Monetary Policy Instruments: Design of Instrument Mix and Coordination of Instrument Design

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Central banks use a multiplicity of monetary policy instruments—some operated at their own initiative and some at the initiative of commercial banks—to inject or absorb reserves. The number and variety of instruments are often surprisingly large, their operational design is quite diverse, and the mix and features of instruments vary considerably among countries and over time. While the design of specific instruments and the details of monetary policy operating procedures have been discussed extensively, analysis of factors that govern the mix of instruments in use and the choice of an efficient instrument mix, including the technical features of the instruments, have not received significant attention in the literature. This paper analyzes and attempts to explain why countries use a wide array of instruments and what causes variations in the mix of instruments and their technical design. For this purpose, it examines the linkages between policy objectives and institutional constraints of monetary policy on the one hand, and the range and mix of monetary policy instruments on the other. This examination helps to highlight the rationale for the diversity of instruments and to explain how a country’s use of different instruments is—and should be—coordinated in practice to achieve its monetary policy objectives most efficiently.

Background

The types of monetary policy instruments available have received increased attention in recent years, in the context of the adaptations needed in central bank operating procedures and instruments in the

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1See the remaining chapters of this volume for a discussion of the design and functioning of different monetary policy instruments.
face of financial sector reforms and innovations. (See Alexander, Baliño, and Enoch, 1995; Kneeshaw and van den Bergh, 1989; Batten and others, 1990; and Friedman, 1990.) In principle, to control the quantity of money supplied by the banking system, it suffices for the central bank to determine one nominal monetary magnitude and a nominal interest rate (see Johnson, 1973). In addition, a central bank credit instrument would also be needed to contain systemic risks, insofar as the central bank assumes—as it typically does—a lender-of-last-resort function.

In practice, though, monetary authorities have used a wider range of instruments than suggested by the above principles. Table 1 presents the range of monetary instruments used in 11 members of the European Union as of 1995. It illustrates the differences in instrument choice that exist even within a group of countries that are closely linked to one another because of their economic integration and broadly similar level of development. The three categories—reserve requirements, standing facilities, and open market operations—have different functions. Reserve requirements have been losing importance as a monetary tool. While a significant number of countries still have such requirements, they do not use them actively. In fact, they have rarely changed the reserve ratios—except to lower them in order to reduce the burden unremunerated reserves impose on banks, as many industrial countries did in the 1990s (see, e.g., Bisignano, 1995; and Bank of Japan, 1995). Nevertheless, required reserve balances can smooth fluctuations in short-term interest rates and facilitate the functioning of the payment system. For these reasons, the prospective members of the European Economic and Monetary Union (EMU) have decided to give the future European System of Central Banks the power to set reserve requirements. Also, they have left open the possibility of remunerating reserve balances.

All countries in Table 1 have some form of standing facilities, that is, facilities that commercial banks can operate at their own initiative. Rediscount is such a facility: banks can obtain central bank credit against eligible collateral. Standing facilities serve two closely related purposes: to ensure that banks can meet their settlement obligations and to keep interest rates within a corridor. Keeping interest rates within a corridor is made possible by the fact that banks having an emergency need for liquidity can borrow from the central bank at a preestablished rate, while those having excess funds can place them with the central bank by making a deposit—if the central bank offers a standing facility—or repaying outstanding debt.2 However, central banks usually want to

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2For instance, in Germany, a bank short of funds can access the Bundesbank's Lombard window. While the Bundesbank does not operate a deposit facility, banks typically have outstanding loans from the Bundesbank's rediscount window (which carries a below-market interest rate), which they repay when they have excess funds.
Table 1. Monetary Policy Instruments in the European Union

<table>
<thead>
<tr>
<th>Country</th>
<th>Reserve Requirements</th>
<th>Remuneration of Required Reserves</th>
<th>Standing Facilities</th>
<th>Open Market Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lending below market rates</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Denmark</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>European Economic and Monetary Union</td>
<td>Possible</td>
<td>Possible</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>France</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Germany</td>
<td>Yes</td>
<td>No</td>
<td>Close to market</td>
<td>Yes</td>
</tr>
<tr>
<td>Greece</td>
<td>Yes</td>
<td>Partly</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ireland</td>
<td>Yes</td>
<td>Below market</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Italy</td>
<td>Yes</td>
<td>Partly</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Netherlands</td>
<td>No</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Portugal</td>
<td>Yes</td>
<td>Partly</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Spain</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Possible</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

have tools to affect monetary conditions within the corridor. For this purpose, they engage in open market operations, in which they offer to buy or sell securities outright or with an engagement to reverse the operation at a set date; they can make this offer either to all market participants or to a select group of them (primary dealers).

The diversity in instrument mix reflects various needs: (1) to ensure achievement of monetary control objectives (e.g., to influence the level of reserves or some other operating target with a good degree of precision in a specific time frame) in the face of a variety of shocks to the supply of and demand for reserves; (2) to adapt the instruments and operating procedures to reflect the institutional constraints that affect the working of the instruments (money and securities market structure, banking industry structure and soundness, and features of the interbank payment clearing and settlement system); (3) to achieve other subsidiary objectives (smooth functioning of payment system, fostering growth of money and securities markets, and preventing systemic financial crises) that are considered critical by central banks for the efficient transmission of monetary policy; and (4) to reflect macroeconomic circumstances, particularly the type of monetary and exchange rate regime. These and other relevant considerations are outlined below.

First, uncertainty over the effectiveness and effects of a particular instrument at a given time may lead the authorities to have some instrument redundancy; that is, they may prefer not to rely on the minimum possible number of instruments. More specifically, multiple instruments are needed—as discussed further in the next section—to offset the shocks to the supply of and demand for reserves and to ensure that specific operating targets are reached effectively (with reasonable precision within a specific time frame) and efficiently (in a way that is cost effective and least disruptive to financial markets and banking soundness). Specific instruments could be insufficient, or function perversely, requiring another instrument to reinforce and counterbalance them.

