

Implementing monetary policy in emerging market economies: an overview of issues

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Introduction

This paper provides an overview of monetary policy operating procedures in emerging market economies.¹ Most of the discussion reflects the situation in mid-1998. The emphasis is on general principles although in practice country-specific factors condition actual procedures. Yet there has been a certain convergence in monetary policy instruments and procedures in recent years, not only in industrial countries but also in most emerging market economies. Major forces for change have been the rapid development and deepening of a variety of financial markets and instruments, the diversification of financial institutions and the globalisation of intermediation.²

As long as the financial sector was relatively closed and dominated by commercial banks, monetary control was exercised by the setting of only two parameters: reserve requirements against demand deposits at commercial banks and the discount rate on bank borrowing from the central bank. This is what is defined in the South African paper as the classical cash reserve system. Adjustments in either parameter would induce banks to change the terms of their loans and deposits, leading

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¹ This overview draws heavily on central bank answers to a questionnaire and on policy papers prepared for a meeting of senior central bank officials on this topic, held at the BIS in early 1998.

² Extensive overviews of monetary policy operating procedures in industrial countries can be found in Borio, Claudio (1997): "The implementation of monetary policy in industrial countries: a survey". *BIS Economic Papers*, No. 47; and Kneeshaw, John T. and Paul Van den Bergh (1989): "Changes in central bank operating procedures in the 1980s". *BIS Economic Papers*, No. 23. Both studies contain extensive further references to articles on monetary policy implementation.

to changes in the economy-wide stock of money and in turn aggregate spending. Even more rudimentary techniques based on quantity controls rather than on price signals proved effective as long as financial markets remained underdeveloped and insulated from foreign influences.

Once new financial markets developed and market integration progressed, bank intermediation became less dominant. Households placed part of their savings outside the banking sector, enterprises started tapping non-bank sources of funding and banks, too, had to gain a foothold in the new markets, on both the supply and the demand side. In this new environment, the setting of bank interest rates came to depend on conditions in financial markets. Moreover, aggregate spending became sensitive to more than just bank-determined interest rates. In order to control the new channels of financial transmission new procedures had to be developed, focused on influencing the behaviour of all market participants and price formation in a variety of short-term money and interbank markets.³ As paraphrased in the Bank of Israel's paper, "It is not enough to clear the landscape, one also has to construct new modes of travelling through it".

Although the experiences and the choices made in individual countries vary widely, a number of common trends in the modernisation of operating procedures can be detected. First, the deepening of financial markets and the growth of non-bank intermediation have induced, if not forced, central banks to increase the market orientation of their instruments. In most cases (but with a few notable exceptions identified below), *a higher proportion of reserves is now supplied through operations in open markets*, with the use of standing facilities limited to providing marginal accommodation or serving as emergency finance. This, however, does not imply an erosion of the power of standing facilities in affecting liquidity conditions; indeed, it is often the marginal changes in bank liquidity which have the greatest impact on interest rates. Secondly, the increased importance and flexibility of the price mechanism in the new market environment have induced many central banks to *focus more on interest rates* rather than bank reserves in trying to influence liquidity. A third trend is that, reduced market segmentation, and thus the greater

³ The various channels through which monetary policy affects the economy in emerging market economies are discussed extensively in "The transmission of monetary policy in emerging market economies". *BIS Policy Papers*, No. 3.

ease and speed with which interest rate changes are transmitted across the entire spectrum of yields, has enabled central banks to *concentrate on the very short end of the yield curve* where, given payment and settlement arrangements, their actions tend to have the greatest impact. The move to real time gross settlement systems in several countries may increase the short-term focus of policy implementation even further. Fourthly, the greater market orientation of the central banks' instruments has been associated with a preference for *flexible instruments*. In the highly volatile financial environment marking several of the emerging market economies, flexibility in the design of the policy instruments may be particularly important. Much of this greater flexibility has come from the growing use of repurchase operations. Finally, awareness of the important role of market psychology and expectations has increased markedly. This has implications for the degree of *transparency* which central banks need to influence interest rates, their reliance on market information in formulating policies and their own tactics in *signalling* policy changes to the market.

The financial landscape

The financial landscape is one of the major factors shaping the choice of monetary policy procedures and instruments. For the central bank two important aspects of the financial environment are (a) the structure of financial markets and (b) the counterparties to central bank operations.

Structure of financial markets

Only in the most advanced economies does a fully developed structure of liquid markets offer the monetary authorities a choice of markets in which to operate and a guarantee that actions in one market will rapidly and predictably spread to other markets. In most other countries, the financial landscape is more rudimentary.

Which markets should be of greatest importance for monetary policy implementation? The *interbank market* has traditionally been key: a smooth functioning of this market reduces reliance on the central bank for settling interbank transactions. Moreover, active trading in this market by all banks will ensure a quick and even spreading of the

impact of policy-induced changes in liquidity. In the Hong Kong Special Administrative Region of China, for instance, improved efficiency of interbank payment flows enabled the Monetary Authority to abolish in late 1998 a deposit facility it had offered to commercial banks until then. A deep interbank market in foreign exchange in Singapore has been the backdrop to the active use of foreign exchange swaps as the primary monetary policy tool of the Monetary Authority.

By contrast, a highly segmented or fragmented interbank market can prevent greater reliance on market operations. Incomplete interbank development can be observed in several countries. In Colombia, the taxation of interbank transactions serves to fragment the market; in Israel, a regulation prohibiting interbank transactions in liquid assets had to be scrapped before the market could develop; in Korea, an uneven distribution of funds across the various institutions inhibits the development of transactions among them. In Russia, the interbank market is segmented with different layers of banks and interbank rates, sometimes on a regional basis; a breakdown in the payment and settlement system following the financial crisis of mid-August 1998 further exacerbated the inefficiency of the Russian interbank market and severely hampered the central bank's efforts to manage liquidity in the ensuing months of financial turbulence. In South Africa, access to accommodation and settlement accounts at the central bank used to be restricted to only a few banks, which hindered the development of a broad interbank market and constrained the central bank's operations in that market. In Peru, the high degree of dollarisation has meant that the local currency interbank market is very thin. Sometimes, the underdevelopment of the interbank market is partly the central bank's own doing. In particular, high reserve requirements on banks' liabilities, especially when they include interbank deposits, tend to inhibit interbank activity. Similarly, easy and cheap access to central bank standing facilities slows the growth of interbank liquidity management.

Monetary policy implementation is also greatly facilitated by the presence of one or more developed *markets for high-quality securities*. Often, these securities involve short-term paper issued by the central government (usually Treasury bills). Where stocks of such securities are limited – sometimes due to the absence of government deficits or, as in the case of Indonesia, the prohibition on domestic borrowing by the government – central banks have often issued their own paper. The

issuance of central bank paper is very important in Brazil, Chile, Colombia, Hong Kong, Indonesia, Korea, Peru, Poland and Thailand.⁴

High-quality securities markets can play two important roles in monetary policy implementation. First, the central bank can use these markets to conduct open market operations: while primary issuance serves to withdraw liquidity, secondary market operations enable the central bank to inject liquidity too. Secondly, high-quality securities can serve as collateral for rediscount operations or direct central bank lending. Conceptually (although not in legal terms since the underlying securities change ownership), securities perform a similar role in repurchase operations. The need for collateral for central bank lending operations is a very important motive for the Hong Kong Monetary Authority's programme of issuance of Exchange Fund bills and notes (another is the desire to establish a benchmark yield curve for private sector debt issues).

In most emerging market economies, a range of securities markets has developed, albeit to varying degrees of depth and liquidity. An important factor that has hindered the more extensive use of open market operations is the virtual absence of secondary market trading in a majority of countries. Many reasons can be cited for this illiquidity: a tendency to hold securities until maturity; the lack of a supporting institutional trading framework (brokers, dealers, discount houses, monitoring and information systems); insufficient standardisation of terms and conditions; and an immature settlement system for securities. Colombia, India, Indonesia, Korea, Peru, Poland, Saudi Arabia and Thailand identify one or more such problems in their domestic money markets.

Counterparties in central bank operations

The commercial banks are usually the counterparties to central bank operations. Two reasons may explain this. First, banks are the financial institutions which keep reserves in deposit accounts at the central bank. Secondly, banks are often the institutions directly regulated and super-

⁴ Although the Colombian central bank planned to phase out the use of central bank paper in 1998 (and to discontinue it altogether in 1999), the fear of driving up already high secondary market rates on government securities, should these be used in market operations, compelled it to continue relying heavily on its own paper in open market operations in the second half of 1998.

vised by the central bank. Where credit risk is involved in monetary policy operations, the central bank may be reluctant to transact with institutions it does not directly control.⁵ Beyond these factors, there are very few general rules.

One distinguishing factor is sometimes the type of operation or instrument. Access to standing facilities is typically limited to commercial banks. Lead times in announcing the terms and conditions of the regular keynote operations or basic refinancing operations may allow a more diversified set of counterparties, including banks, non-banks and dealers, than is the case for fine-tuning on emergency operations. In Indonesia, there are different counterparties depending on the security auctioned. The new operational system in South Africa (introduced in March 1998) restricts participation in tenders of repurchase transactions to banks, while outright operations are conducted without counterparty restrictions. National characteristics, as well as the degree of maturity, of financial markets (e.g. use of dealers and/or brokers) may often play a role too (e.g. the exclusive use of discount houses in the keynote operations of the Bank of England). Sometimes, selecting only a limited number of counterparties is intentional, so as to promote an environment of more intense competition in which financial institutions strive to achieve the status of central bank counterparty. One further important aspect may be the signalling impact of operating directly with banks or indirectly via other financial intermediaries. For instance, preference may be given to executing interbank operations via brokers rather than with a limited number of individual banks if the central bank wants all banks to be aware that it is intervening in the market. Choosing the broadest range of counterparties for a particular operation may also be useful for ensuring the rapid signalling of the central bank's policy stance. The number of counterparties can also differ substantially from one country to another. Among industrial countries, for instance, a sharp contrast exists between Germany, where all institutions subject to reserve requirements can participate in regular auctions, and the United Kingdom and the United States, where the number of counterparties in the keynote operations is very restricted.

⁵ In some countries legal constraints are imposed on the type of institution with which the central bank can deal. In Israel, for instance, the central bank can only extend domestic currency loans to, receive deposits from or deal in foreign exchange with commercial banks.

Relying only on banks as regular counterparties raises a number of issues for central banks in emerging market economies where the banking sector is often dominated by a small number of banks. In particular, they need to guard against collusion (e.g. during auctions). One such safeguard, adopted by the Central Bank of Brazil, is to limit the maximum allotment per bidder. The Bank also looks at other indicators (e.g. the dispersion of bids, the demand-to-offer ratio) to detect non-competitive practices. In Thailand, the central bank can cancel a bid if there is evidence of non-competitive behaviour. In Korea, the central bank can suspend a bank displaying non-competitive behaviour or cancel its counterparty status.

A major challenge for the central bank is dealing with a banking sector that is vulnerable or operates in a volatile environment. For instance, in the wake of the increased credit risk of their counterparties in the call market, commercial banks in Korea became reluctant in late 1997 to deal with other financial institutions, greatly increasing the volatility of call rates. The central bank therefore decided to include these institutions in the range of participants in its liquidity-providing and absorbing auctions. The issue may be of particular relevance in countries in transition with a legacy of low deposit mobilisation, directed credit, monobanking and financial market underdevelopment. Weak corporate governance, the lack of publicly available information, rudimentary risk management skills, lax supervision and market failures imply a weak financial system in many countries. These features not only undermine the efficiency of policy implementation, but also expose the central bank to a variety of credit (because of the lack of sufficient high-quality collateral) and other risks (e.g. adverse selection in that only weaker banks resort to central bank finance). Because credit auctions have often been used to give banks their first exposure to market mechanisms, they need to be designed carefully to overcome the various shortcomings of the financial infrastructure and to promote the markets in which indirect policy implementation can take place in more efficient and less risky ways.

Strategies and tactics in monetary policy implementation

When considering how best to achieve the objectives of monetary policy, the central bank has to make a number of choices with respect to

Table 1
Institutional aspects of operational procedures

	Policy decision body	Frequency of meetings	Operation department competency
Hong Kong ¹ . . .	Exchange Fund Advisory Committee	Monthly	..
India	Board of Directors	Weekly	Advisory capacity
Indonesia	Monetary Council ²	Bi-weekly	..
	Board of Directors ²	Weekly	
Korea	Monetary Board ²	Half-monthly	Choice, timing, size of operations
Malaysia	Management Committee	Weekly	Choice of instruments, timing
Singapore	Senior Management and relevant Department Heads	Weekly	Choice of instruments, size and timing of operations
Thailand	Governor upon recommendation of Money Market Committee members	Twice a week	Some discretion with respect to choice and timing of operations
Brazil	Monetary Policy Committee	Monthly and ad hoc	Advisory capacity
Chile	Central Bank Council	Quarterly on a regular basis	Choice of instruments, timing and size of operations
Colombia	Board of Governors ²	Weekly	Advisory capacity
Mexico	Board of Governors and relevant Department Heads	Daily	Maturity of operations
Peru	Central Bank Board	Weekly	None
Israel	Governor	Monthly	Extensive
Poland	Monetary Policy Council	Monthly	Advisory capacity
Russia	Board of Directors	Weekly	Limited discretion
Saudi Arabia . .	Senior Management	Regular	Advisory capacity
South Africa . .	Governors Committee	15 times per year and ad hoc	Broad direction and choice of instruments

¹ Hong Kong operates a rule-based currency board system. In consultation with the Exchange Fund Advisory Committee, the Financial Secretary exercises control over the use of the Exchange Fund which is deployed for the maintenance of the exchange value of the HK dollar and the stability of the financial system. ² Including Government participation.

the strategy to be followed and the more specific tactics to be adopted in executing policy. The institutional setting may have a bearing on strategies and tactics. Some of the country details are given in Table 1. Significant differences appear to exist in the frequency with which the primary decision-making body meets. In general, where this frequency is high, the authority of the central bank department responsible for conducting monetary policy operations is more limited than where the policy decision body meets at longer intervals.

Whatever the institutional set-up, a number of strategic issues will need to be faced by the policy-makers, relating to: the selection of intermediate and operational objectives of monetary policy; the choice of key or target operating interest rate; and the degree of volatility of key interest rates to be allowed.

Intermediate targets

In many countries, financial liberalisation and development have eroded the once important role of explicit intermediate targets in monetary policy implementation. In the industrial world, most central banks have chosen either to make the exchange rate the dominant policy indicator or to have their policies guided by a sometimes wide range of indicators of development in the financial markets and the real economy. In recent years, several central banks have geared policy to an explicit forecast of inflation. Among the emerging market economies, Chile and, since 1999, Poland are examples of countries in which the central bank has shifted its focus towards formulating more explicit inflation targets. Very few central banks, with the major exceptions of the newly established European Central Bank and the Swiss National Bank, attach much importance to a broad money growth target in either deciding upon or explaining monetary policy.

