficit should be completed before implementing financial reform; financial liberalization should precede the removal of controls on international capital transactions; and trade liberalization should precede capital account liberalization.

^{2/} The removal of direct instruments in the process of financial reform is discussed in a subsequent section.

covering the operations and obligations of market participants have to be set up. Further, a framework for supervision of the intermediaries and for the dissemination of market information must be established. On the part of the government, the tax system should not unduly discourage secondary market trading--turnover taxes and stamp duties may cause such problems. At the same time, the government should develop its debt management policy and design debt instruments that are market oriented.

4. Removal of direct instruments

Inefficient resource allocation and other problems associated with the use of direct instruments are well known. A necessary step in financial reform is, therefore, to discontinue the use of such instruments once the indirect instruments are established. As noted earlier, however, some countries have experienced excessive interest rate fluctuations, capital inflows, or credit expansion at the beginning of financial liberalization. It may, therefore, be desirable for the central bank to retain several less distortive direct instruments in its arsenal to guard against the loss of monetary control. As mentioned, measures such as limiting the rate of credit expansion to that of deposit growth may be warranted when the indirect instruments are still at their infancy. Similarly, the imposition of a maximum spread between the average cost of funds to the financial institutions and their lending rate may be considered in the situation of excessive upward movements of the lending rate. ^{1/} This does not mean that credit ceilings and administrative controls on interest rates should be maintained for a prolonged period while developing indirect instruments. Rather, the strategy should be to place primary reliance on the indirect instruments and activate the direct instruments only when necessary. As soon as the situation permits, direct controls should be eliminated.

II. Operating Procedures With Market-Based Instruments and Related Issues

1. Policy framework

In contrast to direct monetary instruments that seek to control the volume and direction of credit or the level of interest rates directly, indirect monetary instruments seek to influence money, credit, and interest rates indirectly through changes in the liquidity conditions of commercial banks and other financial institutions. Indirect monetary instruments include treasury bill auctions, reserve requirements, rediscount facilities, repurchases and reverse repurchases, secondary transactions in government

^{1/} The permissible spread, however, has to take into account normal intermediation costs, risks, and reasonable profits. For this and other issues relating to interest rate management, see Leite and Sundararajan (1990).

securities, operations in government deposits, special deposits with the central bank, central bank bills, and foreign exchange intervention.

In terms of the money supply process, indirect monetary instruments affect the supply of money through changes in either the stock of reserve money or the money multiplier, or both. A discretionary change in the provision of reserves through open market operations, for instance, would affect the liquidity positions of commercial banks and, through it, the supply of money and credit. By varying the interest rates on government securities, however, such operations could also affect money market conditions, leading to changes in lending and deposit rates of the commercial banks. In turn, changes in interest rates could affect the currency-deposits ratio and the excess reserve ratio, thereby altering the money multiplier.

Changes in the money supply, together with interest rate variations, are expected to affect aggregate demand, output, prices, and the balance of payments via various channels. Chart 1 depicts the possible transmission mechanisms of monetary policy in a market-based system. It should be noted that as indirect instruments become more developed and effective, the "interest rate channel" could become more powerful than the "credit rationing channel." Further, with greater capital mobility and more flexible exchange rate regimes, monetary policy could also affect the balance of payments and, in turn, the domestic economy via the exchange rate. Open market operations that are intended to raise domestic interest rates, for example, could induce capital inflows that could result in an appreciation of the exchange rate. The exchange rate appreciation, in turn, would decrease the demand for tradable goods and reduce the domestic prices of imports, thus, helping to reduce inflationary pressures.

The above description of the use of indirect monetary instruments does not imply that the central bank should be engaged in fine-tuning either the money supply or interest rates. In fact, in many countries, an intermediate monetary target is set, even announced, ahead of time, and monetary instruments are manipulated to achieve the intermediate target. Many central banks also establish an operating target. Both the intermediate target variable and the operating target variable could change over time as the financial system evolves and the approach to monetary policy changes. By and large, the intermediate target could be an aggregate in the monetary survey or a long-term interest rate, whereas the operating target could be a short-run interest rate (usually the interbank lending rate), the exchange rate (in a managed floating system), or an aggregate in the central bank's