Second, given that central bank instruments are typically used in a market that central banks also influence, the instruments must be tailored to the market structure (instruments and institutions) and its state of development. For instance, there is little scope for traditional open market operations if a secondary market for government securities does not exist or is too shallow. If that situation is due to a lack of suitable government securities, central bank or private paper (e.g.,

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3However, causality runs both ways. If the central bank uses certain instruments in its transactions, this will help to make those instruments more liquid, and therefore more attractive, which will enlarge the market for them.
banker’s acceptances) may be used in monetary operations—which enlarges the range of instruments. If the cause is not a lack of government securities, but the underdevelopment of the secondary market, open-market-type operations (i.e., operations in the primary market) may be a suitable alternative.

Third, as will be further discussed later, instruments are closely linked; for instance, whether or not required reserves can be averaged influences the need for central bank lending facilities. Also, the size and scope of market operations depend on the design of central bank lending facilities. Thus, changes in one instrument often require adjustments in another, leading to different mixes of instruments and different procedures.

Fourth, macroeconomic circumstances lead to the introduction of specific instruments (e.g., indexed securities, as in Chile) that may not be needed in other circumstances. Similarly, in heavily dollarized economies (such as Bolivia’s), the authorities may wish to use foreign-currency-denominated paper as a way to influence domestic short-term interest rates in foreign currency temporarily.

Fifth, the functioning of the payment system—particularly the interbank settlement arrangements—affects the scope of the instruments of monetary control, as well as their design. As an example, the introduction of real-time gross settlement in New Zealand will require banks to hold larger reserve balances, which has prompted the central bank to consider abandoning its current ceiling on the amount of a bank’s reserve balances that the central bank remunerates (Reserve Bank of New Zealand, 1997).

Sixth, the degree of soundness of the banking system may make some instruments less effective and require the introduction of other ones. For instance, in circumstances where distress borrowing has become a major problem, the authorities may need to reduce their reliance on some instruments that rely on market responsiveness to interest rates and use more direct ones, such as reserve requirements. Finally, for historical reasons, a country might have become used to certain instruments that strongly influence market behavior and expectations, making it hard to change them.

Thus, the prevalence of a wide array of instruments reflects multiple objectives—both macroeconomic and microeconomic—that central banks pursue, as well as multiple constraints on the achievement of a primary objective. Moreover, a range of structural and institutional considerations (payment system design, money market structure, banking system soundness) serve as both objectives and constraints on the conduct of monetary policy. These themes are illustrated in greater detail in the next section.
Objectives, Constraints, and Choice of Instrument Mix

The channels of transmission of monetary policy and hence the effectiveness of monetary policy in influencing the ultimate objectives (inflation, external balance, exchange rates) depend crucially on the way monetary policy is implemented. It is well known that direct controls on credit and interest rates can cause significant inefficiencies and promote disintermediation, thus making monetary policy increasingly ineffective in influencing macroeconomic goals. While the transition from direct to indirect and market-based instruments of monetary policy is a complex process involving concomitant reforms in a range of financial and central banking structures, the appropriate adaptations and modifications of those instruments in the course of this transition play a crucial role in maintaining adequate monetary and credit control. This contribution to stability is essential for successful financial sector liberalization. Box 1 presents the changes in monetary instruments that took place in selected countries as they liberalized their financial sector.

Discussion in this section will focus mainly on the factors that influence the design and coordination of a range of indirect instruments. Typically, however, in systems based on direct controls on credits and interest rates, the number of instruments tends to proliferate according to the varying amounts of interest subsidy channeled to different economic sectors (including government), and to a complex system of quantitative credit controls that, in part, serve to enforce interest subsidies. As a result, a shift to indirect instruments necessitates, in many cases, a sharp reduction in the number of instruments.

However, during the transition, when both selective and direct credit controls may coexist with the newly introduced market-based instruments, the number and range of instruments may appear bewilderingly large, which will often pose significant coordination problems to ensure achievement of monetary policy objectives. Moreover, the instrument mix and the coordination of different instruments have to be continuously adapted as markets and institutions evolve and as macroeconomic circumstances change. The interaction between the macroeconomic dimension of monetary policy (monetary control to achieve price or exchange rate stability) and its structural dimensions (institutional objectives and constraints that underpin the efficient transmission of monetary policy) is the central theme of this section.

4For an elaboration of this theme in a closed-economy context, see Chick (1977); for economies in transition, see Sundararajan (1991).
Box 1. Financial Liberalization and Monetary Policy Instruments

Many countries have changed their monetary policy instruments as part of a broader process of financial liberalization. Typically, they started from a system that relied on direct instruments of monetary control, which resulted in the administrative allocation and pricing of bank credit. That system was transformed into one in which the market played a key role in that allocation and pricing. A few examples of such transformation are presented below.

Chile

*Instruments before financial reform:*
- Subsidized selective credits, quantitative credit controls, selective rediscounts, interest rate controls, and reserve requirements.

*Instruments after reform:*
- Reserve requirements, a market-based discount window, and operations (including reverse transactions) with central-bank-indexed papers; currently, the last-named are the main instrument.

Ghana

*Instruments before financial reform:*
- Credit ceilings and interest rate controls.

*Instruments after reform:*
- Cash reserve requirement, secondary liquidity requirement, and auctions of central bank and government securities.

New Zealand

*Instruments before financial reform:*
- Ceilings on many lending and deposit rates, reserve asset ratios, public security holdings ratios, credit growth guidelines, and priority credit guidelines.

*Instruments after reform:*
- Open market operations and rediscount, both using central bank securities.

Russia

*Instruments before financial reform:*
- Directed credits, interest rate controls.

*Instruments introduced as part of the reform:*
- Reserve requirements, credit auctions, Lombard facility, deposit auctions, repos and outright transactions in government securities.