In the emerging market economies, intermediate targets for specific monetary aggregates continue to be specified in several countries (see Table 2), suggesting that the shift away from explicit money targets has been somewhat less pronounced. Sometimes, money targets are seen as the most effective way of constraining government finances. Nevertheless, many countries using money targets do so only in an indicative way, supplementing them with other variables such as interest rates, exchange rates and expected inflation.

Table 2
Intermediate targets of monetary policy

	Main target(s)	Supporting indicators
Hong Kong . . .	Exchange rate ¹	
India	M3 ¹	Interest rate; exchange rate; credit
Indonesia	M1, M2, credit ¹	Interest rates
Korea	M3 ²	M2; MCT (M2 + CDs + Money in Trust); interest rate; exchange rate
Malaysia	None	Money supply (M1, M2 and M3); exchange rate; credit
Singapore	Exchange rate target band	Interest rates
Thailand	Broad M2	Interest rates; M1; M2; credit
Brazil	Monetary base; amplified monetary base; M1; M4 ¹	
Chile	None	Overall consistency of spending and output with target inflation and external balance
Colombia	Monetary base	Exchange rate; interest rate
Mexico	Monetary base ¹	Exchange rate; expected inflation
Peru	Monetary base	Interbank rate; exchange rate; balance required reserves
Israel	None	Inflation expectations; M1; budget deficit; current account; aggregate demand
Poland	Broad money ^{1,3}	
Russia	Exchange rate band	M2
Saudi Arabia . . .	Exchange rate ¹	Inflation and balance of payments
South Africa . . .	M3 ¹	Private sector credit; interest rates; foreign exchange reserves; effective exchange rate

¹ The target is made public. ² Adopted following the financial turmoil in late 1997. ³ Dropped in early 1999 when explicit inflation targeting was adopted.

Operating targets

The daily implementation of monetary policy is guided by operating targets. Unlike in industrial countries, where the choice of operating

target has almost universally been narrowed down to a short-term interest rate. Table 3 suggests that in the emerging market economies the shift towards interest rate targeting has not been as pronounced. In several countries, *bank reserves* or the somewhat broader concept of the *monetary base* continue to serve as the operational focus of monetary policy implementation. This may reflect a perception in these countries that bank reserves have a reliable and predictable influence on the broader monetary aggregates (i.e. that the money multiplier has remained stable or that the classical cash reserve system is still relevant). A second interpretation may be that price signals are less reliable than in more stable and well-developed financial systems. The Bank of Mexico argues that the rapidly shifting level of interest rates in an unstable inflation environment (or in the immediate aftermath of a financial crisis) provides a noisy and perhaps distorted echo of the stance of monetary policy. The central bank may then prefer to achieve a quantitative target rather than a price target. Often, too, disinflation episodes are supported by IMF programmes in which targets tend to be defined in terms of critical items of the central bank's balance sheet – partly because these elements are more directly under central bank control.⁶

However, many central banks have found that movements in the monetary base have been volatile and not always closely related to economic or broader monetary conditions. In addition, financial deregulation and liberalisation have enhanced the role of the interest rate in the monetary transmission mechanism. For these reasons, almost all of the central banks surveyed in Table 3 have chosen to assign to a short-term money market interest rate at least an important subsidiary role in their day-to-day policy implementation. Even in those countries subscribing to a monetary target, such as Russia and Peru, movements in interest rates are carefully considered in order to manage day-to-day liquidity. The most notable exception is Mexico where interest rates were not given an operational role in the policy framework put together in the wake of the peso crisis of late 1994/early 1995. The Bank of Mexico targets a particular level of the sum of the daily positive and negative (overdraft) settlement balances held by commercial banks at the central bank.

⁶ An example is the loan agreement between Thailand and the International Monetary Fund concluded in the wake of the country's 1997 financial crisis, which sets a ceiling on net domestic assets of the central bank, resulting in an upper limit to the size of the monetary base.

Table 3
Operating targets of monetary policy

	Main target(s)	Subsidiary objectives
Hong Kong . . .	Exchange rate	
India	Bank reserves	Bank rate; 3 to 14-day repo rates
Indonesia	Currency and bank reserves	Interbank rates
Korea	Bank reserves; Overnight call rate	Exchange rate
Malaysia	Three-month central bank intervention rate	
Singapore	Exchange rate	Interbank rate
Thailand	Monetary base	Interbank, overnight and one-month repo rates; exchange rate
Brazil	Overnight repo rate (SELIC-rate)	
Chile	One-day interest rate in real terms ¹	
Colombia	Overnight rate	
Mexico	Cumulative balance of bank reserves ¹	
Peru	Monetary base	Interbank rate; exchange rate; balance required reserves
Israel	Interest rate on short-term loans to and deposits of banks	
Poland	Short-term interest rate ^{1,2}	
Russia	Minimum target for net foreign assets; maximum target for net domestic assets of the central bank during the month and the exchange rate daily	Treasury bill yield; overnight interbank rate
Saudi Arabia . . .	Bank reserves and overnight repo rate	
South Africa . . .	Overnight Bank rate until March 1998; overnight repo rate thereafter	

¹ The target is made public. ² Dropped in early 1999 when explicit inflation targeting was adopted.

Interest rates and the exchange rate are thus allowed to move freely according to market conditions. Up until late 1998, experience with this operating framework showed that even marginal changes in the

cumulative reserve target could bring about significant and rapid price adjustments in money and foreign exchange markets. Financial turmoil in late 1998, however, seemed to erode the signalling power of a “short” overall position imposed on the banking sector.⁷ Unless there is evidence of speculative activity, the Bank of Mexico’s tolerance for volatile overnight rates has generally been great.

Which interest rate as operating target?

Which money market interest rate should the central bank focus on as the main (or subsidiary) operating target? Often, the operating target is the overnight rate, which is mainly determined in the interbank market for settlement balances: this is the case in most industrial countries and in several of the emerging market economies included in Table 3 (e.g. Colombia, Hong Kong, Israel, Korea, Russia, Thailand and South Africa). The reason for this preference may be practical: the overnight rate is usually the rate which the central bank can control most easily. Being the monopolist supplier of bank reserves (settlement balances) and being able to affect the demand for them through a system of required reserves and/or by determining the terms of interbank clearing and settlement, the central bank can in theory control the overnight rate with a high degree of precision.⁸ Indeed, its greatest influence is almost invariably exerted in the overnight market.

Yet central banks may be hesitant to focus policy exclusively on the overnight rate. First, the overnight rate can be prone to sudden changes that reflect technical adjustments (e.g. related to the details of the system of reserve requirements, seasonal factors, errors in projecting the autonomous sources of liquidity) which the central bank may not want to counteract. Central banks may be concerned that their tolerance of (very short-term) swings will be misinterpreted as changes in the stance of monetary policy. Secondly, the structure and characteristics of the financial system may be such that the overnight rate plays a relatively

⁷ In addition, in order to increase its ability to directly affect interest rates, the Bank of Mexico imposed mandatory (remunerated) deposits on the banking system in September 1998 (see the section on reserve requirements).

⁸ Another interesting explanation of the growing operational significance of the interest rate is that growing central bank independence has made it possible to substitute the operational efficiency of targeting an interest rate for the politically expedient practice of choosing a quantitative monetary target.

modest role in the monetary policy transmission mechanism. In those cases where interest rate changes are not transmitted smoothly or predictably from the overnight market to the other segments of the money market, central bank control of the overnight rate may not have the desired effects over the entire yield spectrum.

Money market rates with longer than overnight maturities may be more relevant for the pricing of loans and deposits or as benchmarks for longer-term financing. If control of the overnight rate comes at the cost of greater volatility of rates at the more relevant maturities, overall monetary control could be compromised.⁹ The experience of the United States and the United Kingdom illustrates this point. The Bank of England has adopted the short-term interest rates in the one to three-month maturity range as its operating target because commercial banks' base rates are linked closely to longer-term money market rates. By contrast, the (overnight) federal funds rate is the benchmark for the pricing of loans, making this rate the natural focus of monetary policy operations in the United States.

In the emerging market economies, similar contrasts can be observed and this may well have implications for the tactical choices made by individual central banks. In Brazil, Korea, Saudi Arabia and South Africa, the overnight rate serves as the benchmark for the short end of the yield curve, while in Israel the overnight rate on central bank loans (until 1996) and on deposits (since 1997) determines the prime rate charged by commercial banks which, in turn, is key to the pricing of domestic currency loans and deposits throughout the banking sector. In Hong Kong and Mexico, one to three-month rates are the main benchmark interest rates.¹⁰

Given that the ability to set objectives at more than one maturity is quite limited, central banks may select a short-term interest rate with a longer maturity than the overnight rate as their operating target (as in the United Kingdom). In India, for instance, the three to 14-day repo, seven day rate is considered an important (subsidiary) operating target. In South Africa, the seven-day repo rate was initially the focus of policy

⁹ While trying to influence rates at somewhat longer money market maturities, the central bank may rely on techniques such as averaging of required reserves and standing facilities to give greater stability to overnight rates (see below).

¹⁰ However, the Hong Kong Monetary Authority has adopted the overnight US federal funds target rate as its operating target.

when the new operating system was introduced in early 1998; in the course of the year, however, the overnight repo rate was retained as the operating target. The choice of operating variable may also be related to the design of the central bank's instruments. If the central bank supplies most bank liquidity through operations of a specific maturity, it is likely to have a large and direct influence on rates at the corresponding maturities and may choose to adopt these rates as its operating objective.

Focusing on longer-term rates, however, has its costs. First, control will be significantly less than in the market for bank reserves, given that the central bank is not likely to exert a dominant influence on either the supply or the demand side. Secondly, the central bank may wish to leave price formation in these longer-term markets free because it wants to use the information from (freely determined) interest rates in these markets to monitor private sector views and expectations. Finally, concentrating on longer-term markets may greatly increase volatility of the overnight rate. For instance, where the need for end-of-day settlement balances is the binding variable in banks' demand for reserves, the attempt to meet operating objectives at longer than overnight maturities may imply accepting or encouraging potentially large movements in the overnight rate.

Volatility and interest rate corridors

How much volatility should the authorities allow for in the key operating rates underlying their policy strategy? Under normal circumstances, most central banks attach importance to a smooth trend in their key short-term interest rates and are willing to apply their instruments towards reducing volatility. First, as already argued, volatile interest rates can obscure the policy signals. Secondly, more orderly market conditions are often seen as promoting a more rapid and more predictable transmission of monetary policy. Thirdly, less volatile interest rate conditions may help financial institutions better assess and manage (and reduce their exposure to) interest rate and market risks. Finally, securities dealers who finance their activities by frequently borrowing in very short-term markets stand to benefit greatly from stable rates in these markets; in turn this may promote the development of the money markets in which the dealers operate.

At the same time, there are several reasons why few central banks advocate eliminating interest rate volatility altogether (even if they have had perfect control over the market rate). First, too strict control over interest rates may deter the development of money markets. The South African paper cites this reason for not including arrangements to constrain interest rates in its new operating system. Moreover, in deciding on its policy stance, the central bank may want to let short-term interest rates reflect the build-up of liquidity pressures. Too little volatility may cloud these market signals. Finally, in crisis situations, quick and sharp adjustments in interest rates may be necessary. The facilities or practices in place to restrain their movement may then delay the authorities' ability to respond to the crisis. Especially in countries with some degree of market segmentation, the monetary authorities have welcomed an overnight rate that can sharply and rapidly react to, for instance, exchange rate pressures. In effect, allowing the volatility in the overnight rate to absorb such temporary pressure could enable the authorities to preserve stability in more crucial money market rates.

In the market for bank reserves, the central bank could use a number of techniques to contain the volatility of interest rates: these will be discussed in greater detail in subsequent sections. One technique used in several countries is the averaging of reserve requirements over the maintenance period. Changes in liquidity of a more technical nature could then be absorbed by adjusting the balance in the banks' required reserve account at the central bank without giving rise to interest rate changes. Another technique is the use of standing facilities to define an interest rate corridor, bounding the fluctuation range for interest rates.¹¹ Typically, the ceiling of the corridor is a lombard-type credit facility, whereas the floor is a deposit facility with a low rate of return. If no such deposit facility exists, a subsidised lending facility (e.g. a discount window at below-market cost) could serve the same function (as it does, for instance, in Brazil and Germany prior to the launching of the euro): banks would have an incentive to pay back these loans if excess liquidity pushed market interest rates below the initial level of the discount rate. Of course, the central bank could fine-tune its market operations to smooth the movement of the overnight and other money market rates. Indeed,

¹¹ Because of the likelihood of major uncertainty at the start of monetary union in Europe in 1999, with potentially significant implications for interest rate volatility, the European Central Bank decided to introduce an interest rate corridor through the use of standing facilities.

in many countries the central bank tries to steer the overnight interest rate even when a formal interest rate corridor exists. Obviously, the analytical demands and the degree of precision of liquidity projections need to be much higher in cases of more active interest rate smoothing, especially in a volatile environment in which autonomous changes in liquidity can be large and sudden.

Brazil, Colombia and, until September 1998, Hong Kong have put in place formal interest rate corridors for limiting the fluctuations of the overnight rate.¹² Except for Colombia, where the corridor is established through the sale of central bank paper and repurchase operations in Treasury bills, formal standing facilities are used to define the corridor. In Hong Kong, the previous corridor system was binding at the end of the day when the banks could access the Monetary Authority's Liquidity Adjustment Facility (LAF). During the day the Facility was closed and interbank rates could move beyond the margins set by the LAF bid and offer rates. This arrangement offered the twin advantage of creating greater interest rate stability while still allowing the central bank to identify sources of liquidity pressure in the course of the day. A more informal corridor has been adopted by the Reserve Bank of India: a floor tends to be set to the overnight rate by the fixed tender rate on liquidity-absorbing repos, while the above-market Bank rate on the export refinance facility and the general refinance facility defines a ceiling. In principle, the Bank of Israel could enforce a corridor using its lending operations and deposit facilities.

Special characteristics of the facilities supporting the corridor can have implications for its effectiveness. In some countries the maturity of the loan or deposit facilities is different from that of the interest rate for which they are assumed to define a ceiling or floor. Access to the facilities is usually subject to some restrictions. In Hong Kong, the degree to which banks can obtain credits from the Monetary Authority depends on their holdings of Exchange Fund notes and bills. Moreover, a schedule of discount rates (related to the Base rate) is applicable for different percentage thresholds of holdings of Exchange Fund paper. Typically,

¹² Modifications were made to the interest rate corridor systems in Brazil and Hong Kong in the second half of 1998. In Brazil, the cheaper credit facility was closed between early September and mid-December in the face of heavy capital outflows, thus forcing the commercial banks to seek funds from the more expensive credit window. In Hong Kong, the deposit facility was discontinued, while the credit facility and the interest rate charged on it were renamed the Discount Window and the Base rate.

only a very limited amount of credit can be obtained (and thus repaid in conditions of excess liquidity and falling interest rates) in the case of subsidised lending facilities. Often, penalty rates are charged to frequent borrowers.

