Money Markets and Monetary Policy Operations

The money market is the cornerstone of a competitive and efficient system of market-based intermediation, and should normally be in good working order before a government bond market is developed. The money market stimulates an active secondary bond market by reducing the liquidity risk attached to bonds and other term financial instruments and assisting financial intermediaries in managing liquidity risk. The money market serves as the medium for government cash management and provides the first link in implementing monetary policy using indirect instruments.

There are three key conditions required to develop a well-functioning money market: (i) banks and other financial institutions must be commercially motivated to respond to incentives to actively manage risk and maximize profit, (ii) the central bank must shift from direct to indirect methods of implementing monetary policy, and (iii) the government must have a good capacity for cash management, thereby giving the central bank greater freedom in setting its operating procedures. The design of the central bank’s market operating procedures has a significant impact on banks’ incentive to actively manage the risk of running short of reserve money: the greater the incentive, the more
banks will transact among themselves and the more liquid the market will become. On the other hand, a weak capacity for cash management by the government limits the extent to which the central bank can tighten incentives to actively manage the risk of running short of reserve money without causing excessive volatility in money market interest rates.

2.1 Introduction

Development of liquidity in the interbank market—the market for short-term lending between banks—provides the basis for growth and increased liquidity in the broader money market, including the secondary market for Treasury bills and private sector money market instruments such as commercial paper and bankers’ acceptances. An active, liquid money market greatly assists the development of a well-functioning market in government bonds and private sector bonds. A well-functioning money market supports the bond market by increasing the liquidity of bonds. It makes it easy for financial institutions to cover short-term liquidity needs, and makes it less risky and cheaper to warehouse bonds for on-sale to investors and to fund trading portfolios of bonds. Trading in forwards, swaps, and futures is also supported by a liquid money market, as the certainty of prompt cash settlement is essential for such transactions. The money market’s constituent parts and links to other markets are summarized in Figure 2.1.

Development of the money market requires policies that provide incentives for banks to actively manage the risk of running short of excess reserve money (usually by removing disincentives to active management), shift central bank monetary policy implementation from direct to indirect measures, and equip the government with adequate capacity for cash management.

29. Liquidity as used in this chapter has two meanings. Market liquidity refers to the level of excess reserves, or liquid funds, available to banks. Transactional liquidity (see Section 2.2.1) refers to the ease of trading in the market.
Lack of a profit maximization motive on the part of banks and other financial institutions hinders money market development by dampening response to changes in the incentives to actively manage risk. State-owned banks are often directed to support the government’s budget or policy requirements and do not respond to removal of disincentives to actively manage their liquidity risk, which is particularly important to developing the interbank money market. Deregulating banking, privatizing or incorporating state-owned banks, and establishing effective prudential oversight are major policy initiatives that should precede, or move in step with, initiatives to develop the money market.

Direct methods of implementing monetary policy such as liquid asset requirements, interest rate controls, and directed credit hinder development of a money market. Deregulation and establishing a liquid money market create opportunities for innovation in the way banks manage their balance sheet. A central bank seeking to use indirect methods to implement monetary policy, such as open market operations, will require an effective interest rate transmission mechanism, which also calls for a liquid money market.

Closely related to improved liquidity management is the policy issue of coordinating government debt and cash management with monetary policy implementation. These official actions have a strong impact on bank reserve balances and influence the development of primary and secondary credit markets. In the long run, appropriate monetary policy and good debt and cash management will be complementary, although there may be coordination problems in the short term.

2.2 Developing the Interbank Market

The central bank’s operating procedures greatly influence the stability of the money market, as well as banks’ incentives to actively use the money market to manage risk. If the central bank’s operating procedures are not calibrated to encourage both market stability and active risk management, the money market will be illiquid, volatile, or both. An important

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30. Liquidity risk is used here to mean the risk of running short of reserves.

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Developing Government Bond Markets

Figure 2.1. The Money Market and Links to Other Markets

**Interbank Market**
Funds held immediately prior to final settlement to enable banks to meet obligations to each other and to the central bank. Only institutions with accounts at the central bank and the central bank participate. Also called the clearing or settlement market.

**Call Money Market**
Market for funds with overnight maturity. Transactions take place during the day. Banks and large organizations participate.

**Primary Market**
Initial sale of T-bills by the Government's agent, usually the central bank. Sold by auction or tap issue.

**Term Money Market**
Market for funds with maturities greater than a day and less than 1 year. Includes secondary market in T-bills and other paper. Banks and large financial organizations participate.

**Primary Government Bond Market**
Initial sale of government bonds by the Government's agent, usually the central bank. Sold by auction or tap issue.

**Bond Market**
Market for paper of over 1 year remaining to maturity. Banks and other financial and institutional investors participate.