Sources: Alexander, Baliño, and Enoch (1995), and Baliño, Hoelscher, and Horder (forthcoming).
The need for more than the minimum number of instruments to ensure monetary control typically arises from the type, magnitude, and duration of shocks affecting the supply of and demand for reserves. From a monetary management point of view, a central bank must be able to inject into, and withdraw from, the system base money in sufficient amounts when needed. In principle, a single instrument would suffice. For example, a rediscount window or a credit auction injects base money into the system when a rediscount is granted, and absorbs it when a rediscount must be repaid. In practice, however, this action may not ensure timely absorption of reserves. For instance, the timing and amount of maturing rediscount may not match the timing and amount of sterilization needs. Similarly, the use of reserve requirements to absorb excess bank reserves may in practice be constrained by the uneven distribution of excess reserves among banks. This could require that some of the banks be provided adequate reserves through a discount window to enable them to comply with the increase in reserve requirements. This would be particularly important in the early stages of interbank market development, but is also relevant for well-developed markets, where a sound individual bank may be temporarily unable to obtain sufficient interbank funding, because of, for instance, the uncertainty relating to the ability of borrowers to cope with tighter credit conditions. Thus, depending upon the size of the increase in reserve requirements (or the size of reserve absorption by any other instrument) and the initial distribution of bank reserves, the ability of interbank markets to redistribute available reserves may come under stress and require the simultaneous injection of reserves, for example, through a discount window. Moreover, some market-based instruments may become less effective in cases of systemic bank distress, which may also lead the authorities to rely on a combination of instruments to achieve their objectives. Thus, separate instruments are needed to absorb and inject reserves, and their setting must be coordinated to ensure the desired overall effect.

Multiple instruments and considerable variations in their design also arise because of the different preferences of central banks for the interest responsiveness of the supply of reserves relative to the demand for reserves, reflecting the types of shocks that typically affect the supply of and demand for reserves in the country concerned. For example, the

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5See Flannery (1996) for a demonstration of how interbank markets could fail as a result of information uncertainty.

6See, for instance, Lindgren, Garcia, and Saal (1996) and Sundararajan and Baliño (1990). The argument is that if there is systemic bank distress, banks may react inappropriately to interest rate signals, which are at the core of the functioning of market-based monetary instruments.
discount window could be designed to have a supply curve that would be either elastic upward sloping or somewhat inelastic with respect to the market rate (Friedman, 1990). Similarly, the design of reserve requirements, interbank settlement arrangements, and arrangements to sell treasury bills (auctions, tap sales) could influence the interest elasticity of the demand for reserves. The implications of these issues for instrument coordination are further explored in the next section.

Modern central banks—while typically making price stability their overriding objective—also have other goals, such as ensuring the smooth functioning of the payment system, facilitating the development or smooth functioning of money and securities markets, and avoiding systemic financial crises. To attain these goals, central banks need the appropriate instruments and operational procedures, in addition to the core instruments they need for day-to-day monetary management. The implications for instrument mix and design of payment system arrangements, market structure, and banking soundness are discussed in greater detail later in this section. In all these cases, the design of discount window and lender-of-last-resort (i.e., emergency credit to individual banks) facilities plays a crucial role.

In this context, whether the private sector can be relied on to provide lender-of-last-resort facilities and whether central banks have any advantage in providing such services have been debated in recent literature. It can be argued that, in well-developed markets, open market operations alone are sufficient to manage bank liquidity and that lender-of-last-resort facilities to provide emergency credit to illiquid but solvent banks are unnecessary if banks have enough information on borrowers' creditworthiness. However, insofar as in times of financial stress (e.g., owing to sufficiently large macroeconomic shocks) information is uncertain and costly to update, interbank markets may not function efficiently enough to redistribute reserves, and central banks must offer lender-of-last-resort facilities—in addition to open market operations—to support the interbank payment system.

In some countries, different segments of the money markets (treasury bills, commercial paper, and unsecured interbank credit) may not be well integrated, and the central bank may intervene in and offer last-resort discount window support to each of these segments in order to provide liquidity to the markets and smooth out interest rate fluctua-

7Goodfriend (1993) argues that, given appropriate disclosure of information, the private sector can readily organize adequate interbank lending facilities, and, hence, in well-developed markets, lender-of-last-resort facilities of a central bank are not needed and open market operations alone should be sufficient to deal with bank liquidity. In this context, Flannery (1996) argues that interbank markets could fail under financial stress and that a lender of last resort is needed in addition to open market operations.
Thus, such intervention could give rise to a proliferation of instruments—such as different discount facilities for different instruments—as well as facilities to influence unsecured interbank markets—such as recycling of government deposits between the central bank and commercial banks (e.g., Canada and Malaysia).

The above discussion raises the broader question of whether interest rate smoothing is a desirable operational objective for central banks. Most central banks have devoted significant efforts to modifying the mix and design of instruments to reduce volatility in key short-term interest rates. They have had several reasons for doing so: to ensure that monetary policy signals were not obscured by day-to-day volatility in rates, thereby speeding up the transmission of effects of monetary policy; to avoid excessive shocks to the financing costs of securities dealers; to protect the soundness of financial markets, particularly money markets, in cases where sharp adjustments in interest rates could affect asset value and the solvency of dealers; and to minimize spurious fluctuations in money and credit caused by autonomous and short-run factors that affect the demand for and supply of reserves (defensive monetary operations or "accommodation" operations) (Holmes, 1969; and Guttentag, 1996). Smoothing interest rates, however, requires adaptations in the design of instruments and operating procedures, as discussed in the next section.

The degree of market development is an important determinant of the type and mix of instruments that a central bank can use. It is difficult to provide a single path for the development of monetary instruments. Often, the transition from direct to indirect instruments requires initially designing instruments that rely on less developed markets and moving toward those that foster and rely on more developed markets. There is a growing literature dealing with these transition issues.

As already mentioned, countries that use direct instruments, like credit ceilings, interest rate controls, and directed credits, typically end up with a plethora of instruments. Box 2 presents the changes in instruments that occurred in Indonesia as part of the financial liberalization process. The distortions created by direct instruments and their growing ineffectiveness as economic agents devise ways to circumvent them lead authorities to look for other tools. Those tools will often include reserve requirements, which can be used initially to absorb the

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8Securities dealers rely on short-term money markets to fund their inventories. Thus, low volatility of short-term interest rates lowers transaction costs (bid-ask spread) in the securities markets.