A related issue is the ideal size and frequency of interest rate adjustments. Very few central banks in the emerging market economies have adopted a formal position in this respect. In the interest of promoting orderly market conditions, several central banks express their preference for a policy of small, gradual changes at regular intervals (e.g. Brazil, India, Indonesia, Korea and Saudi Arabia). Fears of overshooting, and thus of having to backtrack and lose credibility, can also motivate the preference for changing the operational interest rate only by small amounts. Moreover, if the central bank is credible and transparent, changes tend to be infrequent as the market often moves in anticipation of a central bank initiative. However, it is worth bearing in mind that the central bank may not have much discretion in this area and that external market conditions (Poland) or the degree to which the inflation target is being reached (Israel) largely dictate the size and frequency of interest rate adjustments. Similarly, in those cases where tight exchange rate pegs are adopted, such as Argentina, Hong Kong and Singapore, the exigencies of the exchange rate regime mean that sudden jumps in interest rates may have to be accepted. Political factors can also play a role: in view of the high profile of the Bank rate in South Africa prior to March 1998, the Reserve Bank usually adjusted this rate only in large and infrequent steps.

Monetary policy and the public sector

Policies of the public sector and the monetary authorities may not be consistent. Potential general areas of conflict that could impinge on the operational efficiency of the central bank include the public airing by the Treasury or Ministry of Finance of views that are contrary to those held by the central bank, the imposition of exchange rate regimes that complicate monetary policy, and the stance of fiscal policy in general. There are, however, also a number of areas in which the relationship between the public sector and the central bank may lead to specific operational problems; those discussed here often arise as a result of state-owned

financial institutions, the central bank's role as banker of the public sector and public debt management.

State-owned financial institutions

In many countries, large *state-owned banks and/or a government-run postal system* continue to play an important role in the banking system. In some countries, local or regional banks have been established by powerful local governments. Often, too, financial institutions, such as development banks, have been set up with the objective of financing projects given high political priority. Such banks could complicate the implementation of monetary policy in two important respects. First, explicit or implicit deposit guarantees or bailout promises may make these institutions less responsive to interest rate adjustments or to the policy signalling of the central bank. The Saudi paper later in this volume notes that: "The presence of government-sponsored institutions which are under little pressure to maximise profits tends to diminish the responsiveness of loan and deposit rates to monetary policy." Moreover, their interest rates may be set by government agencies at levels that reflect political objectives but are incompatible with market conditions. (In addition, there is the more general problem that the presence of these institutions in the market could have implications for the soundness of the financial system and force the central bank to subordinate its monetary policy objectives to safeguarding or redressing the soundness of the financial system.) Monetary policy implementation may thus be constrained, be less predictable, or require the use of direct controls in the central bank's dealings with state-owned institutions.

A second impediment to efficient policy implementation is that these institutions may be prone to conditions of either excess liquidity or liquidity shortage. In some cases their main function is to collect the public sector's tax receipts or to manage the accounts on which salaries of public sector employees are paid. At particular periods they may consequently hold large amounts of liquidity. Moreover, state guarantees may attract many depositors to these institutions, further aggravating the problem. Other state-owned banks may have a tendency to overinvest in longer-term government paper, causing them to face a quasi-permanent state of low liquidity. The structural liquidity imbalances experienced by different types of state-owned financial institution are likely to

complicate the efficient distribution of bank liquidity in the interbank market and to cause sharp fluctuations in the overnight rate when the imbalances are particularly marked. The central bank may then be forced to continue relying heavily on standing facilities, even though it may prefer to manage liquidity through market-based procedures.

For most emerging market economies, problems with state financial agencies or state-controlled financial institutions do not seem to have arisen, or have been corrected in the past. Even though state ownership of financial institutions is still relatively substantial in several emerging market economies, their behaviour is considered to be broadly compatible with that of private commercial banks. Only in the cases of Poland and Russia do state savings banks appear to derive a privileged position from their extensive network of branches and from state guarantees, reducing the efficiency of monetary policy. In Saudi Arabia, too, specialised credit institutions can lend at government-influenced interest rates, although this practice does not appear to constrain the implementation of monetary policy. The same applies in India and Korea, where interest rates of the postal savings system are set by the government but often shadow the rates offered by commercial banks.

Public sector accounts at the central bank

The *banking relationship between the central bank and the public sector* can be an important component of bank liquidity changes. At periods of intensive revenue collections and disbursements, the transfer of public funds to and from the central bank could act to disturb the level of bank reserves. Even when no flow of funds between the central bank and the commercial banks accompanies public sector transactions, and overall bank liquidity thus remains unchanged, public sector operations could complicate liquidity management if they give rise to pronounced liquidity imbalances among commercial banks and in turn to frictions in the interbank market. Moreover, active financial management by the Treasury of its own funds using commercial financial institutions could interfere with the management of short-term interest rates by the central bank.

In general, however, how far deposits and withdrawals by the public sector complicate liquidity management depends on the extent to which these transactions take place through changes in the balances of the government accounts held at the central bank, as well as on their

predictability. Government access to credit from the central bank is a further complication. A summary of arrangements with respect to central bank deposits from and credit to the central government is provided in Table 4.

Although in all countries under consideration the government holds some deposits at the central bank, the extent to which the central bank acts as government banker varies widely. In Brazil, India, Israel, Korea, Poland, Russia and Saudi Arabia, (virtually) all central government transactions lead to changes in the deposit liabilities of the central bank; by contrast, in Hong Kong only the surplus on the Treasury's account, and in South Africa a small balance (given that the Reserve Bank does not pay a remuneration), are kept on the books of the central bank. Moreover, in a number of countries (e.g. Hong Kong, India, Malaysia, Mexico, Russia, Saudi Arabia and Thailand), special government bodies, state governments and/or public enterprises are allowed to maintain accounts at the central bank.

The quasi-universality of the central bank as banker for the government sector in emerging market economies (as well as in industrial countries – only in Austria and Sweden does the central bank not hold government deposits) is rather surprising given that government revenues and expenditures can display erratic and variable patterns and as a result can give rise to major problems in managing bank liquidity. The desire to delegate the portfolio management of the large financial resources under government control to a neutral, non-commercial entity is probably an important reason why the central bank tends to be chosen as the main banker of the central government.

To alleviate problems of liquidity management, some countries have taken steps to improve the predictability of swings in government deposits at the central bank through formal or practical arrangements. For instance, in Brazil, income tax receipts and disbursements via the central bank follow a pre-specified schedule; special, large transfers require prior notification. In Mexico, a one-day notice of transfers has to be given, while in Peru a committee including representatives of the central bank, the Treasury and the Banco de la Nación (the government's main banker) convene on a monthly basis to forecast government budget transactions; greater detail is provided in the weekly forecasts of the Banco de la Nación. In Malaysia, frequent meetings are held with the Treasury to discuss the cash flow needs of the Government and prior notice has to

Table 4
**Relationship with the central government:
lending, deposits and debt management**

	Lending	Deposits			Debt management
		All	Only part	Special arrangements	Transfers at central bank discretion
Hong Kong			*		
India	*	*			*
Indonesia	(*)		*	*	
Korea	*	*			(*)
Malaysia	*		*		*
Singapore			*	*	*
Thailand	(*)		*		*
Brazil	(*)	*		*	
Chile				*	
Colombia	(*)		*	*	*
Mexico	*		*	*	
Peru			*	*	
Israel	*	*			
Poland		*			*
Russia		*			
Saudi Arabia . .	*	*			*
South Africa . .	*		*		*

Notes: **Brazil:** Central bank is prohibited from buying newly-issued Federal debt but can renew its existing stock of Treasury bills and notes. **Colombia:** No credit has been granted since 1992 other than in exceptional circumstances at the central bank's discretion. The central bank administers public debt but does not decide on terms/timing. **Hong Kong:** Most government deposits are kept at commercial banks, but surplus funds can be deposited at and managed by the Monetary Authority. **India:** Advances for temporary mismatches. Overdrafts exceeding ten consecutive working days to be phased out as from April 1999. **Indonesia:** Possibility of credit to public enterprises for food price stabilisation and liquidity credits to banks for financing special government programmes. **Israel:** Bridging loans restricted in size relative to the budget, as well as loans for repaying long-term loans to the central bank. The Bank may finance government excess foreign exchange spending by buying government bonds. **Korea:** Central bank administers issue/redemption of government securities but timing and terms are decided by the Ministry of Finance and Economy. **Malaysia:** The Central Bank Act 1958 stipulates that any advances to the government should not exceed 12.5% of the budget revenue and must be paid no later than three months after the end of the financial year in which it is granted. The central bank determines the lending rate. The government has never used this facility. **Mexico:** Overdraft is limited to 1.5% of the budget; purchases of government paper only by placing bids at the primary auctions and for replacing maturing debt. Purchases from secondary market only through public auction; terms and timing of issue/redemption of government securities; administered by the central bank, are decided by the Ministry of Finance. **Poland:** Direct credit is to be disallowed in 1998. **Russia:** The central bank administers public debt but does not decide on terms/timing. **Saudi Arabia:** Lending for temporary cash requirements only. **South Africa:** Direct lending possibility has not been used in the last decade; some limited direct government purchases are possible. **Thailand:** Central bank can buy government securities to finance a budget deficit. These securities can be issued for an amount of up to 20% of the government's budget and 80% of repayment of principal.

be given in cases of large transfers. In Colombia, an agreement regulates the average government balance to be kept at the central bank. In Indonesia and Singapore, arrangements for the collection or transfer to the central bank of tax receipts are designed to smooth movements in the government's account. In Israel, a law specifying the pace of fiscal deficit reduction and a predictable seasonal pattern of government spending and revenues minimise the surprises in budget execution. In Korea, the introduction of a new government scheme in early 1997 involving the use of surplus funds held at the central bank for lending to financial institutions was associated with the creation of a mechanism for consultation with respect to the timing and the scale of these transfers. In Thailand, large deposits and withdrawals usually occur on a regular schedule.¹³

The experience of many industrial country central banks is that, notwithstanding attempts at coordination, swings in the government's financing position have frequently disrupted the central bank's management of liquidity. One solution is to prevent the government placing balances (or surplus balances that exceed projected levels) with the central bank or in the overnight market. Another solution is to penalise the government by paying a lower interest rate on excess balances.

At certain times, cooperation between the central bank and the Treasury with regard to the depositing of government funds could be a useful tool of monetary management. For instance, several Asian economies had to cope with large capital inflows before the recent crisis: as public finances showed significant surpluses, the depositing of government funds at the central bank helped to sterilise part of the rising stock of international reserves at the central bank.

Several central banks have the authority to shift at their own discretion the Treasury's deposits between their books and the commercial banks. This can be a very useful weapon of monetary management especially in those circumstances where the timing and expected short duration of disturbances in bank reserves make it difficult to offset them

¹³ In the United States, the Treasury tries to keep a steady working balance at the Federal Reserve, and to place additional funds in special accounts at commercial banks that have agreed to accept them. Various requirements apply to these special accounts, making banks at times reluctant to accept excess Treasury cash and thus creating volatility in the Treasury's working balances at the Federal Reserve.

through operations in securities markets. Moreover, transfers of government deposits can affect bank reserves and thus have a direct impact on short-term interest rates. This practice is very common in Canada; in the emerging market economies, the transfer of government deposits has been applied in Malaysia and South Africa. In South Africa, transfers are rather passive in the sense that they seek to neutralise the impact on bank liquidity of changes in the distribution of government funds between the central bank and the commercial banks. In Malaysia, by contrast, transfers of government deposits between the central bank and the commercial banks have been used as a more active instrument of monetary policy.

Government borrowing and the central bank

In many industrial countries, *direct central bank credit to the government* (e.g. central bank loans or central bank purchases of government debt) has been limited to avoid a potential loss of monetary control.¹⁴ In the emerging market economies, lending to the central government (or even to local governments or public enterprises as in India, Indonesia and Mexico) continues to be more widespread. However, open-ended access to credit facilities at the central bank no longer exists: in all countries limits are imposed on the amount, maturity, purpose or frequency of recourse to central bank credit. Therefore, credit to the public sector in the major emerging market economies would not appear to be as important a constraint on monetary discipline as in the past. Moreover, as recourse to central bank credit diminishes, experience in industrial countries has shown that governments become more keen to manage the bulk of their liquidity outside the central bank. This limits the impact on bank liquidity of flows in and out of the Treasury's account at the central bank.

Public debt management can also have implications for monetary policy implementation. The timing and size of public sector debt operations which are most advantageous from the perspective of the public sector may conflict with the central bank's strategies of bank liquidity management. The conflict could be most acute in countries with high

¹⁴ In the United States, for instance, the Federal Reserve System is not allowed to participate in auctions of new Treasury issues and, in refunding operations, cannot subscribe for more than the amount of maturing securities it holds.

inflation and substantial government borrowing requirements, given that the high interest rate policy which the central bank would like to pursue is likely to lead to tensions between the latter and the Treasury, particularly when the maturity of government debt is rather short. Often, pressure is put on the central bank to stabilise yields at relatively low levels. Another problem can arise when the central bank is heavily relied upon to develop securities markets for government financing. The South African paper indicates that, in those cases where the central bank is also a market-maker in government debt, this function may be difficult to separate from its monetary policy-motivated operations. The problem in South Africa was resolved in 1998 by creating primary dealers.

To defuse potential conflicts in debt management, many countries have set up mechanisms of coordination and consultation between the central bank and the Treasury; less often, the management of public debt is fully delegated to the central bank. In Colombia, Korea, Mexico and Russia, the central bank administers the public sector's debt programme, although the main responsibility for deciding on the terms and timing of new issues rests with the Treasury. The central bank acts in an advisory capacity or participates in debt management committees in Brazil, Mexico, Poland, South Africa and Thailand. In India, Malaysia and Saudi Arabia, debt management is largely in the central bank's hands.

Autonomous factors of bank liquidity

The previous section described some of the difficulties that can arise if the central bank is the Treasury's main banker. Government transactions then directly affect the central bank's balance sheet, in turn necessitating offsetting measures to insulate bank reserves from undesired flows in and out of the Treasury's account. However, such government transactions are not the only items which can change the central bank's balance sheet and over which it has little control. Other exogenous factors that can cause such changes are net foreign assets, currency in circulation and special items, such as valuation changes. These sources of liquidity creation/withdrawal largely beyond the control of the central bank are often grouped under the heading "net autonomous position". By contrast, those balance sheet items that are closely under the central bank's control – mainly lending to banks and operations in open markets –

are usually classified as the “net policy position”. Bank reserves are influenced by both the autonomous factors and the policy variables. This conceptual framework often underlies the forecasting exercises which many central banks conduct on a regular basis and with planning horizons ranging from one day to several months (Table 5). The length of the maintenance period for required reserves sometimes conditions in a major way the choice of a particular planning horizon.