Chart 1
Impact of Monetary Policy on the Economy

balance sheet (usually net domestic assets or a component of reserve money). 1/

2. Operating procedures

Operating procedures under a market-based system of monetary control vary from country to country, reflecting, among other things, different stages of economic and financial development as well as different exchange arrangements. There are, however, several essential steps in the procedures that are common in most countries that strive to achieve quantitative targets for money or credit. First, a desired path for the demand for reserve money is established, derived from the level of an intermediate target variable (e.g., broad money) that is consistent with the ultimate policy goals. Second, a desired path for the operating target variable (e.g., net domestic assets of the central bank), based on the desired path for reserve money, is estimated. Third, on the basis of forecasts for the major elements of the central bank's balance sheet, the projected path for the operating target variable is calculated, assuming that there are no net sales of government securities and no change in other policy instruments. Fourth, the policy response to the deviation between the desired and the projected path of the operating target variable is decided. 2/ As an illustrative example, the case of Nepal, which relies mainly on primary bill auctions, is discussed below.

In Nepal, treasury bill auctions on a monthly basis were introduced in November 1988. The system of reserve money programming, however, was not established until August 1989 when interest rates were freed. 3/ Since then, broad money has been selected as the intermediate target variable. Because of the pegged exchange rate system and the fact that the overall balance of payments has been one of the most important objective variables, the operating target variable of monetary policy has been net domestic assets (NDA) of the Nepal Rastra Bank (the central bank).

1/ A widely held view is that interest rates should be the preferred target when the financial sector is the dominant source of instability. A monetary aggregate target is preferable when the instability originates mainly from real sector disturbances. The exchange rate may be considered to be a target when a country is faced with capital flow problems and the stabilization of the exchange rate becomes a priority. Johnston (1990) discusses issues in the design of a monetary policy framework consistent with indirect controls.

2/ Policy responses and operating procedures to deal with the deviation are highly country-specific and depend upon: (1) the structure and depth of money markets; (2) the nature of the clearings settlement system; (3) an assessment of the causes of deviation; and (4) the exchange rate system.

3/ Interest rates were freed, together with the removal of direct credit controls and the revamping of refinancing facilities of the central bank.

Operating procedures essentially consist of the following steps. 1/ First, a path for the desired level of NDA of the Nepal Rastra Bank is estimated over a year. This path is derived as the difference between the estimated demand for reserve money (RM) and the targeted level of net foreign assets (NFA) of the central bank, thus,

$$NDA_t^* = RM_t - NFA_t$$

The demand for reserve money is estimated on the basis of the projected demand for broad money that is consistent with expected developments in output and prices. An important element in the estimation of the demand for reserve money is the estimation of the commercial banks' demand for reserves, which consist of required reserves and excess reserves. Required reserves are a product of the required reserve ratio and the amount of bank deposits, which is estimated as a component of broad money. The demand for excess reserves depends, among other things, on the seasonal variations in each individual bank's deposits and loans, the opportunity cost of holding excess reserves, and the ease of access to the refinancing window and to the interbank market. In practice, the ratio between excess and required reserves in the past has been applied to derive excess reserves once required reserves are calculated.

The next step is to calculate the projected path for the NDA, assuming that there are no net issues of treasury bills outside the central bank and there are no changes in other instruments. This is done by forecasting the major components of NDA in the central bank's balance sheet, which consist of central bank's net claims on Government (NCG); central bank lending to commercial banks, to financial and nonfinancial public enterprises, and to the nonbank private sector (CBL); and other items net (OIN):

$$NDA_t = NCG_t + CBL_t + OIN_t$$

The central bank's net claims on Government is the difference between the domestic financing requirement of the Government and financing through borrowing from the commercial banks and from the nonbank sector. The latter two sources of financing include not only treasury bills (assuming no net issues here) but also development bonds and national savings certificates. Projections for central bank lendings are based on the annual refinance limits (for financial public enterprises), seasonal patterns, and trends, if any. Finally, a judgmental forecast can be made for other items net.