9Direct instruments are those that rely on regulations that set constraints on the operations of the banking system, while indirect instruments are those that operate chiefly through the market. See, for instance, Sundararajan (1992) and Alexander, Balño, and Enoch (1995).
liquidity overhang that direct instruments typically generate, and a re­
discount facility to inject liquidity into the system and provide short­
term accommodation to banks (sometimes also accompanied by a
lender-of-last-resort facility such as a Lombard window). However, re­
serve requirements cannot be used flexibly, as discussed earlier, and
often impose a heavy tax burden on banks. Hence, more efficient and
flexible instruments need to be developed in the transition to devel­
oped markets. Sales of government or central bank securities geared to
the implementation of monetary policy can be helpful in making that
transition. While lacking the advantages of secondary market opera­
tions, they can help the authorities achieve their monetary objectives
more flexibly and in a market-oriented way. Finally, as markets develop,
the authorities will be able to use open market operations as a main
tool. Unlike primary market sales, open market operations allow wide
scope for the authorities to adjust liquidity or influence interest rates as
frequently as needed (as often as several times within a single day).

The development of money and securities markets and of monetary
instruments are mutually reinforcing processes. Well-developed finan­
cial markets—particularly for short-term operations—facilitate the
monetary operations of the monetary authority. Conversely, the avail­
ability of a high-quality security (such as a government or central bank
paper) can provide a crucial impetus to the development of a securities
market.

Market development considerations affect the number and type of in­
struments. For example, the design of a lender of last resort, the use of
securities as collateral, and the design of a secondary window all affect
the pace of money market development. For instance, acting as lender
of last resort is an important function of central banks, but that support
should be provided in a manner that encourages banks to go to the
market first. Central banks can do this either by charging a penal rate—
above market rates—for discount window borrowing or by using moral
suasion, based on close monitoring of prudential ratios and liquidity
management of commercial banks. Otherwise, if central bank funds are
available at nonpenal conditions, banks will have little incentive to trade
funds with each other in the interbank market—or in extreme cases
even to tap the public’s savings. Similarly, when primary market sales of
central bank or treasury securities are used, it is important to ensure
that a minimum number of securities be regularly supplied to the mar­
ket and to avoid reducing the volume of sales sizably in order to inject
liquidity. This would require that regular primary sales of securities be
accompanied by a discount window or credit auction facility—both to
provide liquidity to the securities and to avoid reducing the volume of
primary sales below a minimum, thereby fostering markets.
Box 2. Financial Reform in Indonesia

In June 1983, Indonesia undertook a significant financial reform. Up to that time, a major task of the banking system had been to channel public sector funds, derived chiefly from oil revenues, to priority borrowers and government programs. Bank Indonesia (BI) relied on interest rate controls and on bank-by-bank credit ceilings. Much of commercial banks' lending capacity arose from so-called liquidity credits (subsidized credits) provided by BI to be on-lent to specified sectors. This led to a buildup of excess bank reserves, discouraged financial savings, distorted interest rates, and undermined the ability of BI to execute monetary policy. In addition, as a way to support the exchange rate, BI had undertaken a large number of foreign exchange swap operations, which resulted in heavy losses for BI when the rupiah had to be devalued.

The reforms comprised
• the elimination of bank credit ceilings
• gradual reduction of the loan categories eligible for liquidity credits
• deregulation of interest rates on most types of deposits and loans
• introduction of new monetary control instruments, including rediscount facilities (one for temporary liquidity shortages and another to promote maturity transformation) and BI certificates (SBIs)—a marketable certificate to serve as a sterilization instrument.¹

In 1985, to further deepen the money market, the authorities introduced a standardized banker's acceptance (SBPU). In 1987, they made exchange

¹The absence of a domestically financed fiscal deficit prevented the authorities from issuing domestic government debt.

Macroeconomic circumstances and the regulatory environment also greatly influence the types of instruments a central bank uses. For example, if inflation is high and volatile, a central bank's instruments will tend to be of short maturity, reflecting market preferences. Longer-term instruments will be considered too risky by private sector holders and will be too costly for the issuer of the liability; as a result, some countries have used indexed or floating rate instruments for both monetary and public-debt-management purposes (e.g., Brazil and Chile).¹⁰

Large capital inflows often need to be sterilized. For this purpose, some countries have widened the range of indirect instruments, so that no single instrument carries an excessive burden of adjustment. For ex-

¹⁰Economists and policy practitioners have debated the use of indexed instruments. Some have argued that their use shows the authorities' commitment to low inflation, while others have made the opposite argument, See Price (1997).
rates and interest rates more flexible, and in 1988 they adopted a further package of reforms. The latter included the establishment of a syndicate of banks to act as primary dealers of SBIs.

Indonesia's reforms took place in an environment of prudent fiscal policies and an open capital account, which withstood serious disturbances, like the capital outflows of 1984 and 1986–87.

In recent years, BI has been able to rely chiefly on indirect instruments of monetary control. For instance, in 1995–96, open market operations with SBIs were the main instrument. However, at the same time, BI also raised reserve requirements from 2 percent to 3 percent, a tightening effect that was reinforced by the elimination of cash-in-vault as an eligible asset to fulfill reserve requirements. Also, BI has continued to operate its rediscount window for SBPUs and has continued to provide liquidity credits—although the list of activities eligible for those credits is much shorter than before the reforms.

Indonesia's experience illustrates the fact that financial liberalization frequently does not occur at once, but is rather a process in which instruments have to be adjusted to the needs of the market, which the process itself influences. The reforms facilitated a more market-oriented allocation of financial savings, and increases in the size of the monetary sector and of private credit relative to GDP. They also allowed for increased competition in the banking system, which led private banks to more than double their market share between 1982 and 1989.


ample, at various times countries have issued special long-term securities, tightened rules of access to central bank credit facilities, introduced foreign exchange swaps and special repurchase facilities, and adjusted the reserve requirement regime in response to capital inflows.11 Pressures to monetize the fiscal deficit may require the central bank to set up a range of other instruments to offset the expansionary monetary impact.12 While fiscal deficit financing might stimulate the development of government securities markets and create new monetary policy instruments in some countries, in others it has led to reliance on captive markets based on regulations.


12Experience shows that attempts to sterilize the impact of large monetized deficits can succeed in the short run, but are unsustainable over the medium term.
Thus, the size of the fiscal deficit and the regulatory framework for its financing could influence the range of government debt instruments and their use for monetary management. When the market for government securities is constrained by reliance on liquidity requirements—requirements to invest specific proportions of liabilities in government securities and other eligible assets—several countries (e.g., Malaysia) have used private sector instruments and markets, such as banker’s acceptances and an interbank reserve market, for monetary operations. The use of liquidity ratios creates captive markets, constrains interest rate flexibility, and limits the effectiveness of primary issue auctions for monetary management. Hence, alternative instruments are needed. This has led to the creation of special treasury bills or central bank bills for monetary purposes and to the more extensive use of repurchase transactions in government securities and sometimes in private paper.