For most of the early part of the 1990s many emerging market economies are likely to have experienced structural (i.e. autonomous) surpluses of bank liquidity. In the light of rapid international reserve growth, a very large autonomous source of liquidity inflows was net foreign assets. In currency board regimes, such as Argentina and Hong Kong, where a tight link exists between foreign exchange reserves and

Table 5
Liquidity forecasting features

	Planning horizons	Most unpredictable item
Hong Kong . . .	2 days (revised almost on a real-time basis)	Net foreign assets
India	2 weeks	Government
Indonesia	Weekly	Net foreign assets
Korea	15–16 days	Government and currency
Malaysia	1 day	Government and currency
Singapore	No formal forecasts	Government
Thailand	1 month and 1–2 days	Government
Brazil	1 month	Net foreign assets
Chile	1 month (daily revisions)	Net foreign assets
Colombia	1 week	Bank reserves
Mexico	1 day	-
Peru	1 month and 1 day	Government
Israel	1 month (daily revisions)	Net foreign assets
Poland	2 days, 2 weeks, 1 month	Government and net foreign assets
Russia	No formal forecasts	Government
Saudi Arabia . .	No formal forecasts (but short-dated liquidity is watched)	-
South Africa . .	1 to 6 months (regularly revised)	Government

domestic money creation, net foreign assets in principle are the prime determinant of bank liquidity. In industrial countries the importance of net foreign assets tended to be much more modest over this period, possibly reflecting the greater reliance on floating exchange rates in the major developed countries.

By contrast, net lending to the government is likely to have given rise to autonomous bank liquidity outflows in several countries. In Asia, fiscal surpluses in the first half of the 1990s tended to boost the positive balances in government accounts at the central bank. The Latin American case may have been one of significantly improving fiscal discipline in the 1990s, requiring less recourse to central bank financing.

Currency in circulation often has been an important factor absorbing bank liquidity. Especially in those economies recovering from a past history of high (Brazil, Peru) or suppressed (Poland, Russia) inflation, the public's readier acceptance of banknotes has made currency one of the more dominant exogenous causes of changing bank liquidity – a manifestation of remonetisation. As inflation stabilises and financial deepening proceeds, the impact of changes in currency holdings on liquidity growth is likely to decline (although the spread of automated teller machines has tended to increase the use of currency for transactions in some industrial countries). The impact of this factor indeed tends to be smaller in the most advanced emerging economies and in the industrial countries in general.¹⁵

Even though ex post particular exogenous components of the central bank's balance sheet may show on average a strong tendency to add to or subtract from bank liquidity, their behaviour ex ante may be very difficult to predict. (For this reason, the terms "structural" or "medium-term" trends should be used with caution.) Table 5 shows which balance-sheet components central banks consider most difficult to forecast. Often, government spending is identified as the hardest item to predict. Difficulties in forecasting the impact of government financial operations on the central bank's balance sheet frequently reflect the absence of reliable arrangements to make the flow of government funds in and out of central bank accounts easier to predict (see the previous section), as well

¹⁵ Another autonomous factor affecting reserves could be «float», which is generated when cheques are processed more slowly (i.e. debited more slowly from the account of the banks on which the cheques are drawn) than the agreed schedule for crediting the reserve accounts of the bank presenting the cheques.

as the impact of the seasonal and random fluctuations in the government's cash position on the residual credit lines which the government has with the central bank in many countries. Net foreign assets also remain hard to predict in several countries. For instance, in Colombia special factors such as foreign exchange receipts from the privatisation of public utilities can at times make the forecasting of net foreign assets particularly uncertain.

Demand for central bank reserves

In practice, institutional rules governing the relationship between commercial banks and the central bank establish the demand for bank reserves and hence play an important role in the design of operating procedures. In some countries, payment system rules require that banks maintain settlement or working balances at the central bank that are adequate to clear their expected end-of-day obligations: the chosen size of these balances is in part dictated by the conditions under which banks can obtain central bank credit for this purpose. More often, however, banks are obliged to keep larger central bank reserve balances than they would hold for settlement or working purposes. These institutional characteristics allow the central bank to predict a baseline demand for reserves which, in combination with a forecast of the autonomous liquidity position, enables it to calibrate its operations aimed at supplying bank reserves.

Reserve requirements normally constitute the binding variable determining the marginal demand for central bank reserves for the majority of emerging market economies.¹⁶ This is not surprising given the high reserve requirement ratios in place in many countries. However, three exceptions are noteworthy. Hong Kong has no statutory reserve requirements. In Mexico the average requirement is zero.¹⁷ And in Russia, banks' use of their holdings of required reserves for settlement

¹⁶ At certain periods the binding constraint can become the need to hold settlement balances.

¹⁷ As noted above, a mandatory deposit at the Bank of Mexico was imposed on commercial banks in early September 1998. The banking system was required to deposit 1.2 billion pesos each trading day until a total of 25 billion pesos was accumulated with the distribution per bank being a function of the individual banks' total liabilities at the end of June 1998.

purposes is limited in practice by the large amount of paperwork involved.

The demand for bank reserves tends to be rather interest inelastic, especially at the end of the reserve maintenance period when the demand curve may be completely vertical. Averaging provisions for required reserves, discussed in greater detail below, may allow some greater interest rate sensitivity of the banks' demand for reserves, especially during the early and middle part of the maintenance period. Nevertheless, the additional degree of interest sensitivity is in practice limited, in particular when required reserve holdings are only slightly higher than the typically basic level of precautionary clearing and settlement balances banks would want to hold in the absence of a system of reserve requirements. Moreover, individual banks may not want to accept very large deviations from their average reserve position for fear of not being able to adjust their position later in the maintenance period – this concern would tend to grow as the number of days remaining in the maintenance period becomes smaller – or for fear of having to do so at an interest rate which may turn against them, a concern which large banks that account for a large share of interbank activity may experience in particular. In practice, therefore, banks tend to pursue a smooth pace of reserve accumulation, largely independent of interest rate movements.

At times, the demand for reserves could also be unstable. When interest rate expectations shift rapidly, banks may want to maintain reserve positions which are quite different from those that result under circumstances of stable interest rate expectations. Similarly, where reserves are determined by the current level of bank liabilities (contemporaneous reserve accounting; see below), unexpected changes in the latter could cause sudden adjustments in reserve positions.

Both low interest rate elasticity and an unstable demand for reserves compel the monetary authorities to manage their reserve-supplying operations more actively. Errors in supplying the appropriate level of reserves then tend to trigger sharp interest rate movements.

Settlement balances

If procedures are in place allowing banks to continue transacting with each other once settlement positions can be determined with a fair degree of accuracy (e.g. pre-settlement rounds), if interbank markets

work smoothly and if central banks stand ready to offset unexpected, last-minute imbalances, banks would keep only minimal settlement balances at the central bank. However, these conditions are often not fulfilled, with some of the most commonly cited factors explaining the need for settlement balances including seasonal factors, errors of estimating the payment volumes and uncertainty surrounding government transactions.¹⁸

Appendix Table 1 contains the main institutional arrangements and settlement systems in place in the countries surveyed. Two points are worth mentioning. First, several countries already operate a real-time gross settlement (RTGS) system, or combine both RTGS (for large transactions) and discrete time net settlement (for smaller transactions). The move to RTGS systems in the industrial countries has spread more widely. An important issue to address when moving to an RTGS system is how to provide the intraday credit needed to make the system work smoothly. In Hong Kong, intraday credit is extended automatically, provided banks hold a sufficient stock of Exchange Fund paper as collateral. In Korea, banks can apply for a limited amount of collateralised half-day call loans. In Saudi Arabia and Singapore, intraday repos support the RTGS system. In Poland, part of the banks' required reserves can be used for settling on a gross and real time basis. The new RTGS system introduced in South Africa also relies on intraday financing through changes in the banks' required reserves. Secondly, in order to avoid the use of end-of-day facilities (very often at penal rates), central banks in some countries provide liquidity not only during the day but also during afternoon pre-settlement sessions. The instruments used to alleviate end-of-day imbalances and accommodate the marginal liquidity needs are shown in Appendix Table 1 and are described in greater detail in the section on standing facilities.

Reserve requirements

Most countries impose reserve requirements on demand, savings and time deposits. Such requirements often apply uniformly to all types of deposit, sometimes on the grounds that differential ratios can be

¹⁸ Other factors can be country-specific. For instance, in Russia, the deficiencies of the current settlement system may force banks to hold settlement balances in order to be able to react to frequent changes in the payment system.

circumvented by banks' shifting deposits from one category to another. In many cases, however, differential ratios are applied to serve particular objectives. For instance, some countries have higher ratios for short-term deposits so as to lengthen the maturity of deposits (Brazil, Colombia, Israel, Peru, Poland, Saudi Arabia and Thailand). Higher ratios are sometimes imposed on foreign currency deposits compared with domestic currency deposits in some countries (Peru and Thailand). Prudential and liquidity reasons often explain this differential. In Poland, however, the statutory ratio for foreign currency deposits is lower than that for domestic-currency-denominated deposits, although the intention is to unify the required rate for all types of deposit. Several countries apply marginal reserve requirements which apply to the *increase* in a balance-sheet item, not its level. Typically this is done to maximise the effect on bank behaviour while minimising the average cost to banks (see Appendix Table 2 for details). In the context of the widespread domestic use of dollars, the Central Bank of Peru, for instance, uses the marginal reserve requirement on banks' dollar deposits as a monetary instrument to prevent excessive expansion of credit, but it is not frequently changed.

Reserve requirements can serve at least four functions.¹⁹ It is useful to contrast their use in emerging market economies, with that in the industrial world.

- They can help to stabilise the overnight interest rate in the face of changes in liquidity conditions that are sometimes purely technical in nature (the *buffer function*). This is the main role that the requirements play in industrialised countries. As explained below, there is conflicting evidence on whether this is also the case in emerging market countries.
- Since reserve requirements often represent the major determinant of the demand for central bank reserves, they can be adjusted to offset the supply of liquidity generated through autonomous factors (the *liquidity management function*). Few industrial countries use the reserve requirements for this purpose, while nearly half of the emerging market countries seem to do so.

¹⁹ In a number of countries, reserve requirements play a prudential role, acting as a kind of deposit insurance by protecting banks against illiquidity. Similarly, they can be used to manage international capital flows.

- They can be used actively (i.e. not just in response to liquidity developments) as a means of changing the stance of monetary policy (*monetary control function*). This was the case years ago in only two industrialised countries, but remains the case in some developing countries. (Although the liquidity management and monetary control functions are conceptually distinct, particular policy actions typically contain hard-to-disentangle elements of both.)
- If non-remunerated, or remunerated at below-market rates, reserve requirements can be regarded as a source of revenue for the central bank (*seigniorage*).

The functions that reserve requirements seem to fulfil in the countries under review are shown in Table 6 and the main features of the system in place in Table 7. In both tables the respective items for the average of industrialised countries are also presented (see Appendix Table 2 for more details).

From the perspective of the *interest rate buffer function* there are two features of the reserve requirement system that are similar in emerging market and industrialised economies. First, in all emerging market economies with reserve requirements except Russia, Saudi Arabia and Singapore, banks need to meet the reserve requirement only on average during the maintenance period.²⁰ Averaging is important for the interest rate buffer function because it permits banks to use part of their balances of required reserves to offset short-term or seasonal changes in liquidity conditions during the maintenance period. Higher required reserve balances tend to make the banks' demand for reserves more stable, as they would increase the day-to-day flexibility within the maintenance period (and reduce the need for often hard-to-forecast excess reserve balances). By contrast, low reserve requirements complicate reserve management by banks as they increase the risk of an overdraft, or the need to find funds in a thin market, resulting from an unexpected reserve outflow late in the day and make it more difficult to work off a large excess on a particular day over the course of the remainder of the maintenance period. However, several central banks limit the degree to which banks' daily reserve holdings can deviate from the average

²⁰ Operating procedures changed in South Africa in March 1998, introducing the possibility of averaging of reserve requirements over the maintenance period.

Table 6
Functions of reserve requirements¹

	Interest rate buffer	Liquidity manage- ment ²	Monetary control	Seignorage income ³
Indonesia		Yes	Yes	Yes
India		Yes	Yes	Yes
Korea	Yes	Yes		Yes
Malaysia	Yes	Yes		Yes
Singapore		Yes		Yes
Thailand			Yes	Yes
Brazil			Yes	Yes
Chile				Yes
Colombia		Yes		Yes
Mexico	Yes	Yes		
Peru		Yes	Yes	Yes
Israel				Yes
Poland	Yes			Yes
Russia		Yes		Yes
Saudi Arabia		Yes	Yes	Yes
South Africa	Yes ⁴	Yes		Yes
<i>Memorandum item:</i>				
<i>Number of countries with reserve requirements citing this function</i>				
	8/11	3/11	0/11	10/11

¹ There are no reserve requirements in place in Hong Kong. ² Defined here as a situation in which the requirement is adjusted to absorb the liquidity created by autonomous factors or to create or enlarge a liquidity shortage. ³ Defined here as a situation in which remuneration is considerably below market rates. ⁴ Since March 1998.

required level. These limits appear to be more common in the case of emerging market economies than in the industrial world (e.g. Brazil, Indonesia, Israel, Malaysia and Mexico). Secondly, the buffer function is more effective if the maintenance period lags the calculation period so that both the banks and the central bank know with precision the amount that must be held as reserve requirement. In cases of semi-lagged or simultaneous reserve accounting, errors in forecasting required reserves (and therefore the level of excess reserves) on the part of either the central bank or the commercial banks can sometimes lead to very sharp adjustments in the overnight rate. Carry-over provisions, allowing errors in one maintenance period to be offset in the subsequent

one, are used in industrial countries with semi-lagged or simultaneous reserve accounting (e.g. France and the United States).²¹

However, two other features could impair the interest rate buffer function in emerging market economies when compared with industrialised countries. The first concerns the maintenance period, which has to be long enough for banks to benefit from the averaging feature of the reserve requirement and effectively arbitrage over the period. For most industrial countries, the maintenance period is one month. As shown in Table 7, the maintenance period is shorter in many of the emerging market economies under review: only one week in Brazil and Indonesia, and two weeks in India, Korea, Malaysia, Singapore and Thailand. The second feature concerns the inclusion among reservable assets of items other than deposits at the central bank which can compromise the interest rate buffer function. The most common such asset is vault cash, which is included in required holdings in some of the countries permitting averaging.²² There is greater use of vault cash in emerging market economies.²³

The differences just described suggest that reserve requirements may play a more limited role as an interest rate buffer in the emerging market countries than in the industrial world. Indeed, the reserve requirement system appears to perform this function only in relatively few countries (India, Korea, Malaysia, Mexico, Poland and South Africa in its new system). Emerging market economies could be relying on other means to ensure the stability of the interest rate. In particular, the wide availability of standing facilities (see the next section) may be used to perform this function.