The last step is to examine the deviation between the desired and the projected NDA for each month over the next 12 months and to decide how the gap is to be closed within a specified time frame. This would be the basis for determining the gross amount of treasury bills to be auctioned each

1/ A more elaborate presentation can be found in Sundararajan, Itam and Brekk (1989).

month, as well as other policy actions such as changes in reserve requirements, and additional issues of development bonds and national savings certificates. In a purely "defensive" operation in month t that does not require the use of other instruments, the amount of treasury bill auctions is determined as follows:

$$NDA_t^* = NDA_{t-1} + \text{net new issues of treasury bills}$$

3. Issues

This section discusses several issues associated with operating procedures under a system of indirect monetary control, which may arise during various stages of financial reform.

a. Dealing with "autonomous factors"

Among the items on a central bank's balance sheet, there are autonomous or nondiscretionary factors--those that are beyond the short-term control of the central bank--and policy or discretionary instruments. The main items for the former are net foreign assets and net claims on government; the latter include central bank lending, sales and purchases of government and/or central bank securities, repurchase and reverse repurchase agreements, and foreign exchange swaps.

In deriving the projected paths for reserve money and for the operating target variable, the changes in the autonomous factors should be estimated as precisely as possible. For this purpose, economic indicators, including those relating to the national income accounts, prices, the central government budgetary operations, and the balance of payments, should be made available in a timely fashion. ^{1/} This would facilitate the central bank's assessment regarding the nature of the deviations between the projected and the desired path of the operating target variable, i.e., whether they are likely to be permanent or transitory. In turn, this assessment would enable the central bank to decide upon the magnitude and pace of monetary corrections, whether instruments other than open market operations would be required, and whether the operating and intermediate targets should be revised. Rigid adherence to the monetary targets without proper assessment of the character of the changes in autonomous factors could result in excessive volatility in interest rates and possibly the exchange rate, with an adverse impact on domestic saving and investment and on external stability.

A related issue in dealing with autonomous factors is the requirement for the central bank to provide special liquidity support for ailing financial institutions. The management of monetary policy is severely

^{1/} The type of indicators will depend on the time frame for projections. While annual indicators are needed in setting the annual monetary targets, market-based operations generally require very short-term projections.

constrained when the authorities are faced with widespread risk and insolvency among financial institutions, a development that has occurred during financial reform in some countries. Providing liquidity support for these institutions may well be a short-run solution, although it will certainly complicate the central bank's task in dealing with macroeconomic instability at the same time. When this special liquidity support becomes a dominant factor, the room to maneuver in open market operations is correspondingly reduced. As already discussed, it is important that the prudential regulation and supervision of financial institutions be strengthened at the very early stage of, or even prior to, financial liberalization in order to avoid a financial crisis.

b. Coordination with fiscal and external sector policies

As the financial system is liberalized, indirect monetary instruments are used, the exchange rate regime is made more flexible, and international capital becomes more mobile, interest rates and the exchange rate become increasingly important as the channels through which monetary policy is transmitted to affect the real economy. However, in such a market-based system, interest rates and the exchange rate are not determined by monetary policy alone. It is, therefore, important that monetary policy be coordinated with fiscal and external sector policies in order to avoid inconsistencies between targeted demand and supply in financial markets, and undesired interest rate fluctuations and capital movements.

Interest rate "overshooting" was experienced in some countries that implemented stabilization-cum-liberalization programs during a period of macroeconomic instability with large budget deficits and a deteriorating balance of payments. High interest rates led to higher operating costs and widespread insolvency of firms. ^{1/} As the proportion of bad loans in their portfolios increased, commercial banks either raised their lending rates further or sought financial support from their central banks. However, the sharp increase in interest rates also induced large capital inflows. The authorities were then faced with the difficult choice of either permitting the exchange rate to appreciate, which would worsen the external current account and complicate the task of structural adjustment, or purchasing foreign exchange from the public, which would interfere with their efforts to reduce monetary expansion and reduce inflation. The problems described above reflect the wrong sequencing of reforms as well as the lack of policy coordination. To the extent that large budget deficits are the main cause of macroeconomic instability, a reliance on restrictive monetary policy without substantial fiscal adjustments would lead to excessively high interest rates. In the absence of capital controls, this is likely to result in large capital inflows. Further, the inflow problem would worsen if the expected rate of depreciation of the domestic currency falls short of the difference between expected domestic and foreign interest

^{1/} For this particular issue, see, e.g., International Monetary Fund (1983), and Sundararajan and Balino (1990).

rates. On the other hand, if domestic interest rates adjusted for the expected rate of domestic currency depreciation are lower than foreign interest rates, capital outflows would be encouraged.

Financial programming provides a good framework for policy coordination. In such a programming exercise, the adjustment need is assessed, program objectives are set, and various policy instruments required to achieve the objectives are determined. ^{1/} This is particularly important in deriving the desired path of the intermediate monetary target, but policy authorities must keep the financial program in constant review to ensure that the corrective actions taken in various fields are consistent and appropriate in achieving the common objectives.