If the fiscal position shifts to surpluses (e.g., Jordan, Thailand), or the government is legally restrained from borrowing domestically (e.g., balanced budget rule in Indonesia), the central bank may have to issue its own debt to absorb reserves. Some central banks have issued their own debt obligations, even when fiscal deficits were sizable and government securities had to be issued in parallel. For instance, many central banks have found that the use of central bank paper gives them more control over their day-to-day monetary operations (e.g., Nepal, New Zealand, Philippines, and Poland) and enables them to operationally separate monetary and public-debt-management functions. However, the use of both central bank and government securities, particularly in the early stages of market development, may segment the markets and raise issues of operational coordination of similar instruments.

The design of the payment and settlement system also helps determine the types of instruments the monetary authority uses. This is because the system affects the supply of and demand for bank reserves and the scope of the lender-of-last-resort facilities that the payment system needs in order to operate efficiently. For instance, to avoid queuing or gridlock, a real-time gross settlement system requires that banks be able to borrow from the central bank within a day; otherwise large reserve balances would need to be maintained to ensure settlement. In contrast, a system in which payments are netted periodically and only net debts are settled is riskier, but requires no daily credit and can operate with a lower amount of reserves. However, it would still require a

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14 See Quintyn (1996) for discussions of the pros and cons of central bank versus treasury securities and of country experiences.
lender-of-last-resort arrangement to ensure settlement at the designated time (e.g., end of day) and avoid systemic risks. More fundamentally perhaps, given that indirect instruments of monetary policy work by changing the supply of reserve money in the system, it is crucial that final settlement of interbank obligations take place in the books of the central bank or, as a minimum (as in Hong Kong, China), that settlement banks face a restriction on the amount of reserves that they can create. The lender-of-last-resort facilities that support the operation of payment systems—such as Lombard credit facilities and intraday overdrafts—should be distinguished from other central bank credit facilities that are used for actively managing the supply of reserves and interest rates (e.g., discount quotas, bill discount facilities) and those that might be provided as part of bank restructuring operations.

The soundness of the banking system has a major influence on the effectiveness, mix, and design of monetary instruments. The transmission mechanism—from the initial impact of a monetary operation on bank reserves and short-term interest rates to other variables in the economy—may suffer if the banking system is unsound; some of the reactions that would normally be expected may be weakened or become perverse. That is the case, for instance, of distress borrowing. Insolvent bank borrowers may react to higher interest rates (prompted by a monetary tightening) by increasing—rather than reducing—the amount of loans demanded. Banks facing financial difficulties will often accommodate such demands, with the expectation that loans in default might be repaid and because bank owners would be risking depositors' funds rather than their own. In addition, weaknesses in the banking system would limit the smooth functioning of interbank and money markets. Thus, in such cases, the effects of monetary policy will be weakened and less predictable.

Banking soundness considerations affect monetary policy instruments and operations. All central bank credit should be managed with extreme caution by close monitoring of the soundness of individual banks. Also, the design of monetary operations would have to take into account the impact of banking distress by requiring adequate collateral, by limiting access to individual lending facilities according to uniform

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15For a discussion of payment system risks, see for instance Bono and van den Bergh (1993).
16Balino, Dhawan, and Sundararajan (1994) note that, in the early period following the move to two-tier banking, banks in the former Czechoslovakia (including the central bank) settled their obligations on the books of two designated commercial banks, which faced no explicit credit limitation. This was changed as part of the former Czechoslovakia's switch to indirect instruments.
17For a discussion of these issues, see for instance, Lindgren, Garcia, and Saal (1996).
criteria, and by remunerating reserves or reducing reliance on unre­munerated reserve requirements so as to contain the costs of interme­diation. Finally, in exceptional circumstances, central banks could be called upon to provide credit to insolvent banks that are being rehabil­i­tated as part of a bank restructuring strategy. Such credit should be guaranteed by the government.

Historical circumstances also play an important role in determining which instruments a country uses at a particular time. Changing instruments entails costs, such as those of informing banks and other eco­nomic agents of the change introduced, of adapting procedures to con­form to the change, and of managing the expectational effects of a change in established instruments. Thus, there is some inertia in the range of instruments countries use.

The choice of monetary policy objectives and nominal anchors could also influence the instrument mix and design. Countries may choose, for instance, a monetary aggregate or an exchange rate peg as an inter­mediate target with the expectation that such a target will allow them to attain their final objective, typically price stability. In addition, many central banks set operational targets, (e.g., base money or nonborrowed reserves) that are consistent with achieving the intermediate target. Short-term interest rates are the common day-to-day operational target, and the operating procedures and instrument mix are adjusted to achieve the degree of interest rate flexibility that the authorities choose in light of their policy objectives.

For instance, in Germany, the interbank market rate moves within a corridor between the Lombard rate, which is the ceiling, and the dis­count rate, which serves as the floor—both set by the Bundesbank. In addition to bounding interest rate fluctuations, the Bundesbank’s repurchase operations to supply reserves for up to two to four weeks influence the position of interest rates within that boundary. The intro­duction of repurchase auctions in the Bundesbank in the early 1980s was motivated by the need for greater interest rate flexibility following the increasing influence of external factors on the supply of and de­mand for bank reserves. In contrast, the United States implements monetary policy chiefly through open market operations that are de­signed to achieve targets for overnight interbank rates, but keeps sev­eral discount facilities available for banks experiencing liquidity needs. Access to the short-term adjustment credit facility is controlled not by the discount rate—which is typically set close to or below market rates and adjusted infrequently mainly for announcement effects—but by

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18See, for instance, Balino and Cotliarelli (1994) for a review of the literature on monetary policy frameworks.
moral suasion. The U.S. Federal Reserve scrutinizes a bank’s request, which it can deny if it deems such financing unjustified. In addition, in special circumstances, the Federal Reserve makes extended credit available for longer-term liquidity needs.