Central banks in emerging market countries tend to use reserve requirement variations to *offset autonomous influences* on bank liquidity more frequently than in industrialised countries. Furthermore, in some cases the management of reserve requirement ratios is also directed to *control monetary policy*. The phasing-out of direct controls on bank credit has often involved the imposition of high reserve requirements as a transitional measure to control liquidity.

²¹ In August 1998, the United States shifted to a lagged reserve accounting system.

²² In Germany, vault cash was excluded in the requirement from 1995.

²³ One reason, noted by the South African Reserve Bank, is the central bank's desire to minimise the administrative costs of excessive daily shipments of vault cash between the banks and the central bank.

Table 7
Main features of reserve requirements¹

Country	Range of ratios (%)	Averaging	Maintenance period		Frequency of changes since 1990
			Duration	Lag with respect to calculation period	
India	3–11	Yes	2 weeks	2 weeks	Frequently
Indonesia	3–5	Yes	1 week	2 weeks	Twice for Rupiah deposits; 3 times for FX deposits
Korea	1–5	Yes	2 weeks	7 days	4 times
Malaysia ²	13½	Yes	2 weeks	1 month	8 times
Singapore	3	No	2 weeks	2 weeks	Once
Thailand	6	Yes	2 weeks	2 weeks	Once
Brazil	15–75	Yes	1 week	1 week	Very frequently
Chile	3.6–9	Yes	1 month	No	None
Colombia	5–21	Yes	14 days	2 days	Very frequently
Mexico		Yes	28 days	No	Infrequent
Peru	7	Yes	1 month	No	Once
Israel	0–6	Yes	1 month	No	
Poland	5–20	Yes	1 month	1 month	10 times
Russia	8–11	No	1 month	1 month	Very frequently
Saudi Arabia	2–7	No	1 month	2 weeks	None
South Africa	2	Yes	1 month	15 business days	5 times
<i>Memorandum item:</i>					
<i>Industrial countries</i>	<i>Most countries below 3%³</i>	<i>All except two⁴</i>	<i>Most countries one month</i>	<i>Most countries no less than 2 weeks</i>	<i>Infrequent</i>

¹ There are no reserve requirements in place in Hong Kong. In the case of Mexico, these features correspond to the zero-average reserve requirement. See Appendix Table 2 for other features.

² Situation as of the end-1997. In 1998, the statutory reserve requirement was reduced in stages to 4% at yearend. ³ Austria: 3–5; Italy: 15; United States: 3–10. ⁴ Australia and the United Kingdom.

There are substantial differences among the emerging market economies in the frequency of changes in reserve requirement ratios. Four countries, namely Brazil, Colombia, India and Russia, have very frequently adjusted their ratios, for the purposes both of offsetting autonomous liquidity developments and of controlling the growth of

broader monetary aggregates. The Reserve Bank of India changes reserve requirements frequently to moderate reserve money expansion, so that the supply of broad money can be kept under control.²⁴ The Central Bank of Brazil used high reserve requirements to contain the growth of credit during the implementation of the Real stabilisation plan launched in July 1994. In Colombia, reserve requirements were reduced in late 1998 to alleviate shortages of liquidity and remuneration was introduced. In Russia, the central bank regularly revises the compulsory reserve requirement ratios, taking into account the immediate objectives of monetary policy, in order to regulate the liquidity of the banking system and keep the money supply within preset parameters. Malaysia and Poland change their ratios rather less frequently. In the period 1989–96 Bank Negara raised the ratio eight times in order to absorb excess liquidity from the banking system.

In contrast, the ratios are changed only infrequently in Indonesia, Korea and Peru, mainly to accommodate “structural changes” in liquidity conditions of different sources. Bank Indonesia, for instance, changed the ratio of reserve requirements only during 1996 and 1997. It first increased the ratio from 2% to 3% in February 1996 and again to 5% in April 1997 to promote monetary stability and induce banks to operate more prudently. However, the reserve ratio of foreign currency liabilities was reduced from 5% to 3% in October 1997 as part of efforts to support the exchange rate. The Bank of Korea increased the ratios to absorb the excess liquidity generated by substantial current account surpluses during the late 1980s. More recently, the ratios were reduced in order to improve banks’ profitability and to support their competitiveness in deposit-taking vis-à-vis non-bank financial institutions not subject to reserve requirements.

In Singapore, the reserve requirement was kept unchanged at a relatively high level between 1975 and the middle of 1998. This helped sterilise automatically part of the large inflows of foreign exchange in the late 1980s and the first half of the 1990s. Given that banks had much improved their liquidity management systems, the Monetary Authority of Singapore decided to halve reserve requirements to 3% of the liabilities base in July 1998. However, banks must have this minimum balance on

²⁴ See, for instance, the discussion in the Indian paper of how the cash reserve ratio was used to neutralise the monetary impact of growing government deficits prior to 1992.

account at the end of each day of the maintenance period. Although the system of zero average reserve requirements was retained, a measure was taken in Mexico in August 1998 which in some respects was similar to an increase in required reserves. Commercial banks were required to make a special (remunerated) deposit at the Bank of Mexico, the maturity of which was not preset. The measure was aimed at tightening liquidity conditions and facilitating an increase in interest rates which under the existing arrangements had become more difficult to implement. As explained in greater detail in the Mexican paper later in this volume, a sizable accumulation of international reserves during 1996 and 1997 had moved the “structural position” of the Bank of Mexico vis-à-vis the money market from surplus to deficit. Under those conditions, the signalling mechanism used by the central bank had progressively lost power.

Whenever not remunerated at market interest rates, reserve requirements amount to a tax levied on banks.²⁵ This is an important source of income for central banks (*seigniorage*), in both industrialised countries and emerging market economies in general, even in those countries in which at least some deposits are remunerated (India, Brazil, Peru and Poland).

While reserve requirements in emerging market countries play more diverse roles than in industrialised countries, there are clear signs of convergence to lower levels and less active reliance on them. The need to reduce the tax on bank (as opposed to non-bank) intermediation has been one important motive. In Israel, Korea, Singapore and South Africa, there has been a marked movement towards ratios that are both lower and less dispersed. The central banks of India and Russia have indicated an intention to move in this direction.²⁶ One major concern in this shift towards lower reserve requirements is its ability to trigger a spurt of credit growth. In Mexico, for instance, the replacement of reserve requirements by liquidity requirements and their subsequent lowering in the late 1980s and early 1990s is sometimes claimed to have played a role in precipitating the peso crisis in late 1994.

²⁵ For this reason, the newly established European Central Bank decided to remunerate banks' reserve holdings at a market rate.

²⁶ Reductions in reserve requirements in Colombia, Malaysia and Russia in late 1998 were not motivated by tax considerations, but were aimed at easing liquidity shortages. By contrast, the cash reserve ratio was raised in India in mid-1998 to resist exchange rate pressure and drain liquidity.

Yet perhaps the most important reason for the continuing use of reserve requirements to offset autonomous liquidity factors has been the large-scale inflows of short-term capital which many emerging market economies experienced in the years prior to the financial crises that have hit several economies since 1997. Among the many monetary policy instruments central banks used to cope with these flows, reserve requirements often played a prominent role because of the automaticity with which they sterilised a proportion of the inflows. This was the case in many Latin American countries, and also in Indonesia and Malaysia. However, the effectiveness of reserve requirements tended to decline over time as investors found other channels, not subject to reserve requirements, through which to conduct their transactions.

Supply of reserves: standing facilities

Central banks in most industrialised countries have in recent years come to rely more on discretionary market operations in managing liquidity, and less on standing facilities (Table 8). Driving forces behind this development have been the growing maturity and diversity of financial markets and the process of interest rate liberalisation. Movement away from standing facilities can also be discerned in most emerging market countries although the trend has not gone as far (see Table 9 for an overview of existing arrangements). Indeed, certain reforms in some countries have in recent years tended to enhance the role of standing facilities as a tool of liquidity management.

A first development of note in the area of standing facilities has been the movement away from facilities designed to support particular sectors. In India, central bank refinance facilities were sector-specific and thus played an important role in directing resources to desired sectors; this was reformed in April 1997 with the introduction of the General Refinance Facility.²⁷ With this reform, the Bank Rate (whose significance had been eroded by the proliferation of differential interest rates) reacquired its key role as a signalling instrument for monetary policy, becoming the reference rate for the entire financial system. In Korea, by

²⁷ There is also an export credit refinance facility under which banks are eligible for special export credit refinance. In addition, concessional refinance is provided for certain institutions such as development or cooperative banks.

Table 8
Use of central bank standing facilities

	Are standing facilities more important than open market operations? ¹	Greater use of standby facilities in emergencies?	Functions				
			Signalling central bank's policy intention	Limiting rise/fall in market rates	Basic financing	Emergency settlement	Marginal accommodation
Hong Kong . . .	Yes						✓
India	No	Yes	✓	✓	✓		
Indonesia	No	Yes				✓	
Korea	No	Yes			✓ ²		
Malaysia	No	Yes				✓	
Singapore	No					✓	
Thailand	No		✓				
Brazil	Yes	No	✓	✓			
Chile	No	No	✓				✓
Colombia	No	Yes			✓	✓	✓
Mexico	No					✓	✓
Peru			✓			✓	✓
Israel	No		✓				
Poland	No		✓	✓		✓	
Russia	Yes		✓		✓		✓
Saudi Arabia . .	No	No					
South Africa . .	No		✓	✓			✓

Notes: **Brazil:** Access to central bank credit from the TBC discount facility greatly widened (and conditions eased) in June 1996. At present, commercial banks kept short of bank reserves (via primary central bank debt auctions) thus forced to the discount window. **Hong Kong:** The Monetary Authority operates the Discount Window and allows banks unrestricted access to day-end liquidity assistance using Exchange Fund Bills and Notes as collateral. **India:** General refinance facility introduced in April 1997 with a move away from sector-specific refinancing. **Indonesia:** Standing facilities used to help banks with a liquidity problem; open market operations for achieving monetary target (base money). **Korea:** Not used to manage liquidity because rediscounts sector specific). However, in cases of serious financial market instability, limited additional liquidity can be supplied to individual financial institutions experiencing difficulties. **Malaysia:** Two types: rediscount and advances. Not used frequently. **Mexico:** Facilities used to operate the system of zero reserve requirements whereby overdrafts should be compensated with a deposit on a different day. **Peru:** In the context of a dollarised economy, liquidity in domestic currency is provided by net purchases of foreign currency. **Poland:** Banking system in general over-liquid. **Russia:** Refinancing rate is the most important central bank rate. **Saudi Arabia:** Repos have the attributes of both open market operations and standing facilities as they are used by banks at their own discretion. **Singapore:** No regular credit facilities exist, but shortfalls in the banks' Minimum Cash Balance are allowed. **South Africa:** New arrangements after March 1998 implied a movement away from the discount window to discretionary market operations. A marginal lending facility defines an upper limit to the overnight money market rate. **Thailand:** Discount (or loan) window is last resort facility for banks and finance companies.

¹ In managing short-term bank liquidity. ² Discount system (viz. aggregate credits ceiling) is closely linked to the support of small and medium-sized enterprises.

contrast, because the rediscount system was designed to support small and medium enterprises at an interest rate well below market rates, the central bank has not been able to use standing facilities to adjust market liquidity and signal changes in the monetary authorities' stance. The policy move to place the interest rate into the centre of operations implied a more frequent use of open market operations in liquidity management.

A second significant evolution concerns the role of access to the discount window in supporting weak banks. In many countries, it is weak banks that have tended to rely most on central bank discount facilities.²⁸ Before 1996 in Brazil, for example, it was mainly those banks which could not get finance from the interbank market that resorted to the central bank's rediscount facility. Reforms in June 1996 eased the conditions of access to the discount facility (TBC), which effectively provides a floor to the interest rate corridor.

The use of standing facilities as a tool of monetary policy serves several functions. The first is to *signal the central bank's policy intentions*. In some cases, the standing facility will provide an interest rate which serves as a pivot for other interest rates. The refinance rates in India and Russia serve this function. In other cases, standing facilities effectively define an interest rate corridor, with a ceiling set by a credit facility and a floor determined by the rate at which the central bank borrows (or accepts deposits). In the special currency board case of Hong Kong, the Liquidity Adjustment Facility basically set a floor and a ceiling on overnight interbank rates prior to September 1998. The LAF bid and offer rates were set by the Hong Kong Monetary Authority with reference to the US federal funds target rate. Within this corridor, interest rates responded to pressure on the foreign exchange market.²⁹ In Brazil, the interest rate corridor is set each month by the Monetary Policy Committee; weekly central bank debt auctions are used to provide additional signalling to short-term interest rates. The Brazilian paper notes that the relatively

²⁸ Even in the United States, discount window borrowing came to be seen as a sign of weakness after several episodes of bank financial stress between the mid-1980s and early 1990s: at present, banks are very reluctant to use the discount window, priced below-market, regardless of the market cost of funds.

²⁹ As noted in footnote 12, the LAF bid rate was removed in September 1998 and the LAF offer rate was renamed the Base rate. The latter is determined as the average of the five-day moving averages of overnight and one-month HIBORs, subject to a floor set by reference to the US federal funds target rate.

Table 9
An overview of standing facilities

	Market ceiling	Market floor	Below market	Notes
Hong Kong	There is a two-tier Discount Rate structure: Basic Rate for up to 50% of banks' holdings of Exchange Fund paper; Basic Rate plus 5%, or overnight rate, whichever is larger, above that amount
India	Refinance rate	RBI repo rates	Concessional refinance for certain sectors	
Indonesia	Rediscount of domestic letters of credit		Discount facilities	Domestic letters of credit for exports
Korea	Temporary credits		Aggregate ceiling credits (= 5%)	Temporary credits at call rate of previous half-month plus 2%
Malaysia	Rediscount rate			
Brazil	Lombard rate (TBAN)		Discount rate (TBC)	
Chile	Liquidity credit line (three sections)	Deposit rate		
Colombia	Rediscount rate			
Mexico				Overdrafts that exceed the limit carry a penalty rate of twice the market rate
Peru	Rediscount rate (= 16%)			
Israel				Discount window loans at increasing interest rates according to a commercial bank's utilisation of these loans
Poland	Lombard (rediscount rate)			
Russia	Lombard, Repos Session 2	Rate on deposit facility		

inexpensive discount window may divert banks short of funds from the interbank market to the central bank: in normal circumstances, recourse to the TBC by the major commercial banks takes place almost every day and in large amounts. In September 1998, however, the central bank decided to discourage capital outflows by forcing the banks to borrow only from the more expensive TBAN window. Access to the TBC window was restored in mid-December (but subsequently closed again as the domestic currency came under renewed pressure in early 1999). The Israeli paper also touches on the link between standing facilities and interbank market development: reforms in the late 1980s changed the discount window mechanism (replacing unlimited access at a given interest rate with a “ladder of windows”, each one carrying a higher interest rate) and encouraged an interbank market in liquid assets (with the central bank acting as a clearing agent).