An important aspect of policy coordination in connection with treasury bill auctions is the coordination between such auctions and government domestic debt management. The preparation of a cash-flow statement for the government for the fiscal year will establish a path for government domestic borrowing. For this purpose, it is important to develop monthly projections of the main components of government expenditure, revenue, foreign grants, net foreign borrowing, and net domestic borrowing. This information will facilitate the determination of the total amount of government securities that should be sold outside the central bank in order for monetary developments to move along the desired path. The lack of such coordination may result in either a buildup of government deposits with the central bank, an undesired increase in the central bank's holding of government securities, or a substantial drawing on the overdraft facility with the central bank.

c. Concern about interest rate stability

As discussed previously, excessive volatility of interest rate movements has deleterious effects on the solvency of domestic producers and financial institutions, on domestic saving-investment decisions, and on balance of payments and exchange rate stability. In addition to the policy coordination and appropriate sequencing mentioned above, it is important that prudential reforms are undertaken. The latter would not only strengthen the soundness of financial institutions and enable them to compete in the markets but would also avoid the accumulation of nonperforming loans that put pressures on lending rates. As discussed in the next subsection, the establishment of a repurchase market for government securities would also alleviate the volatility of interest rates.

Some central banks have tried to avoid possible excessive interest rate volatility by adopting different selling techniques for treasury bills. Instead of free auctions where the volume of bills to be sold is pre-announced and competitive bids are conducted, a central bank may, for example, decide to auction treasury bills without announcing the tender

^{1/} For a detailed discussion of financial programming and related issues, see International Monetary Fund (1987).

volume. The central bank can then exercise its discretion in accepting or rejecting bids according to its interest rate objectives. Alternatively, the central bank may announce both the tender volume and a permissible range of interest rates for bids that would be accepted. In both cases, the central bank has a complicated task of managing the price and the quantity at the same time; in the former, the added flexibility to the central bank is at the expense of reducing information to market participants.

Many developing countries are, however, also concerned about upward movements of interest rates because of their implications for the budgetary operations of the government. The traditional rationale for maintaining low yields on government securities is the need to contain the interest cost of government debt so that the government can allocate more funds for other categories of expenditures, particularly social services and development projects. The concern for the interest cost to the government, however, would limit the scope for monetary control through open market operations, particularly if the debt instruments used in the operations are government securities. Below-market yields also prevent the development of an active secondary market for government securities. Further, financial institutions holding such government securities tend to pass the implicit "tax" on to their customers through higher interest rate spreads, thus distorting the interest rate structure of the financial sector. To achieve the objective of financial reform and to make open market operations fully effective, therefore, it is important that the government be willing to accept a higher cost of borrowing as reflected by the market conditions.

d. Secondary market and repurchase market

In some countries, trading in the primary market for government securities is hampered by the absence of, or the lack of development in, a secondary and/or repurchase market, which reduces the liquidity of the securities. Impediments to the development of such markets include the above-mentioned below-market yields on the securities, statutory requirements for provident funds and financial institutions to hold substantial amounts of such securities, ^{1/} and the lack of trading expertise and ready access to financing for dealers and other market participants.

In order to develop a secondary market in government securities, it is essential to increase the volume of transactions in the primary market. Once a sufficient volume of securities has been built up, dealers with

^{1/} In addition to inhibiting market development, liquid asset requirements can also complicate monetary management during periods of reserve shortages. A purchase of treasury bills by the central bank to relieve reserve shortages could create a shortage of liquid assets. On both grounds, it seems desirable that the liquid asset requirement is reduced so that it would not become a binding constraint in monetary management but would serve prudential purposes.

proper training can be authorized. The dealers will be responsible for making markets in government securities. At the same time, the central bank should offer financial support to dealers in terms of lines of credit and guaranteed buying arrangements, particularly in the absence of a well-developed interbank market. As market makers, dealers should develop a proper term structure of interest rates on government securities, quote buying and selling discount rates for different maturity bands of these securities, and compute the prices for sale and purchase based on the applicable discount rate for the remaining maturity. To ensure the viability of the secondary market, the central bank should develop capital adequacy guidelines for dealers and monitor their activity and risk exposure.