The type of exchange rate regime also affects instrument mix. If a country belongs to a monetary union, pegs to a common currency, or is otherwise closely connected by an open capital account to other countries, the design and mix of instruments can be strongly affected, for example, by the need to avoid capital flows arising from differences in monetary regulations, which would constrain competition and undermine the regulations. For instance, if reserve requirements are unremunerated (or remunerated at a below-market rate), other things being equal, financial intermediation will shift to the country that has the lowest reserve requirements. Similarly, differences in interbank payment systems that affect the need for settlement balances can also affect the relative competitive position of banks. Therefore, countries in a union or those closely connected by a peg and capital mobility severely restrict their members’ choice of monetary instruments (and the same applies to other banking regulations) and try to homogenize payment system operations. A recent example of such a trend for harmonization can be observed in the countries that are part of the European Union. The move toward the introduction of a common currency has led to a careful examination of monetary instruments with a view to harmonization. While work in this area is still proceeding, as discussed previously, agreement already exists on the elements of the basic model that will be put in place.\textsuperscript{19} Monetary policy will be determined by the European System of Central Banks, which will comprise the European Central Bank and the national central banks. The latter will carry out all monetary operations—such as running open market operations and standing facilities—but under the guidelines and instructions of the decision-making bodies of the European Central Bank.

Countries that choose an exchange rate target often adapt their instrument design and operations to ensure achievement of that target. Under normal circumstances, such a target implies that domestic interest rates should respond rapidly to changes in the supply of and demand for reserves, and the instrument design should reflect this. For example, if international interest rates rise, domestic interest rates should rise in parallel to contain the pressures for capital outflows and a depreciation. In general, monetary operations should permit a rapid adjustment of domestic interest rates in line with international rates and thereby support the fixed exchange rate regime. Such adjustments

\textsuperscript{19}For a fuller discussion of the arrangements envisaged for the European Economic and Monetary Union, see European Monetary Institute, \textit{Annual Report} (1996 and 1997).
Box 3. Sweden: Adjustment in Monetary Instruments

Sweden presents an interesting example of a change in monetary instruments in response to a change in monetary targets.1 Beginning in the 1930s and until a crisis forced the floating of the krona in November 1992, Sweden pegged its exchange rate. At the time of the crisis, it was pegged to the European currency unit (ECU). Under the fixed exchange rate regime, the central bank’s main operational tool was its discount window, which allowed the central bank to affect the overnight interbank rate. To this end, the central bank set an interest rate schedule on its discount window, which adjusted the rate in predetermined discrete steps on the basis of the level of bank borrowing. This measure was complemented with open market operations to push banks to borrow at the desired interest rate level. When the peg was abandoned, Sweden switched to inflation targeting. To bolster the credibility and effectiveness of the new framework, the authorities decided to adjust interest rates in a more gradual and transparent manner in response to changes in inflation prospects. To this end, the central bank repo rate took over the role that the central bank’s marginal lending rate had been playing. The interest rate schedule was abandoned, but an interest rate corridor within which the repo rate could move was established, bounded by the rates on two central bank standing facilities: a lending facility, which set the upper bound, and a deposit facility, which set the lower bound.

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1Hörngren and Wessman-Martensson (1991) and Sveriges Riksbank (1994) discuss these arrangements in more detail.

could be achieved either through short-term fine-tuning instruments, such as repurchase agreements (repos) or other forms of open market operations (in securities or in foreign exchange markets), or through prompt adjustments in discount rates. For example, small open economies used standing discount facilities with graduated changes to exert automatic upward or downward pressure on interest rates in response to reserve shortages or surpluses following interventions in the foreign exchange market (see Bank for International Settlements, 1988). A very gradual and cautious adjustment in interest rates or discretionary adjustments that could be delayed or inadequate might prove ineffective in responding to external or internal shocks in fixed exchange rate regimes. Box 3 illustrates Sweden’s experience in adjusting its instrument mix to a change in monetary targets.

Operation of a currency board poses additional constraints on the mix and design of instruments. These arrangements prohibit or strictly
limit the scope of monetary operations, owing to the currency-backing rules that are a key element of such boards. Also, some technical features become important; for instance, repos against liquid assets denominated in foreign exchange are more compatible with the nature of the arrangement than repos against domestic currency assets. Moreover, because they also limit the ability of the central bank to act as lender of last resort, these arrangements further influence the design of monetary instruments. For example, reserve requirements may be set at fairly high levels and liquidity requirements may be established to make it easier for banks to withstand an eventual systemic liquidity crunch.20

**Technical Aspects of Instrument Coordination**

The preceding discussion has focused on the broad factors affecting instrument mix. The more technical aspects of instrument design and instrument coordination are discussed below.

**Relationship Among Interest Rates**

An effective monetary policy requires an appropriate structure of interest rates among instruments. Key concerns are to avoid creating artificial opportunities for interest rate arbitrage that allow banks to make unwarranted profits at the expense of the central bank and allowing one instrument to impede the effectiveness of another. Table 2 illustrates a structure of policy interest rates set by the central bank, including market-determined interest rates—such as those arising from open market operations—that meets those concerns.21

Reserve shortfalls must be penalized at a rate significantly higher than the cost of accessing central bank facilities (or obtaining funds in the market) to prevent their becoming a source of regular financing, which would jeopardize monetary management.22 Similarly, a lender-of-last-resort facility should be lower than the cost of a reserve shortfall, but more expensive than other central bank facilities because it serves

20For a discussion of these and other aspects of currency boards, see Balboa and Enoch (1997).

21The structure in Table 2 implicitly assumes that there are no maturity differences between the various assets or liabilities or that the yield curve is flat.