In many cases, the width of interest rate corridors depends on the underlying situation. For example, pressure in several foreign exchange markets in recent months has led many central banks to accept greater day-to-day movement in overnight interbank interest rates. Hence the corridor has widened recently in several countries (Table 10).

The second major function of standing facilities is to *act as a safety valve* in response to unexpected liquidity developments or to various obstacles or inefficiencies that prevent a smooth redistribution of reserves via the interbank market. In order to preserve the special or exceptional feature of recourse to standing facilities, central banks have often incorporated several restrictions in the design of the facilities, which include (Table 11):

- limiting the volume of funds to be borrowed;
- limiting access to a certain number of consecutive days;
- setting the interest rate on the facility above market rates.

The safety valve function continues to be important in several countries where the primary emphasis is on market operations, largely because of the difficulty of forecasting the demand for bank reserves.

Supply of reserves: market-based operations

Reliance on market-based operations creates a need for forecasts of the liquidity which the central bank will have to provide in order to

Table 10
**Spread between rates on central bank deposits
and credit facilities**

	General features	Response of spread to crisis situations
India	Spread between general refinance rate and rate on CRR balances is 500 b.p. at present	Spread tends to narrow
Indonesia	Spread between SBI and SBPU rate tended to stabilise around 300 b.p. between 1993 and July 1997	
Korea	Rediscount rate 5%: as deposits with the central bank non-remunerated, the spread has been 500 b.p.	
Brazil	Spread between TBC and TBAN was 288 b.p. before October 1997	Although the overnight rate rose in the recent crisis, the rediscount rate was held constant
Chile	Spreads between deposit rate and first and last sections of the liquidity credit lines are 250 and 330 b.p. respectively	
Colombia	Spread between deposits and credit facilities is 700 b.p.	
Mexico	Spread depends on market rates	
Israel	Interest rate on banks' excess reserves deposited with the central bank is about 120 b.p. below the monetary loans rate	
Poland	Spread between lombard rate and intervention rate is about 4 to 5 percentage points	Upward pressure on exchange rate in 1997: impact of central banks' deposits at an interest rate 30 b.p. above the monetary loans rate
Saudi Arabia	Spread between official repo and reverse repo rate is 50 b.p.	

equilibrate the market for bank reserves. Such forecasts range between one day and two months in both industrial and emerging market economies (see Table 5 for information on the latter) and are often subject to significant revisions.

Table 11
Standing facilities: credit from the central bank

Country	Pricing				Uniform or discriminatory	Conditions for access
	Posted	Related to market rate by formula	Float-ing	At discretion		
Hong Kong		✓			The HKMA reserves the right to charge a different Discount Rate to individual banks (e.g. banks believed to be facilitating market manipulation)	Exchange Fund Bills and Notes required as collateral. Pricing: see answer to Table 9
India	✓				Bank rate for 1st 4-week period; bank rate plus 100 b.p. for 2nd four-week period	Limited 0.25% of aggregate deposits. Must have gap of 2 weeks without borrowing after an 8-week borrowing spell
Indonesia		✓			Statutory reserve shortfall: 150% of average o/n JIBOR for 1st day and 400% for following days; for discount facility: 150% of average o/n JIBOR; for negative balance: 150% of average o/n JIBOR for 1st day and 500% for following days	Banks which are facing liquidity difficulties in their daily activities as a result of massive deposit withdrawals (due to a loss of public confidence in the banking system)
Korea		✓	✓		Uniform	Daily ceiling of 50% of required reserves; half-month ceiling of 100% of required reserves
Malaysia		✓		✓		Collateral required. Maturity of 3 months; or 12 months with more special collateral

Table 11 (cont.)

Country	Pricing				Uniform or discriminatory	Conditions for access
	Posted	Related to market rate by formula	Floating	At discretion		
Singapore		✓	✓	✓	For shortfalls in Minimum Cash Balance (MCB): penal rate equivalent to highest o/n interbank rate transacted during the week, subject to a minimum of S\$100 or such larger amounts as the Authority may determine for every day during which the MCB shortfall continues	
Thailand	✓				Uniform	Collateral of eligible securities (up to 90% of face value for a max. of seven days) required. Quotas based on deposit taking/borrowing from the public. Loan requests are closely scrutinised
Brazil			✓			Volume of central bank assistance close to amount of bank reserves held at the central bank (must have Federal securities as collateral)
Chile	✓				Liquidity credit line in three sections with increasing rates	Limited to 12% of required reserves

Table 11 (cont.)

Country	Pricing				Uniform or discriminatory	Conditions for access
	Posted	Related to market rate by formula	Floating	At discretion		
Colombia		✓		✓		Access possible only under special circumstances
Mexico		✓	✓		Uniform	Limits according to each bank's capital or liabilities
Peru	✓				Uniform	Limit equivalent to the capital of the financial institution; maximum maturity of 30 days; no institution can ask for rediscounts for more than 90 days in the last 360 days
Israel	✓					Collateral required
Poland	✓					Collateral required
Russia	✓					Lombard credit requires collateral and has no formal restrictions on access. The setting of the lombard rate is at the Bank's discretion
Saudi Arabia . .	✓*					
South Africa . .	✓					Collateral of official paper required. Interest rate at a premium over repo transactions

* Official repo rate is posted at SAMA's discretion and the market-related repo rate is set with reference to the short-dated rates.

Market operations available to the central bank fall into five general categories:

- *Repurchase transactions against domestic currency assets.* In cash-flow terms they are equivalent to collateralised lending. Temporary purchases (“repos”) inject liquidity, while temporary sales (“reverse repos”) withdraw liquidity.
- *Foreign exchange swaps* are equivalent to the above but are against foreign currency. Liquidity can be injected by a spot purchase of foreign currency combined with an equivalent forward sale and can be withdrawn by a spot sale/forward purchase.
- *Outright transactions* in the secondary market.
- *Issue of short-term paper.* Primary market issuance of either central bank paper or government paper.
- *Interbank market transactions*, including taking deposits or making (possibly unsecured) loans.

Table 12 summarises the use made of these instruments by different central banks. The most widely used instrument is domestic currency repos, followed by foreign exchange swaps. The issuance of short-term paper and secondary market transactions are also significant. By contrast, direct interventions in the interbank market are relatively infrequent.

How central banks decide on the mix of instruments to use depends on many factors (cost of transactions, availability of market paper, flexibility of operation, nature of the operation (e.g. regular versus fine-tuning), the state of the public finances, etc.). One important general consideration may be that the need to send the market clear signals favours the use of one or two particularly visible instruments (which the market has learnt to monitor) even if greater flexibility might dictate a wider range of instruments. A second general point is that central banks use different instruments to address different situations.

In Mexico, for instance, repos are the main type of transaction (outright sales of government securities being somewhat less important). These transactions take place every day at noon, and serve the purpose of satisfying the forecast liquidity needs of the system. However, late-day adjustments (afternoon pre-settlement round) to offset forecast errors are made through central bank auctions of credits or deposits. Similarly, the Reserve Bank of India has widened the variety of instruments in response to liquidity conditions and the requirements of market

Table 12
Discretionary operations: an overview

	Reversed transactions			Outright transactions	Issue of short-term paper	Interbank market transactions
	Domestic currency assets		Foreign currency assets			
	Inject	Withdraw				
Hong Kong ¹ . . .						
India	*	*	*	*		
Indonesia	*	*	* ²	* ³	*	
Korea	*	*		*	* ⁴	
Malaysia				*	*	*
Singapore	*	*	*	*	*	*
Thailand	*	*	*	*		
Brazil	* ⁵	* ⁵			+ ⁶	
Chile	*	*			*	
Colombia	*				*	
Mexico	*	*		*		
Peru	*	*	*		+ ⁷	
Israel	* ⁸	* ⁸	*		*	
Poland	*	*			*	
Russia	*			*		
Saudi Arabia . .	*	*	*			
South Africa ⁹ . .	+	+	*	*		

Note: + indicates main liquidity management operation with a signalling function.

¹ Given its currency board system, the Hong Kong Monetary Authority carries out money market operations only in exceptional circumstances. ² Swap facilities for certain exporters.

³ Only buying securities. ⁴ Monetary Stabilisation Bonds. ⁵ Used only in unusual or emergency situations. ⁶ Weekly central bank debt auction. ⁷ Primary auction of Certificates of Deposit of the central bank. ⁸ Repo-like instruments. ⁹ Since March 1998.

participants. The Bank of Korea uses reversed transactions to meet temporary shortages or surpluses of bank reserves, while using outright transactions in government securities and early redemption of central bank paper (MSBs) to offset structural liquidity imbalances. Singapore with its deep foreign exchange and interbank markets frequently uses foreign-exchange-related instruments and regularly intervenes in the interbank market (Table 13).

Crisis situations, in particular, may demand different instruments. For example, in Indonesia repurchase agreements became more active when

Table 13

Market-based operations at the central bank's discretion

	Instruments	Markets	Operating procedures
India	Dated securities including zero coupon bonds and T-bills	Money, government securities and forex markets	Reversed transactions. Forex swaps and outright securities transactions
Indonesia	Bank Indonesia certificates (SBI) and money market securities (SBPU)	Open market operations	A corridor for daily SBI auctions is set; auctions for selling SBI and purchasing SBPU are organised
Korea	Government bonds and government-guaranteed securities, Monetary Stabilisation Bonds (MSBs)	Secondary markets in government securities	Outright transactions. Reversed transactions and primary issues of central bank paper
Malaysia	Government and central bank paper	Interbank market	Auctions
Singapore	Public sector paper	Open market operations (purchase and sale; SGS repos)	Weekly auctions of T-bills and auctions of government bonds according to a published annual calendar
Thailand	State enterprise bonds, Financial Institutions Development Fund Bonds, Bank of Thailand bonds	Repo market and foreign exchange market	Weekly auctions of Bank of Thailand bonds since 1995. Reversed transactions and forex swaps
Brazil	Central bank debt (and Treasury securities)	Primary market for central bank debt and for liquidity management	Daily auctions of primary debt
Chile	Central bank paper	Open market operations	Reversed and outright transactions. Primary issues of central bank paper
Colombia	Central bank paper*	Open market operations	Primary issues of central bank paper and repurchase agreements
Mexico	T-bills (CETES) of varying maturities; long-term government bonds (BONDES); also AJUSTABONDS and UDIBONOS	Open-market operations in CETES. Intervention in the money market takes place daily	Reversed transactions. Outright transactions in government securities. (Also auctions of credits and deposits)

Table 13 (cont.)

	Instruments	Markets	Operating procedures
Peru	Certificates of Deposit of the central bank (CDBCRP)	Open market operations	Primary auctions of CDs. Reversed transactions. (Forex intervention)
Israel	T-bills	Market for T-bills	Reversed transactions and transactions in T-bills. Forex swaps
Poland	T-bills		Only repo transactions are possible
Russia	Treasury bills	Secondary market in short-term government paper	Outright transactions in T-bills; forex operations. Reversed transactions
Saudi Arabia . . .	Treasury bills, FRNs and government bonds	Foreign exchange and debt markets	Repos; forex swaps; official deposit placements
South Africa . . .	Government and central bank paper	Money market	Daily tenders
* After 1999, operations will have to be done through operations using government paper in the secondary market.			

the auctions of money market securities were suspended during the recent turmoil. In Brazil, the extent of the fallout of the East Asian and Russian crises compelled the central bank to conduct repo operations (which are rare under normal circumstances) to provide liquidity to the system.

Auction procedures

Market operations of all kinds involve some kind of auction. However, the modalities of auctions vary considerably. One dimension is whether the central bank fixes *volumes* or *prices*. The most liberal solution is for the central bank to auction a pre-announced volume of paper: in this system the interest rate is quite free. However, concern that such a procedure might yield excessive volatility of interest rates has discouraged many central banks from pre-announcing volumes that they wish to transact. In contrast, a fixed price tender prevents the market from influencing the interest rate. In repurchase transactions many central banks

use fixed rate tenders. The German Bundesbank used to offer both, relying more in recent years on variable rate tenders (but switching to fixed rate tenders when it wanted to send a strong signal on interest rates). Fixed price tenders may limit the information the central bank can extract from the market (although the distribution of banks' bids could provide some information). In effective terms, however, this may not depart too far from the competitive ideal because tendering can be frequent and the central bank can adjust the rate from tender to tender in the light of the volume demanded. In recent years, the frequency of tenders has increased (with the average maturity declining), thus allowing market forces to exert greater influence. Least sensitive to market conditions are tap sales at fixed interest rates that can be maintained for prolonged periods of time. Here, the dividing line between market operations and standing facilities becomes very blurred. However, tap sales may be made available at an interest rate that is related to levels prevailing in a preceding auction. Finally, in some cases, non-competitive bids can be made, i.e. a certain volume is bid/offered at the weighted average yield (in the case of a multiple price auction) or at the uniform yield resulting from the bids or offers made by competitive bidders during the auction.

The second practical issue is the choice of *auction type*. A key distinction is between single or uniform price auctions (i.e. bidders pay a uniform price that exhausts the whole issue – the “Dutch” allocation method) and multiple or discriminatory price auctions (i.e. successful bidders pay their individual bid – the “American” procedure). One argument in favour of uniform price auctions is that the single price that emerges can provide a very clear and precise signal about money market conditions and central bank intentions – which multiple prices must inevitably blur.³⁰ In circumstances where a clear interest rate signal is not desired (e.g. when the central bank does not want to be seen as having an interest rate objective or when interest rates reflect very temporary imbalances in the interbank market), variable rate auctions may be preferred.

The choice between the two methods will also depend in practice on the assessment of the different possibilities for collusion under the

³⁰ One way to increase the information content of multiple prices is to derive a reference rate, calculated as the weighted average of the bids and offers accepted in tenders. Several central banks follow this practice in determining their official tender rate.

various systems. Some have argued that multiple price auctions provide greater incentives to collude – by pooling bids, bidders can reduce the risk of overbidding. Others have argued that collusion can be more easily enforced in a uniform price auction. It is perhaps for this reason that most Treasury bill auctions are of the discriminatory type. Another concern has been the so-called “winner’s curse”: as winners at a multiple price auction have to pay their own bid, they may try to minimise the chances of over-assessing the security’s resale value by lowering their bids. The average price reached at a multiple price auction may then be less than the single low price that results from a single price auction.