The establishment of a repurchase market is important not only because it would increase the liquidity of securities traded in the primary market and hence strengthen open market operations as the primary instrument of monetary policy, but also because it would enable the central bank to correct or smooth out monetary developments between auctions. Repurchase agreements and reverse repurchase agreements are important in avoiding excessive interest rate volatility in the interbank market and in preventing undesirable credit expansion or contraction before the next auction takes place.

In the case of a buildup of excess liquidity between auctions, for example, the central bank could undertake reverse repurchase agreements in government securities with commercial banks in such a way that the agreements will mature in time for the next auction. Similarly, when an injection of reserves is deemed necessary, the central bank could undertake repurchase agreements in government securities with commercial banks, which will mature before the next auction. Repurchase and reverse repurchase agreements should, of course, be well coordinated with the rediscount policy in order to convey the correct signal regarding the stance of monetary policy.

e. Adequacy of debt instruments and frequency of transactions

The market-oriented instruments of monetary control that could be at a central bank's disposal have already been mentioned. The adequacy of monetary instruments can be judged in terms of the effectiveness of monetary control under various circumstances. The latter, however, will also depend on the extent to which monetary policy is accompanied by, and coordinated with, fiscal and external sector policies. Countries that rely on treasury bill auctions as the primary instrument of monetary control may find that, on occasion, the magnitude and pace of monetary corrections are such that other monetary instruments would also be required. Further, several instruments, such as repurchases and reverse repurchases, and secondary trading in government securities, are often complementary to the treasury bill auctions.

The number of debt instruments and the frequency of their transactions reflect, to a large extent, the stage of financial market development. With a few exceptions, the transition from direct to indirect instruments of monetary policy usually starts with the development of an auction system for treasury bills. One obvious reason is that prior to the transition, sales of treasury bills on a fixed-yield basis were already in existence, and financial institutions, including the central bank, were accustomed to holding a substantial amount of these bills. Thus, at the beginning of monetary policy reform, the central bank may start auctioning the short-dated, say 91-day, treasury bills on a monthly basis.

The monthly auctions are quickly transformed into an instrument of open market operations after sufficient experience with such auctions is gained by market participants. At this stage, the amount of treasury bills to be auctioned is determined by the monetary program, as described above. To improve the liquidity of treasury bills, the central bank may authorize dealers, who are responsible for developing secondary markets, and adjust refinancing facilities to offer loans against the treasury bills with specified remaining maturity.

The central bank may find that monthly auctions are not frequent enough to absorb or inject reserves of the commercial banks, or that the amounts sold at each monthly auction are so large as to create problems for cash reserve management. Therefore, the frequency of auctions may be increased from monthly to weekly, particularly if the reserve maintenance period is also shortened. At the same time, in order to satisfy different preferences of individual investors and to promote the development of the securities market, the authorities may introduce treasury bills with different maturities. In so far as the investors are less likely to hold the longer-dated bills until maturity, secondary trading in these bills may be more active. Also, the issuance of treasury bills with various maturities will provide useful information on the term structure of interest rates and on the market's expectation about future interest rates.

An issue regarding the adequacy of debt instruments is the desirability of issuing central bank securities. In some countries, the central bank issues its own debt instruments primarily as a means to absorb excess liquidity in the banking system. ^{1/} These instruments are considered desirable because of the greater freedom for the central bank to implement monetary policy without direct interference stemming from government budgetary considerations. However, if the objective of developing a sound treasury bill market and eventually other markets for longer-term government

^{1/} Central bank securities could also be used as instruments in open market operations. Unlike treasury bill auctions which usually affect central bank assets and liabilities at the same time, trading in central bank securities could affect the composition of central bank liabilities without necessarily changing the total assets/liabilities of the central bank.

securities is to be achieved, it is important that central bank securities do not compete with government securities and inhibit market development for the latter. Therefore, central bank securities should not be issued and traded regularly in the market, but be employed only occasionally to absorb bank reserves when such a need arises.

III. Issues in the Estimation of the Demand for Money

The existence of a stable demand for money function is the cornerstone of a financial programming exercise as well as monetary targeting. This section discusses the demand for money function in developing countries prior to financial reform, the effects of financial reform on money demand, and implications for policy formulation and implementation.