22For technical reasons, it could be argued that the cost of a reserve shortfall should be at least twice the discount rate. This is because, in deciding whether to borrow from the central bank or run the risk of a shortfall, a bank will compare the cost of borrowing with the cost of a reserve shortfall. However, while the former has a known cost, the latter is uncertain, because the bank will incur such cost only if at the end of the reserve maintenance period it does indeed have a shortfall.
Table 2. Typical Interest Rate Structure of Policy and Market Rates

<table>
<thead>
<tr>
<th>Level</th>
<th>Monetary Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>Penalty charged on shortfalls on required reserves</td>
</tr>
<tr>
<td></td>
<td>Lender-of-last-resort facility (e.g., Lombard rate)</td>
</tr>
<tr>
<td></td>
<td>Open market operations or primary market sale of securities for monetary purposes</td>
</tr>
<tr>
<td></td>
<td>Central bank rediscount</td>
</tr>
<tr>
<td></td>
<td>Open market operations or primary market sale of securities for monetary purposes</td>
</tr>
<tr>
<td></td>
<td>Standing deposit facility</td>
</tr>
<tr>
<td>Lowest</td>
<td>Remuneration of required bank reserve balances</td>
</tr>
<tr>
<td></td>
<td>Remuneration of excess reserve balances</td>
</tr>
</tbody>
</table>

Note: Short-term market rates determined by open market operations could fluctuate between the Lombard rate and rediscount rates or between the rates charged for rediscount and those on deposits made to the standing deposit facility, depending upon the settings of the instruments and the types of shocks to reserve markets.

to ensure prompt settlement of interbank obligations or (as in Germany) to set the ceiling of the corridor for interest rates. Rediscount rates should exceed rates paid on standing deposit facilities or primary bill auctions in order to prevent "round tripping" (i.e., a bank borrowing from one central bank window and then depositing or investing the proceeds at another window).

Monetary instruments that are priced by the market, such as operations in the open market or those that involve auctions (e.g., security sales in the primary market) are typically used to manage market rates within the bounds set by other policy rates, whose settings would be adjusted from time to time as conditions require.

Coordination of Instrument Design

Monetary instruments are linked technically in that the characteristics of each one help define the need for and characteristics of the others. Moreover, because they all influence monetary conditions, coordinating them closely is of paramount importance for achieving the desired stance of monetary policy.

The close linkages between instruments can be readily illustrated. Whether reserve requirements must be met on an average or on a daily basis (an example mentioned earlier) affects the use of central bank credit facilities. If a bank can draw down its reserves on a given day to meet its liquidity needs—even though it will need to compensate the
drawdown by holding more reserves at other points within the same re­serve maintenance period—it will eliminate or lessen its need to borrow from the central bank (or from the market). In addition, a bank’s ability to draw down its required reserves temporarily would help reduce day-to-day volatility in market rates and in the size of monetary operations. Similarly, the conditions of access to a central bank’s lending fa­cility will depend on those of other instruments. For instance, it would make little sense to allow banks to make a risk-free profit by borrowing freely from the central bank at an interest rate lower than what a risk-free asset (e.g., a government security) yields. Moreover, the availability of one instrument may make another one redundant. For example, it would complicate monetary management unnecessarily for a central bank to have two different lending facilities with slightly different access conditions. Nevertheless, in banking systems that have historically relied on central bank credit as a funding source, special discount facilities to supply liquidity may be needed in addition to a lender-of-last-resort fa­cility. Also, the latter can be designed as part of the credit facilities linked to the interbank payment systems. Similarly, it may be unneces­sary to have a short-term deposit facility at the central bank if the level of reserve requirements or the size of regular security issues creates a systemwide shortage of reserves and forces the banking system to bor­row at the discount window.

Market Development and Monetary Policy Implementation

When several instruments coexist, their technical features and their settings must be carefully coordinated to ensure monetary control and foster market development (or, where developed markets already exist, to facilitate their smooth functioning). Deciding on the settings of dif­ferent instruments to achieve specific monetary targets requires short­term forecasting of sources and uses of reserve money. Forecasting en­ables an informed choice of settings for different instruments, such as the level of reserve requirements, the size of the discount quota, the size and maturity of bill and credit auctions, and the volume of open mar­ket operations. The particular mix that yields the desired target for bank reserves or interest rates, however, depends on evolving condi­tions in the bank reserve market and the extent of control sought in set­ting the interest rate. A central bank could generate a systemwide short­age of reserves through one set of instruments and relieve it by granting credit at an interest rate of its own choosing. Alternatively, a central bank could provide credit through standing facilities at specified inter­est rates and absorb the surplus funds, if any, through absorption opera­tions with central bank or treasury securities or through a combination
of these instruments. The choice between these two systems of monetary operations depends on the structure of the banking system, the types of shocks affecting the supply of reserves, and the desired degree of control over interest rates.

The use of several instruments raises coordination issues not only of amounts and interest rates—already discussed—but also of the instruments’ technical design. For example, periodic auctions of both central bank and treasury securities, when used for monetary management purposes, call for coordination of the timing of auctions and the settlement periods with the calendar for the maintenance and computation of reserve requirements. The issue maturity, the auction and settlement timing, discount facilities, secondary market facilities, and other technical features of central bank and treasury securities have to be carefully aligned to facilitate monetary management and ensure the orderly functioning of markets. In practice, central bank securities are typically issued at shorter maturities than treasury paper, reflecting the monetary purposes of central bank paper.

Similarly, the simultaneous use of bill auctions to absorb reserves and credit or repurchase auctions to inject reserves requires coordination of their technical design, taking into account practices in the interbank money market, features of the reserve requirement system, and the role of the discount window. For example, features of the reserve requirement system (such as period averaging or lagged reserve accounting) would influence the interest elasticity of the demand for reserves and could affect the design and operation of other instruments. Also, it could be argued that with lagged reserve accounting the demand for reserves is inelastic for the system and the central bank must accommodate it.