The present practices of central banks are summarised in Table 14. Several central banks use a variety of auctioning techniques. The South African paper notes that, in the new operating environment adopted in March 1998, the Reserve Bank planned to conduct variable rate auctions, using fixed rate auctions only when clear market signals were required. Financial turmoil shortly after the new system was introduced, however, upset these plans. In late May, the central bank fixed the repo rate, rather than have it determined by market forces. New pressure on the rand in June 1998 compelled the central bank to rely again on variable rate tenders. The Bank of Mexico deliberately avoids giving interest rate signals, and uses auctions only to offset autonomous influences on liquidity. Noteworthy, too, is the Korean case. Repos to absorb liquidity use the Dutch method, in which the highest interest rate tendered is uniformly applied to all successful bidders, whereas those injecting liquidity are auctioned at multiple prices.³¹ An important recent change in the industrial world was the change in the Bundesbank’s variable rate tender from discriminatory to uniform price auction.

Repurchase transactions

Repurchase transactions have become the main policy instrument in many countries because of their great flexibility. Compared with outright open market operations they do not require a liquid underlying market for securities, they only have an indirect impact on the prices of the underlying securities, and no link needs to exist between the maturity of the underlying securities and that of the repurchase transaction.

³¹ A change in this practice was under consideration in early 1999.

Table 14
Auction procedures

	Fixed rate (F) and/or variable rate (V)	Single (S) or multiple (M) prices	Secret (S) or open (O)	Notes
Hong Kong . . .	*	M	O	Yields of Exchange Fund papers provide a benchmark for the pricing of private sector debt issues
India	F, V	S, M	S	The cut-off rate on 91/364-day T-bills is emerging as benchmark rate for floating rate instruments
Indonesia	F, V	M	O	Announcement of quantity, maturity and interest rate. Result of auction has direct impact on the interbank money market rate
Korea	F, V	S, M	O	Auction results including total amount of successful bids and the average interest rate are announced publicly
Malaysia	F, V	S, M		SGS auction results include total amount applied, average yield in allotment, cut-off yield and price, and percentage of applications at cut-off allotted; results are published on same day
Singapore	F			
Thailand	V			Auction results include total amount of bid, average yield and high/low accepted yields; benchmark for short-term paper

Table 14 (cont.)

	Fixed rate (F) and/or variable rate (V)	Single (S) or multiple (M) prices	Secret (S) or open (O)	Notes
Brazil	V	M		Maximum and medium interest rates and total demand are disclosed
Chile	F, V	S, M		
Mexico	V	M	O	Single (multiple) price to sell paper (to lend money). Information disclosed: amount demanded and allocated (offered) and highest cut and average rates
Peru	V	M	S	During auctions bidders receive information about amount allotted to them and the interest rate at which the last amount was allocated to any bidder
Israel	V (F planned)	M	S	The day after the auction, information in global terms (i.e. total amount received, amount accepted) is available for the participants of the auction
Poland	F, V	S, M	S	Results are published immediately. Results influence short-term interest rates for borrowers and depositors
Russia	F, V	S, M		Refers to operations in the Treasury bill market
Saudi Arabia . . .	F, V			Securities are offered to the market at pre-determined maturities and prices

Table 14 (cont.)

	Fixed rate (F) and/or variable rate (V)	Single (S) or multiple (M) prices	Secret (S) or open (O)	Notes
South Africa . . .	V	M		The results published include amount allotted, amount of offers received, highest price bid, the price at which bids were fully allocated, the lowest price, the average price and the average rate
* Fixed coupon rate for Exchange Fund Notes. Exchange Fund Bills are issued at discount.				

Moreover, repos are cost-effective, as a temporary reserve adjustment can be accomplished with a single operation, rather than with two outright operations.³² Owing to their flexibility, standing facilities are often organised on the basis of repurchase. Another advantage some see in repos is that they are based on the standardisation of the underlying contract by the markets. Generally, the underlying assets are domestic fixed rate instruments, usually government or quasi-government paper (although other domestic paper could be used).

The only major exception among the major industrialised economies to the growing importance of repos as the primary tool for adjusting the marginal supply of liquidity is the Bank of Canada, which brings about daily liquidity adjustments by transferring government deposits between its balance sheet and that of clearing banks. In the United Kingdom, outright purchases of eligible bills are still very important.

Most emerging market economies have given repos a major role in the day-to-day management of bank reserves. This practice, however, is still rather new (beginning in many countries only after 1992) and further development continues. A very active market in repos and reverse repos

³² In some cases, multi-day repos may allow for withdrawal from the contract before the maturity date, further enhancing the flexibility of the instrument (albeit complicating the reserve forecasting exercise).

has developed in India, Korea, Mexico and Thailand; they are also regularly used in Indonesia, Poland and Saudi Arabia. Repurchase transactions have become the main instrument to regulate liquidity in South Africa's new system. In Israel, the auction rate on repo-like instruments has become the key short-term interest rate in the economy. Repos were introduced in Russia in October 1996. Peru only started to use one-day repos in September 1997 as there had been no eligible collateral paper, but wider use is expected in the near future as a government securities market develops.

However, not all countries have chosen to make repos a major instrument of liquidity management. In Brazil, repos are not used under normal circumstances, the authorities relying instead on standing facilities. Repos have been used in recent instances only in "unusual or emergency situations". The Brazilian paper mentions two such cases. In one case, the sale of a major commercial bank in early 1997 involved a substantial inflow of foreign exchange which was sterilised by a repo operation. In the second case, as mentioned before, repos served to deal with the impact on the Brazilian stock and money markets of the East Asian and Russian crises. In Malaysia, there was an explicit move away from repos back to daily money market tenders, essentially because of a lack of suitable paper.

As noted above, the *underlying eligible assets* are mainly government fixed income securities. Each country usually defines in non-ambiguous terms which paper qualifies as collateral. Government securities are used as collateral in India, Poland, Russia and Thailand. In South Africa, the underlying eligible assets consist of central government bonds, Land Bank bills and Reserve Bank bills. The Bank of Korea permits not only government bonds, but also government-guaranteed securities and, with effect from May 1998, its own debentures (MSBs) to be used in repos. In Saudi Arabia, a limited amount of banks' holdings of government development bonds and floating rate notes can be used in addition to Treasury bills for repo operations. India has recently decided that a number of public sector bonds and private corporate debt securities may be allowed under certain conditions in order to develop the secondary markets in these securities. In Israel, the underlying collateral for its repo-like instruments are the bank deposits held with the central bank. More recently, government bonds were also accepted as collateral. In Peru, the central bank's own paper serves as collateral.

One recurrent problem seems to be the lack of eligible underlying paper on the market (e.g. Peru until recently, Indonesia, Malaysia and Thailand) or the depletion of the stock of eligible collateral paper (Israel, Mexico, Poland). As this situation is usually associated with thin or narrow markets in government securities, some central banks have responded by widening the range of eligible paper (Israel, Poland). In Mexico, the central bank began to use credits guaranteed by the government, commercial bank and development bank securities as collateral.

A wide range of *counterparties* can be used in repo operations. In Mexico and Poland, only banks normally transact with the central bank, whereas in India and Poland primary dealers are used. In Korea, banks, merchant banks, investment and trust companies, and securities companies are accepted as counterparties. While level-playing-field considerations would tend to favour many counterparties, efficiency considerations may call more for a system of primary dealers.

Maturities of repos also vary widely, extending up to 91 days in Korea. However, in most countries the maturity is substantially shorter (less than one week in India, Israel and Russia; two to four weeks in Mexico and Poland). The more complete maturity profile at the short end would seem to reflect the adaptability of the repo instrument to the requirements of managing short-term liquidity.

Finally, repos are often valued because of their efficacy in *signalling* the intentions of the central bank to the market in a transparent way. For instance, in the unsettled exchange rate environment following the mid-1997 financial crisis, the Bank of Thailand kept the repo rate firmly at over 20%: this was meant to clearly communicate to the market the Bank's desire to stabilise the currency. Signals may also be given by changing the underlying conditions of the repos, for example by allowing new participants, adding or withdrawing the underlying collateral assets or changing the auction procedures.

Foreign exchange swaps

When domestic securities markets are not deep but the foreign exchange market is very liquid, central banks may want to engage in foreign exchange swaps for liquidity management purposes. In this way, they gain the efficiency and flexibility of the repo instrument without exerting direct influence on the spot exchange rate to which outright

foreign exchange operations would give rise. The desire to develop a deeper and better functioning foreign exchange market may also be an important reason for active central bank involvement in the foreign exchange swap market.

Despite the similarity with regular repos, a number of important risks may be involved in the use of foreign exchange swaps in liquidity management. First, the value of the underlying asset – foreign exchange – may be prone to sudden valuation changes. When the domestic currency is under pressure and reserves are low, the temptation to use foreign exchange swaps to acquire spot foreign exchange for intervention to support the currency may be great: if this line of defence fails, however, the central bank will incur sizable losses with the unwinding of the forward leg of the foreign exchange swap. Secondly, in many emerging market countries, forward markets are not deep enough to generate market prices for foreign exchange swaps. The central bank may then be forced to determine the swap rate itself. Not only would this have important announcement effects (and influence the spot exchange rate), but it could also expose the central bank to losses. Finally, the central bank might have a very narrow choice of counterparties in the swap operation as only a limited number of large banks might be active in the foreign exchange markets.

Although swaps are used by many countries (including India, Israel, Malaysia, Saudi Arabia and Thailand), they are used regularly only by a few countries. In Singapore, the bulk of liquidity management is done through foreign exchange swaps, much in line with the practice followed in Switzerland, where budget surpluses (or small deficits) and the tendency of banks to hold public sector securities in their portfolio until maturity have constrained the development of other open market operations.

In most countries, however, swaps are used only occasionally and only under special circumstances. Foreign exchange swaps used to be an important instrument in Thailand. More recently, however, the domestic money market was effectively segregated from the offshore market when temporary capital controls were reintroduced in May 1997. Bank Indonesia recently announced special swap facilities to reduce the currency risks faced by exporters and to provide short-term dollar liquidity to the market. In Saudi Arabia, swaps were used to provide emergency liquidity during a regional crisis. In South Africa, “special currency swaps” have been concluded from time to time with banks. In Colombia, foreign

exchange swaps are possible by decision of the Board of Governors under special circumstances.

Transparency about foreign exchange operations varies widely among central banks. A few central banks do not treat foreign exchange swaps as confidential (e.g. Israel, South Africa). The Reserve Bank of India publishes the data on operations in the foreign exchange market within a fairly short interval; in Thailand, the lag is only two weeks. South Africa has published data with a lag of only two days since February 1998. Many central banks, however, remain reluctant to reveal their forward market exposure. Swap operations are often kept confidential in order to avoid signalling pressure on the currency.

Primary market issues

Several central banks issue short-term paper, either their own or that of the government. Central bank paper is auctioned in several countries (Brazil, Korea, Peru, Poland and Thailand). The lack of “desirable” collateral for other transactions (e.g. for repos) may be a factor in the selling of central bank paper (Peru, Poland). Auctioning central bank paper may also be useful to indicate/signal the central bank’s views about desired changes in the interest rate (Brazil). The Bank of Thailand Bond Programme which started in August 1995 was set up to create some form of benchmark yield curve and to replace illiquid issues of state enterprises by more liquid Bank paper. A special situation has emerged in Israel, where the Treasury agreed to issue a small volume of short-term notes that can only be used for serving monetary policy needs and not for financing the budget.

Outright transactions

Outright transactions in the secondary market, that is the firm purchase and sale of securities, remain important instruments in many countries, particularly to offset structural liquidity surpluses or shortages that are large and persistently in the same direction (Korea), i.e. in circumstances where reserve shortages/surpluses are expected to be large and to extend a number of maintenance periods into the future. In order to conduct outright operations that are best suited to the particular circumstance of intervention, the central bank may wish to hold a fairly wide range of qualified securities. For instance, surges in capital inflows may be best dealt with through sales of short-dated paper. However, the

effective use of outright sales depends on the liquidity of the underlying market for these government securities – and in many countries deep and diverse markets do not exist. In Thailand, for instance, the use of outright transactions is still limited because of a general shortage of government securities and because bonds issued by state enterprises were too small in size and too diverse in issues and credit ratings to enable the development of a liquid secondary market. A final constraining factor was that most government and state enterprise bonds were in effect “locked up” in mandatory holdings by banks and finance companies to meet liquidity or prudential requirements.

Signals and transparency

The policies of central banks have become more transparent in recent years, and the heavier reliance on market interest rates has led to greater attention to the signals that their policy actions send to the market. Many central banks have become convinced that increased transparency regarding their operations and clear communication to the public help build broad-based public understanding and support for monetary policy. A more specific result of greater transparency could be that the demand for reserves becomes more interest elastic, easing the problem of controlling the overnight rate. The various techniques used to promote transparency through the signalling of the central bank's intentions and procedures in the emerging market countries are shown in Table 15.

There are, however, many shades of opinion about the virtues of transparency. There is perhaps a consensus in favour of as much transparency as possible in the *general* aspects of policy – the objectives pursued and regular procedures (such as auction procedures). As indicated in Table 2, many central banks in emerging market economies make their main intermediate target public. It is also considered important to have market participants focus on the right issues and to understand, in general terms, how the central bank implements its policy. If the public knows what the central bank's reaction function is, it may be able to anticipate the central bank's moves and facilitate policy-making.