1. Pre-reform period

Prior to financial reform in developing countries, direct instruments of monetary policy were used, observable interest rates did not in general reflect money market conditions, asset choices of wealth owners were often restricted to holding either money or real goods as there were few alternative financial assets available, and credit rationing tended to be the most powerful channel of monetary policy. Under these circumstances, the demand for money function usually took the following form:

$$m_t = a_0 + a_1 y_t - a_2 \pi_t + a_3 m_{t-1}$$

where m denotes the stock of real money balances; y denotes the level of real income; and π denotes the expected rate of inflation. ^{1/} Income is included in the equation to reflect the transaction motives of money holdings. The expected rate of inflation represents the opportunity cost of holding real money balances. The lagged money variable is often rationalized by reference to an adaptive expectation mechanism or a partial demand adjustment mechanism.

Despite direct controls on bank credit and interest rates in the organized financial markets in these countries, however, there usually existed unorganized markets. During tight credit policies, consumers and producers tended to economize on available money balances and to rely more on the unorganized markets in order to realize their planned expenditures. Thus, interest rates tended to rise in the unorganized markets although they might not be recorded and hence were unobservable. What could be observed in this situation, however, was an increase in the income velocity of money. Since interest rates in the unorganized markets reflected the cost of credit or the opportunity cost of holding money--they rose as bank credit became less available and vice versa, an appropriate proxy variable

^{1/} See, e.g., Aghevli et al. (1979).

reflecting the degree of credit restraint (CR) in the organized markets could be included in the demand for money function. 1/

By and large, a reasonably stable demand for money function that included some or all of the above-mentioned explanatory variables could be found for each developing country, which had adequate time series. Further, the great majority of countries exhibited a long-run income elasticity of broad money in the range of 1.25 to 1.50. The long-run income elasticity of narrow money was somewhat lower but tended to be greater than unity. 2/ These magnitudes of income elasticities were explained by monetization and the paucity of other financial assets in which to hold savings.

2. Effects of financial reform on the demand for money function

Financial reform can have important effects on the behavior of financial indicators and aggregates. In many countries, financial reform was accompanied by increases in real interest rates and in the ratios of money and bank credit to GDP, while the currency-deposits ratio fell. 3/

The removal of credit ceilings that constrained financial resource allocation may result in increased borrowing by producers as well as consumers to hold larger money balances at any given level of interest rates and income. This will constitute a shift in the demand for broad money. Further, a liberalization of interest rates on bank deposits may result in a rise in deposit rates relative to other rates of return and an increase in the demand for time and savings deposits. As deposit rates move in line with competing interest rates at the latter stage of the reform, however, the demand for quasi-money may become less sensitive to changes in the general level of interest rates. In any event, the deposit rate can now be used to measure the own rate of return in holding quasi-money as well as the opportunity cost of holding narrow money and, thus, its variation will play a significant role in determining the demand for both broad and narrow money. Finally, changes in the behavior of the demand for money may also reflect the authorities' response to the credit boom at the initial stage of the reform and to the changes in the structure of real interest rates, as well as the pace of the reform.

In a recent study of nine developing countries in Asia, with different stages of financial reform, Tseng and Corker (1990) 4/ estimated the following demand for money function:

1/ For the various proxy variables and the empirical results, see Wong (1977).

2/ See, e.g., Aghevli et al. (1979), and Crockett and Evans (1980).

3/ Bisat, Johnston, and Sundararajan (1990) discuss experiences with financial reform, including changes in financial indicators, in Argentina, Chile, Indonesia, Korea, and the Philippines.

4/ The nine countries are: Indonesia, Korea, Malaysia, Myanmar, Nepal, the Philippines, Singapore, Sri Lanka, and Thailand.

$$M_t = a_0 + a_1 P_t + a_2 (Y/P)_t + a_3 Ra_t + a_4 Ro_t$$

where M is money; P the general price level; Y aggregate incomes; Ra the interest rate on alternative assets; and Ro the own rate of return on money. Using the tests for cointegration, the stable long-run demand for money equations are selected. The fitted value of money demand ($\bar{M}_t$) from the long-run relationship is substituted into the following error correction model to test the predictability of short-run deviations from long-run equilibrium:

$$\Delta M_t = \sum_{i=0}^n (b_{1i} \Delta M_{t-1-i} + b_{2i} \Delta P_{t-i} + b_{3i} \Delta Ra_{t-i} + b_{4i} \Delta Ro_{t-i} + b_{5i} \Delta (Y/P)_{t-i}) - b_6 (M_t - \bar{M}_t) + b_0$$

where n denotes the order of time lag.