**Foreign Exchange Market**
Liquidity of the Money Market affects the functioning of the Foreign Exchange Market.

Money Market liquidity and stability affects the liquidity of the Bond Market.
constraint faced by most central banks is the inability to conduct accurate liquidity management due to the poor quality of government cash management.

The trading volume of the money market depends on the incentives banks have to actively manage liquidity and interest rate risk. Central bank operating procedures that particularly influence banks' risk management incentives are the reserve maintenance period, the definition of liabilities on which reserves are levied, accommodation policy, and the accuracy of operations designed to affect market liquidity—that is, the accuracy with which it can control the daily level of excess reserves. The less accurate the central bank's control of excess reserves, the more the central bank must adapt the reserve maintenance period and accommodation policy to compensate in order to avoid excessive volatility in the overnight rate.

Tension exists between the need to provide incentives for active trading and the desire to avoid excessive rate volatility. If the central bank adopts settings for its operating procedures that create incentives for banks to manage liquidity actively, it will increase the sensitivity of the overnight rate to the level of banks' reserve balances. It will also increase the likelihood of excessive volatility in the overnight rate in response to fluctuations in the level of bank reserves.

2.2.1 Creating Incentives that Stimulate Trading in the Money Market

The central bank will encourage more active bank risk management by shortening the reserve compliance period, excluding interbank transactions from the reserve requirements, adopting a costly accommodation policy, and maintaining the daily level of excess reserves very close to that desired by the banks. Excluding interbank transactions from the reserve measure ensures that money market transactions are an efficient way for banks to

31. Accommodation policy refers to the central bank's policy on supplying reserve money to the market and accepting deposits of reserve money at the initiative of market participants.
acquire the reserve money they need. The other central bank actions to encourage more active bank risk management increase banks' incentives to transact with each other on a daily basis to secure the reserves they want. (See Box 2.1. for a discussion of why banks are sensitive to the level of excess reserve money.)

**Box 2.1. What Are Excess Reserves and Why Do They Matter to the Money Market?**

As expressed in the equations below, total reserve money on the books of the central bank comprises required reserves, excess reserves, and currency in circulation. Required and excess reserves are in the form of deposits at the central bank (settlement cash). The quantity of total reserve money is determined by transactions that affect the central bank's net foreign assets, net domestic credit to government, net credit to banks and other financial institutions, and other items net.

\[
\Delta RM = \Delta NFA + \Delta NDA
\]

\[
\Delta (RR + ER + CIC) = \Delta (NFA + NDCG + NCOB + NCOFI + OIN)
\]

where: RM is reserve money, NFA is net foreign assets, NDA is net domestic assets, RR is required reserves, ER is excess reserves, CIC is currency in circulation, NDCG is net domestic credit to government, NCOB is net credit to banks, NCOFI is net credit to other financial institutions, and OIN is other items net.

Banks need reserve money to meet both their reserve requirements and their settlement needs. The quantity of excess reserves banks require depends on incentives and technical factors. The incentive is the penalty for failing to have sufficient reserve money to meet the reserve requirement or settlement obligations. The larger the penalty, the greater precautionary demand banks will have for excess reserve money. Banks' demand for excess reserve money will also be larger the less efficient is the payment system, banks' internal management of their liquidity, and the money market, and the more erratic the government's ability to manage its cash flows.

Typically, the central bank does not pay interest on banks' deposits with it, so banks will want to minimize their holdings of excess reserves. Unremunerated excess reserves are a cost to banks, which they must cover through higher loan spreads or other income.

The quantity of excess reserves is under control of the central bank, the monopoly supplier of settlement cash, i.e., funds in the form of balances in banks' accounts at the central bank. There are a number of autonomous transactions not initiated by the central bank that affect the quantity of excess reserves. The central bank must forecast these transactions if it is to accurately control the level of excess reserves. Once it has a forecast of the autonomous transactions, the central bank can initiate its own transactions to maintain excess reserve money at whatever level it desires by altering the supply of settlement cash.

If banks have adequate incentives to actively manage their liquidity, the quantity they will manage is the amount of excess reserves (settlement cash) they hold. The overnight rate will be sensitive to the supply of excess reserves as banks bid up the rate to cover shortages of excess reserves, or bid the rate down to dispose of surplus excess reserves.
2.2.1.1 Reserve Requirements and Incentives to Manage Liquidity

The structure of reserve requirements can make banks' demand for reserve money either inelastic or elastic. Inelastic demand occurs when banks are insensitive to interest rates. In such an environment, regardless of the cost of reserve money, banks will want a fixed quantity, and the overnight rate, depending on the supply of reserve money, will vary over a wide range. Conversely, if the banks' demand for reserve money is elastic, the overnight rate will be stable over a wide range of supply and demand conditions.\(^\text{32}\)

Banks' demand for reserve money will be inelastic on any day when banks have to simultaneously meet their settlement and reserve requirement needs. In this case, there will be a fixed demand for reserve money and, given the supply of that money, the quantity of excess reserves will be determined exactly. If there is a shortage of reserve money (negative excess reserves), the banks will bid up the overnight rate in an effort to meet their needs. The limit on how far the banks will bid up that rate is determined by the cost of acquiring funds from the central bank (accommodation policy). If there is a surplus of reserve money (excess reserves), banks will seek to dispose of the excess, driving the overnight rate down. The limit on how far down the overnight rate is driven is determined by the return on excess reserves left on deposit at the central bank.