The instrument mix and design are also strongly influenced by the types of shocks affecting the supply of and demand for reserves and by market development considerations. In particular, monetary systems that are subject to large payment system floats or to erratic or reversible capital movements that strongly influence the supply of reserves (supply shocks) require a fairly elastic supply of reserves to prevent unwarranted jumps in short-term interest rates. In such situations, it is desirable to allow period averaging of required reserves as a means of accommodating automatically both the day-to-day fluctuations in reserves and the lending facilities that allow automatic access. The degree of penalization of such access must be carefully analyzed both to preserve monetary control and to not penalize banks unduly for factors beyond their control.23

24For a discussion of the role of payment system float in influencing the design of instrument mix in the Russian Federation, see Sundararajan and Sensenbrenner (1994)
In addition, in systems dominated by money supply shocks, a fixed discount rate that is adjusted from time to time for monetary control purposes is likely to be preferable to variable discount rates that are automatically tied to a market rate. This is because the interest elasticity of the supply of reserves—attributable to the responsiveness of discount window borrowing—will be influenced by whether the discount rate is a penal rate set above market rates or a preferred rate generally at or below market rates, or is tied to a market rate with a margin. Insofar as a penal rate makes discount borrowing fairly inelastic with respect to market rates, other instruments (open market operations, reserve requirements) should operate in a way that responds to the shocks in the supply of and demand for reserves. If not, monetary control weakens, and interest volatility increases—particularly under shocks to money supply. In contrast, a discount window design that produces a more elastic supply of reserves (preferred rate or tied to the market) works well under money supply shocks, but weakens control of the money stock when the demand for money changes (because the latter would be more easily accommodated by the discount window) and calls for adjustments in other instrument settings (and design) to ensure monetary control.\(^{24}\)

Market development considerations also play a significant role in the design of instruments and operating procedures in general and of the discount window in particular. The choice of securities eligible as collateral in Lombard facilities and repurchase agreements or for rediscounting at the central bank has been used in several cases to promote the demand for specific classes of securities. Most common is the use of government securities in central bank operations, but use of banker’s acceptances and commercial bills of exchange is not uncommon (e.g., Indonesia, United Kingdom). More important, from a market development perspective, is the relative balance between standing facilities at the initiative of commercial banks on the one hand, and market-based operations at the initiative of the central bank on the other. The greater the role of the latter, the greater the scope for the market to find its own equilibrium and the greater the information content of market interest rates for policy purposes. For example, the central bank could reach a precise short-term interest rate target by setting a narrow corridor based on standing facilities and by intervening frequently in the market. Alternatively, an interest rate corridor could be somewhat wider (e.g., through use of a penalty rate and strict limits on discount windows, zero

\(^{24}\)See Roth and Seibert (1983) and Sellon (1980) for a discussion of the impact of discount window design on monetary control under alternative types of shocks in the U.S. context. See Langohr and Santomero (1985) for the European experience.
interest on excess reserves, and a low interest rate on the standing deposit facility at the central bank). While maintaining the corridor, the authorities could then forecast the size of open market operations consistent with the interest rate target (within the corridor) and operate at their own initiative to influence supply and demand in the interbank market. The latter approach is considerably more intensive in terms of the information and analytical demands it places on a central bank, but it has greater potential to foster market development. However, in the absence of adequate information, or in the face of major shocks to bank reserves, this approach could risk a larger volatility in interest rates. Thus, a careful balance is needed between standing facilities that limit short-term interest rate flexibility and market-based operations initiated by the central bank that allow for larger interest rate flexibility.

The question then arises as to whether central banks should design their operations so as to achieve a significant smoothing of interest rates. Most central banks in market economies strive to limit interest rate volatility and to achieve disinflation or other monetary objectives gradually, except in times of financial crisis, when sharp adjustments in the interest rate become necessary for brief periods. The traditional rationale for interest rate smoothing derives from soundness considerations. Smoothing preserves orderly conditions in the markets to avoid payment disruptions, preserves the soundness of financial institutions, and strengthens the transmission channel of monetary policy.25 For this reason, several authors advise against short-run control of the money stock because such a step could lead to large volatility in interest rates. Most central banks currently use short-run interest rate targets to achieve intermediate objectives, whether they be money, credit, or exchange rates, and generally use various mechanisms to ensure smooth adjustments in interest rates.26 Such interest rate smoothing has been achieved by switching to period averaging on reserve requirements, making the supply of central bank credit elastic at market rates, intervening in several markets, making standing facilities available, and increasing the frequency of primary issue auctions or credit auctions. In particular, central banks use a variety of fine-tuning ("defensive") operations (e.g., short-term repos) whose frequency (several times a day, daily, weekly, or longer) varies according to the precision of interest rate

25See Holmes (1969) for the argument in the U.S. context that undesirable instability in interest rates will destroy the financial mechanism that the monetary authority must use if it is to have an effect on the real economy. For a presentation of counterarguments that excessive interest rate smoothing should be avoided, see Gutten tag (1996).

26See Goodhart (1994) for the argument that, when interest rates influence money demand with a lag, attempts of short-run control of money stock through interest rate adjustments could lead to "instrument instability."
or quantity control sought by the authorities. There is inevitably a trade-off between interest rate smoothing and short-run monetary control and between short-run interest rate control through smoothing and the extent of information available from the markets for monetary policy purposes.27

In some cases, the objectives of developing the money and securities market may conflict with the implementation of monetary policy. For instance, avoiding sharp swings in interest rates is normally in line with both objectives, but not always. For example, in the event of a run on the currency or unexpected capital outflows, the appropriate monetary stance might require a sharp increase in interest rates, which could conflict with the objective of maintaining orderly conditions in the securities market and preserving the soundness of the banking system. This underscores the need for continuous vigilance to ensure that a sound banking and financial system structure is in place that facilitates the effective implementation of monetary policy.

Concluding Remarks

With well-functioning financial markets and a competitive banking industry, a single market-based instrument operated at the initiative of the central bank (e.g., repurchase agreements in the secondary market) supported by a Lombard-type short-term discount window would be sufficient. In practice, problems in the structure and soundness of the banking system, unevenness in the distribution of bank liquidity, and the need to avoid excessive volatility in interest rates, as well as market development and payment system considerations together have called for the development of a wider set of instruments and operating procedures in order to foster effective and efficient implementation of monetary policy. As argued in this paper, however, this goal can be accomplished in various ways. Changes in the economic environment, and in particular rapid financial innovation, require a frequent evaluation of the targets and instruments used to implement monetary policy. Thus, countries at various stages of economic and financial development have changed their instrument mix over the last few years. Financial liberalization has been a major force behind many of these changes, particularly—but not exclusively—in developing countries and in economies making the transition from a command to a market system. Changes in monetary policy targets and the need to harmonize and coordinate monetary instruments have been key reasons, together with financial

27On the latter trade-off. see Hardy (1997).
market innovation, for the reform of monetary instruments in industrial countries. Monetary integration in Europe is another example of these forces at work and of the continuing need to adjust the monetary instrument mix to make it optimal under ever-changing conditions.

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Design of Instrument Mix and Coordination of Instrument Design


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