The empirical results, based on the sample periods from early 1970s to 1989, show that for almost all countries (Thailand is the only exception), a stable long-run demand function exists for at least one of the monetary aggregates. In about half of the countries (Malaysia, Myanmar, Nepal, and Singapore), narrow money appears to be most reliably related to income and interest rates, while broad money is favored in the other countries (Indonesia, Korea, the Philippines, and Sri Lanka). The estimated long-run income elasticities of both narrow money and broad money in most countries are slightly smaller than those estimated for the same countries on the basis of a sample period covering up to the late 1970s (Table 1). This may reflect the fact that financial market developments permit asset holders to economize on their money balances. Interest rates generally have significant negative coefficients in the narrow money equations. Further, regression analysis favors the inclusion of interest rates rather than the expected rate of inflation to reflect the opportunity cost of holding narrow money. For several countries (Indonesia, Korea, Malaysia, the Philippines, and Thailand), the demand for broad money is found to be negatively related to relative asset returns (i.e., the return on alternative assets minus the average deposit rate) as opposed to the general level of interest rates. The existence of stable short-run demand for money is limited to only four countries: Indonesia and Malaysia for both narrow and broad money, and Korea and Sri Lanka for broad money only.

Table 1. Long-Run Income Elasticities of Money Demand
in Selected Asian Countries

Country	Aghevli et al. (1979)	Tseng and Corker (1990)
Indonesia		
Narrow money	1.63	1.16
Broad money	1.85	1.58
Korea		
Narrow money	...	0.79
Broad money	...	1.00
Malaysia		
Narrow money	1.23	1.11
Broad money	1.65	1.63
Myanmar		
Narrow money	...	1.27
Broad money	...	1.43
Nepal		
Narrow money	...	1.79
Broad money	...	2.62
Philippines		
Narrow money	0.85	0.67
Broad money	1.54	1.47
Singapore		
Narrow money	1.34	0.86
Broad money	1.33	1.37
Sri Lanka		
Narrow money	1.08	0.92
Broad money	1.48	1.22
Thailand		
Narrow money	0.68	0.85
Broad money	1.49	1.72

Source: Aghevli, B.B., M.S. Khan, P.R. Narvekar, and B.K. Short, "Monetary Policy in Selected Asian Countries," Staff Papers, December 1979; and Tseng, W., and R. Corker, "Financial Liberalization, Money Demand, and Monetary Policy in the SEACEN Countries During the 1980s," Paper presented at a SEACEN Workshop, December 1990.

3. Implications for financial programming and monetary targeting

The instability of the demand for money function--whether it is caused by a one-time demand shift, changes in the income and interest rate elasticities, or changes in the relative explanatory powers of its determinants--has important implications for financial programming and monetary targeting. As already mentioned, a stable demand for money function provides a strong foundation for a financial programming exercise. In formulating monetary and credit policy in this exercise, the maximum domestic credit expansion must be calculated. This is normally done in the following way. First, the demand for broad money is projected on the basis of the targeted rate of growth and inflation. Then, the permissible level of domestic credit is derived as the difference between the projected demand for broad money and the targeted international reserve level, based on the monetary survey identity. The maximum domestic credit expansion is given by the excess of the future permissible level of domestic credit over its current level. Similarly, in a monetary targeting exercise, the determination of the level or range of the intermediate monetary target is normally based on a projected demand for the targeted monetary aggregate. In general, a failure to allow for the increased financial intermediation following financial reform could result in a policy that is tighter than envisaged when credit limits or monetary targets are set at the monetary survey level.

Obviously, the demand for money function established in the pre-reform period needs to be re-estimated, taking into account the effects of the reform. The technique of dummy variables may be used to capture the shift in the intercept ^{1/} as well as the changes in the parameters such as the income elasticity. Other explanatory variables, such as the relative returns on financial assets, may be introduced to better reflect the opportunity cost of holding money. Naturally, the demand for money also depends on the stage and pace of financial reform, on whether a financial crisis has occurred, and on how the authorities responded to such a crisis. There are no quick solutions to all the estimation problems.