There is less agreement about the optimal degree of transparency in the very short-term and specific aspects of policy, although even here the

Table 15
Signalling mechanisms

	HK	IN	ID	KR	MY	SG	TH	BR	CL	CO	MX	PE	IL	PL	RU	SA	ZA
Interest rate signals																	
Announcement of target					*				*	*					*		
Regular tender									*						*		
Fixed rate	*	*	(*)	*	*	*				*							
Variable rate		*	(*)	*					(*)								*
Other market operations				*			*				(*)					*	
Standing facilities		*	*				(*)	*	*	*		*	*	*	*		
Quantity signals																	
Reserve accumulation										*				(*)			
Maturity				*													
Other				*	*		(*)									*	

Notes: **Chile (CL)**: Changes of the target interest rate level are announced in an open and clear way to the market. Sometimes accompanied by changes in posted interest rates on standby facilities, signalling a permanent shift of the monetary stance. **India (IN)**: Fixed and variable rates: the cut-off yields in the auction are emerging as benchmark short-term rates. Standing facilities: Bank rate. **Indonesia (ID)**: Tenders: The result of the auction has a direct impact on the interbank money market. Standing facilities: Bank Indonesia sets a corridor for SBI auctions. **Israel (IL)**: Standing facilities: The Bank of Israel signals by adjusting its interest rates on discount window loans. **Korea (KR)**: Other market operations: Issues on early redemptions of MSBs, outright transactions of government bonds and repos with short-term maturities. Maturity/other: For example, the BOK advances the bidding time for reverse repos or offers a larger quantity or longer maturities than expected in the financial markets when it seeks to lower market interest rates. **Malaysia (MY)**: Signalling via interest rate targeting is sometimes supplemented by official statements and quantitative prudential measures. **Mexico (MX)**: Other open market operations: Signals can also be sent through the announcement of maximum or minimum rates for auctions. Reserve accumulation: Signals are sent through the daily announcement of an objective for the sum of the cumulative balances of the banks' accounts at the central bank. **Peru (PE)**: Standing facilities: Signalling of the stance of monetary policy is done through the rediscount rate (the central bank discount window). **Russia (RU)**: Standing facilities: the refinancing rate. Other: Direct meeting with market participants. **Saudi Arabia (SA)**: Other market operations: Signalling is done via the overnight repo rate. **South Africa (ZA)**: Variable rate: Signalling is done through changes in the amount allotted. **Thailand (TH)**: Other market operations: Signalling is done primarily through a change in the repo rate. Standing facilities: The change in the Bank Rate is rare and thus has a strong announcement effect. Other: Press conferences/interviews have also been used to communicate policy intentions.

recent trend, at least in industrial countries, is towards much greater transparency. Since February 1994 the Federal Reserve, for example, has made public announcements of changes in its federal funds rate target, rather than sending its signals through the operations of the Open Market Desk. Similarly, the Bank of Japan has made explicit announcements about the desired level of the overnight call rate after years of signalling policy changes implicitly via the path of the accumulation of reserves.

In the emerging market economies, the degree of transparency varies significantly. Transparency is near-complete in Mexico. In Saudi Arabia, the limited interest rate sensitivity of credit demand and supply reduces the immediate importance of transparency. The National Bank of Poland prefers to retain some opacity about its intentions so as to create the necessary degree of uncertainty that could help deter excessive capital inflows. The Monetary Authority of Singapore does not make public the composition of the currency market against which, or the range within which, the local currency is stabilised, arguing that non-disclosure permits better control of the exchange rate.

There are two distinct disadvantages of being very transparent about short-term objectives: one is the loss of flexibility (leaving no room for market forces or central bank uncertainty about what to do). The Central Bank of Peru, for instance, has an explicit inflation target but does not disclose its base money objective, so as to give itself some discretion to revise the latter, should circumstances so require. The other disadvantage is that too explicit a signal may raise political pressures that can delay a necessary policy move.

For these reasons, a number of central banks have devised techniques which, over short periods of time and in response to actual conditions and expectations, allow the market itself to decide small movements in rates. The Bank of Japan, for example, avoids making announcements too precise (e.g. “a little above the discount rate, on average”). This approach can help depoliticise the interest rate setting process and thus give the central bank more time to frame its stance as economic conditions unfold. For instance, a rapid spurt in growth or in inflation revealed in monthly statistics can lead the market to push up interest rates; this may allow the central bank some time (e.g. to await for further statistics) before deciding on its own stance.

Perhaps a more fundamental view is that central bank credibility can demand action that, from time to time, surprises the market. A central bank’s “bark” will be more menacing if it occasionally “bites” by catching the market off-balance. Not all central banks would agree. But the general point remains that questions of tactics – often context-dependent and difficult to generalise – pervade any discussion about operating procedures. In drawing together common elements across countries, as this paper has sought to do, this should not be forgotten.

Appendix Table 1
Institutional arrangements and settlement balances

		Settlement balances system ¹	Arrangement to alleviate end-of-day imbalances	Marginal accommodation by the central bank ²		Notes
				Type	Frequency of use	
Hong Kong	RTGS	Pre-settle- ment round with intraday repos	Discount Window	Unlimited	For collateral requirements and pricing: see Table 9	
India	N		Refinance facilities	Frequent		
Indonesia	N		Discount/ overdrafts	Limited		
Korea	RTGS, N		Temporary credits	Limited		N for small- value trans- actions and RTGS for large- value trans- actions and final clearing of the N system
Malaysia	N	Intraday moni- toring and intraday repos	Overdraft/ borrowing	Limited		
Singapore	RTGS					
Thailand	RTGS, N		Repo afternoon session	Loan or discount window	Limited by quotas	N for clearing cheques from commercial banks
Brazil	N	Intraday monitoring	Rediscount (TBC), Lombard (TBAN), emergency loans	Active in rediscount		
Chile	N		Liquidity credit line	Infrequent		
Colombia	G		Rediscount	Infrequent		
Mexico	RTGS, N	Repos Pre-settlement round with central bank auctions of credits/deposits	Overdrafts/ surplus during maintenance period			

Appendix Table 1 (cont.)

	Settlement balances system ¹	Arrangement to alleviate end-of-day imbalances	Marginal accommodation by the central bank ²		Notes
			Type	Frequency of use	
Peru	G	Intraday monitoring	Rediscount	Infrequent	
Israel			Loans		
Poland	RTGS		Lombard	Limited	RTGS only for large transactions
Russia	N	Overnight settlement credit; repo session 2 at penal rate	Lombard facility, repo session 1 and 2, overnight settlement credit		RTGS in Moscow area since 1st January 1998
Saudi Arabia . .	RTGS	Pre-settlement round	Fixed price FX swaps, repos and overdraft at penal rate	End-of-day accommo- dation is frequent	
South Africa . .	RTGS from March 1998		Loans	Infrequent	

¹ N = discrete-time net settlement; G = discrete-time gross settlement; RTGS = real-time gross settlement. ² The type of marginal accommodation provided by the central bank is only indicated in this table. For further details, see Tables 8, 9, 10 and 11.

Appendix Table 2
Overview of reserve requirement systems

	India	Indonesia	Korea	Malaysia	Singapore
Definition	Total demand and time liabilities (net of interbank credit)	Demand, time and savings deposits	Deposit liabilities except for cover bills and financial debentures	Deposits and inter-bank borrowing	Deposit liabilities
Use for settlements	Yes	Yes			Yes
Eligible assets	Cash balances with RBI	Deposits in central bank	Deposits in BOK; up to 35% of reserves may be held as vault cash	Deposits in central bank	Deposits in central bank
Marginal requirements	Imposed from time to time depending on liquidity conditions	No	In case of excessive credit expansion, up to 100%		No
Averaging	Yes	Yes, subject to daily minimum	Yes	Yes, subject to daily maximum and minimum	No ¹
Carry-over	No	No	No	No	No
Type	Lagged	Lagged	Lagged	Lagged	Lagged
Maintenance period (end-day)	14 days	1 week	Half-month 22nd & 7th (next month)	2 weeks 15th & 30th	2 weeks Wednesday
Calculation period (end-day)	1 day – Friday of previous fortnight	1 week	Half-month 15th and end-month	2 weeks	2 weeks Wednesday

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Appendix Table 2 (cont.)

	India	Indonesia	Korea	Malaysia	Singapore
Lag	14 days	2 weeks	7 days	1 month	2 weeks
Remuneration	Yes (4% p.a.), excluding the statutory minimum of 3%	No	None	No	No
Penalties	Yes ¹	Yes ¹	Yes ¹	Yes	Yes
Range of ratios	Up to 11% in CRR of 3% in CRR	3–5% ²	1–5%	4%	3%
Last change	August 1998	April 1997 for rupiah deposits; Oct. 1997 for FX deposits	Feb. 1997	Sept. 1998	July 1998
Frequency of changes since 1990	Very frequently in a range of 9.5–15%	Twice (Feb. 1996 and April 1997) for rupiah deposits; three times (Feb. 1996, April and Oct. 1997) for FX deposits	Four times (Feb. 1990, April 1996, Nov. 1996 and Feb. 1997)	Nine times in 1989–96 period	Once (not for monetary policy purposes)

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Appendix Table 2 (cont.)

	Thailand	Brazil	Chile	Colombia	Mexico ¹	Peru
Definition	Total liabilities ¹	Demand, time and savings deposits ¹	Demand and time deposits ¹	¹		Demand, time and savings deposits ¹
Use for settlements	Yes	Yes			Yes	
Eligible assets	2% banks accounts; 2.5% max. in vault cash and balance in eligible securities	Deposits at central bank and vault cash (up to 15%)	Vault cash and bank deposits in central bank	Deposits at central bank and vault cash	Deposits at central bank	Vault cash and banks deposits in central bank
Marginal requirements	No	Yes	Yes, in foreign currency	Yes	No	Yes, in foreign currency
Averaging	Yes	Yes ²	Yes	Yes	Yes (subject to daily max. and min.)	Yes
Carry-over	No	Yes; only surplus positions	No	No	No	No
Type	Lagged	Lagged	Contem- poraneous	Semi-lagged	Contem- poraneous	Contem- poraneous
Maintenance period (end-day)	2 weeks	One week	One month	14 days	4 weeks	One month
Calculation period (end-day)	³ 7th and 22nd	³	One month	14 days		
Lag	⁴ 2 weeks	⁴	No	2 days	No	No
Remuneration	No	Yes ⁵	No	No	No	Yes ²

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Appendix Table 2 (cont.)

	Thailand	Brazil	Chile	Colombia	Mexico ¹	Peru
Penalties	Yes	TBC+18% p.a.+ penalties	1.5 times average market rate	1% over the required for each day	Twice market rate	1.5 times the average active rate
Range of ratios	6%	15–75%	3.6–9%	5–21%		7% ³
Last change	Sept. 1997		Beginning 1980			April 1997
Frequency of changes since 1990 . .	Last change was the first in 18 years	Very frequently	None	Very frequently; almost monthly	Current system adopted in Sept. 1992	Frequent changes before 1992; since then only one change

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Appendix Table 2 (cont.)

	Israel	Poland ¹	Russia	Saudi Arabia	South Africa ¹
Definition	Deposits with banks ¹	Demand, time and savings deposits ²	All types of deposit ¹	Demand, time and savings deposits ¹	Total net liabilities ²
Use for settlements	Yes	Yes	No	No	
Eligible assets	Cash and banks deposits	Deposits and vault cash (up to 10%) ³	Vault cash is allowed with restrictions	Only deposits at the central bank	Deposits at the central bank and vault cash
Marginal requirements	No		No	No	Temporary and exceptionally used in the past
Averaging	Yes with limits ²	Yes ⁴	No	No	Yes ³
Carry-over	No	No	No	No	No
Type	Contemporaneous	Lagged	Lagged	Lagged	Lagged
Maintenance period (end-day)	One month	Month	Month	One month	One month
Calculation period (end-day)	Month	Month: three computing days: 10, 20 and last day	Month	One day	One month
Lag	None	One month	Month	Last day of the month	15 business days
Remuneration	No	No ⁵	No	No	No ⁴
Penalties	Yes ³	Yes ⁶	Yes ²	Yes	No
Range of ratios	0–6%	5–20% ⁷	8–11 %	2–7%	2% ⁴
Last change			Feb. 1998		
Frequency of changes since 1990	The average level in 1990 was 48%, compared to current average level of 4%	10 changes in 1990–96	Very frequently	The ratios have remained unchanged since February 1980	5 adjustments in the 1990–96 period

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Notes: **India:** ¹ Small deviations: 25% of interest on the defaulted amount is kept by RBI. For larger deviations, the RBI charges the Bank rate plus 3%. **Indonesia:** ¹ Penalties: 0.1% of the daily shortage for rupiah and 0.04% for foreign currency. ⁴ 1% of the amount of the average reserve deficiency. ² Since October 1997, 5% for rupiah and 3% for foreign currency deposits. **Korea:** ¹ At the end of each day of the two-week maintenance period, the Minimum Cash Balance must not be less than 3%. **Brazil:** ¹ Reserve requirements are applied to many balance sheet items. The most important are demand, time and savings deposits. The corresponding ratios of these three items are 75%, 20% and 15%, respectively. The answers provided in the table correspond to these three items. Within time and savings deposits, higher rates apply to short-term deposits. ² In the case of demand deposits, averaging is subject to daily minimum of 40% of required reserves. ³ Friday for demand deposits; variable day for time and savings deposits. ⁴ Demand deposits: 6 working days; time deposits: one week; savings deposits: 9 days. ⁵ Demand deposits are not remunerated; time deposits: discount TBC rate (close to market rate); savings deposits: close to funding rate. **Chile:** ¹ The reserve ratio is 9% for demand deposits and 3.6% for time deposits. The reserve requirement ratio on capital inflows is 30% for one year. Reserve requirements on the "reserva técnica" is 100%, is applied to short-term deposits in excess of 2.5 times the bank's capital and is remunerated on the basis of the Unidad de Fomento. **Colombia:** ¹ Chequing, saving and CD accounts. Higher rates apply to short-term deposits. **Mexico:** ¹ The answers provided correspond to the zero-average reserve requirement in operation. **Peru:** ¹ Current, savings and time deposits; negotiable CDs, certain bonds. Higher rates for foreign currency deposits. ² Only required reserves in foreign currency at LIBOR-1 3/8. ³ Domestic and foreign currency 7%; marginal requirement for foreign currency at 45%. **Thailand:** ¹ The statutory reserve requirement ratio is 6% for domestic currency denominated deposits, and 7% for foreign currency ones. **Israel:** ¹ Deposits in domestic and foreign currencies. Lower ratios apply for long-term deposits. ² Based on a daily average during the month, but the average weekly deficit is not allowed to go beyond 40% in shekels and 15% in foreign currency. ³ Interest rate on loans to cover the reserve deficit is 48%. **Poland:** ¹ New system of reserve requirements was established on 1st January 1998. The answers presented here correspond to the old system with references to the new one in those cases that were provided by the NBP. ² The ratios are: 20% for zloty demand deposits; 11% for zloty time deposits and 5% for all foreign currency deposits. ³ From January 1998. ⁴ Averaging was introduced in August 1994. ⁵ Remuneration was eliminated in January 1998. ⁶ Two times the lombard rate. ⁷ Currently, the Law establishes a maximum of 30% reserve requirement ratio. The new Act sets a maximum limit of 30% on demand deposits and 20% on time deposits. **Russia:** ¹ A lower rate applies to deposits of households at the Sberbank. ² Size of penalty depends on overdue debt duration. Penalty rate cannot exceed two refinancing rates. **Saudi Arabia:** ¹ The ratios are 7% for demand deposits and 2% for time and saving deposits. The reason for differential rates is the volatility in demand deposits and to encourage banks to solicit more of time and savings deposits. **South Africa:** ¹ South Africa introduced new operating procedures in March 1998. Many characteristics of the reserve requirement changed. ² Total liabilities adjusted for capital and reserves, less deposits pledged as securities for loans granted, less amounts owing by banks and mutual banks and less 50% of remittances in transit. ³ Averaging was not possible prior to the introduction of the new operating procedures. ⁴ Except for a supplementary reserve requirement of 1% of short-term liabilities of banks on which interest was paid.