Difficulties in establishing a stable demand for money function have prompted some central banks to discard the use of broad monetary aggregates as intermediate targets and instead focus on narrower monetary aggregates on the central bank balance sheet. However, this approach cannot totally avoid the problem of the instability of money demand, because the estimation of the demand for reserve money must be based on the estimated demand for currency in circulation and for bank deposits. Further, targets set at the level of the central bank balance sheet that do not allow for a possible shift out of currency into bank deposits, and a possible reduction in excess reserves, associated with financial reform, could result in a policy that is more expansionary than envisaged.

^{1/} See, e.g., Goldsborough and Zaidi (1989).

Programming at the central bank level, however, does have some advantages. First, the NDA of the central bank are under its direct control, whereas the developments of domestic credit of the banking system depend in part on the portfolio behavior of commercial banks under a system of indirect monetary control. Second, reserve money can be decomposed into currency in circulation, and commercial banks' required and excess reserves. The demand for currency largely reflects the transaction needs and, as such, it may be more predictable than demand deposits and time and savings deposits, which, to a large extent, also reflect portfolio decisions of the asset holders. The behavior of excess reserves is closely linked to the central bank's operating procedures and, hence, may also be more amenable to projection. Only the projection of required reserves will encounter difficulties similar to the projection of broad money. On the whole, therefore, the projection of demand for reserve money could be less subject to errors than the projection of demand for broad money. Third, statistical data on the central bank balance sheet are usually more accurate than monetary survey aggregates and, thus, facilitate the monitoring of the program.

Whether programming and targeting are at the monetary survey level or at the central bank balance sheet level, it is important, particularly in the case of unstable money demand, to develop various up-to-date economic and financial indicators and the capacity to interpret and monitor them. This would enable policymakers to make a better judgment as to whether monetary policy should change its course when the movements of monetary aggregates deviate from the target paths, or when adherence to a quantitative target has resulted in large fluctuations in interest rates and the exchange rate.

IV. Concluding Remarks

The purpose of this paper has been to discuss issues in the development of a market-based system of monetary control in the context of financial reform in developing countries. The following conclusions can be drawn from the discussion.

First, in order for financial reform to be successful, reform measures should be implemented with proper sequencing. In particular, several key reforms of monetary control procedures, such as those relating to treasury bill auctions and refinancing facilities, should be implemented before direct instruments are removed. Similarly, a system of prudential regulation and supervision--including loan classification and provisioning for bad debts, capital adequacy requirements, and limits on loan concentration--should be established before embarking on major policies to enhance banking competition.

Second, the central bank can assist in developing financial markets by making a transition from direct to indirect monetary control, ensuring financial stability, and providing regulatory support to the market participants. The government can also contribute to financial market

development by bringing its budget deficit under control, improving its debt management policy, and making its debt instruments appealing to the markets. In turn, the development of financial markets will contribute to the effectiveness of indirect monetary control.

Third, to facilitate the decision regarding the magnitude and pace of monetary corrections, monetary programming at the central bank balance sheet level must be carried out. For this purpose, information about key economic and financial indicators, including those that are useful in predicting the autonomous factors in the central bank balance sheet, should be made available in a timely fashion.

Fourth, monetary policy must be coordinated with fiscal and external sector policies to avoid inconsistencies between targeted demand and supply in financial markets and undesired interest rate and exchange rate fluctuations. In particular, treasury bill auctions should be coordinated with government domestic debt management. A lack of such coordination may result in an undesired increase in the central bank's holding of treasury bills or a substantial drawing on the central bank's overdraft facility, particularly if the government is unwilling to allow interest rates at the auctions to reflect market conditions.

Fifth, the establishment of secondary and repurchase markets for treasury bills would not only increase the liquidity of securities traded in the primary market and hence strengthen open market operations, but would also enable the central bank to correct or smooth out monetary developments between auctions. Treasury bill auctions should be frequent enough to effectively absorb or inject liquidity without creating problems for reserve management. As dealers gain sufficient experience in making markets, treasury bills with different maturities and longer-term government securities may be introduced regularly in the markets in order to aid portfolio management of all categories of investors with different maturity preferences.

Finally, financial reform may affect the demand for money function in several ways--a one-time demand shift, changes in the income and interest rate elasticities, or changes in the relative explanatory powers of its determinants. The demand for money function that was established in the pre-reform period should be re-estimated, taking into account the effects of the reform. Whether monetary programming and targeting are at the monetary survey level or at the central bank balance sheet level, it is important to develop various up-to-date indicators so that a better judgment can be exercised in implementing monetary policy in the situation of unstable money demand.

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