Having to meet both the settlement and reserve requirement needs for reserve money on a daily basis represents the maximum tightness for the design of reserve requirements, in the sense that it provides banks with the maximum incentive to actively manage their liquidity. Banks will also need to meet the settlement requirement needs on a daily basis when there are no reserve requirements or a zero requirement.

The length of the compliance period for required reserves has an important effect on bank liquidity management. If banks must meet their required reserve requirement every day, they have little flexibility.

Longer compliance periods for required reserves allow banks to average their reserve money needs over time. A surplus in reserve holdings on any one day can be used to meet a preceding or subsequent shortage. While the settlement need for reserve money must be met every day, the reserve requirement must only be met on average over the compliance period, as the banks have no need on any one day to acquire or dispose of a

\(^{32}\) For a detailed discussion, see Borio 1997.
given amount of excess reserves. They thus have less incentive to drive the overnight rate to either of the limits implied by the central bank’s accommodation policy.

Under a reserve averaging system, banks will on some occasions need to simultaneously meet both the settlement and reserve requirement need for reserve money. This can happen toward the end of the reserve maintenance period, when the ability to make further reserve account changes gradually declines to zero and the exact amount required to achieve compliance becomes clear. At this point, banks seeking compliance may drive the overnight rate toward the bounds set by accommodation policy. The ability to arbitrage reserve balances is also reduced when reserve accounts are held separately from settlement accounts since funds in the reserve account cannot be used to meet settlement needs.

2.2.1.2 Interbank Transactions in the Calculation of Reserve Requirements

If interbank transactions are excluded in the liability base upon which the reserve requirement is calculated, the amount a bank borrows from another bank will result in a lower reserve requirement for the borrowing bank. Including interbank transactions in the reserve calculation can lead to perverse results. This is illustrated by the case of India in 1995, where money market activity came to a halt every second Friday (reserve calculation day), when banks tried to reduce their reserve requirement by eliminating interbank borrowing. As there was little or no demand for interbank funds on the second Friday, the overnight rate fell to 0 percent. (See Figure 2.2) The collapse of money market liquidity and the overnight rate every second Friday inhibited the development of a liquid money market yield curve beyond 13 days.

2.2.1.3 Accommodation Policy and Incentives to Manage Risk

Whereas the central bank’s liquidity management policy covers the way the central bank supplies or withdraws reserve money at its own initiative, the central bank’s accommodation policy covers its supplying reserve money to the market and accepting deposits of reserve money at the initiative of market participants.

If accommodation policy makes it easy and cheap for banks to obtain funds from the central bank, or if the central bank remunerates over-
generously excess reserves deposited with it, banks will find it more convenient to transact with the central bank. Consequently, banks will transact less with each other and will not invest in the staff and information systems required to actively manage their liquidity. A money market will not readily develop under these conditions.

The central bank can use accommodation policy to encourage the development of a money market by making banks’ use of central bank lending and deposit facilities expensive and limited. The more expensive and difficult the central bank makes use of its accommodation facilities, the higher the overnight rate can be driven when there is a shortage of excess reserves. The lower the rate the central bank pays on excess reserves deposited with it, the lower the overnight rate can drop when there is a surplus of excess reserves. The central bank’s accommodation policy thus can establish a ceiling and floor on the interbank rate if it meets all bank liquidity needs.

2.2.1.4 Market Liquidity Management and Incentives to Manage Risk

Market liquidity management refers to actions the central bank takes to manage the overall level of reserve money and, through this, to regulate general conditions in the money market. Much of this management is
focused on offsetting the impact on excess reserves of transactions between accounts held at the central bank and accounts held at commercial banks in order to avoid volatility in excess reserves causing unnecessary volatility in short-term interest rates. Managing the level of excess reserve money promotes trading volume in the money market and enhances the clarity of monetary policy signals by preventing unnecessary interest rate volatility. The tools for this management are similar whether the central bank has an interest rate or a quantitative target.

Successful market liquidity management requires that the daily level of excess reserves in the banking system be close to the level demanded by banks as a group. Not every bank will have the same reserve position. Some banks will have excess reserves, while others will have reserve deficiencies, creating an incentive for banks to borrow from or lend to one another. The key to successful liquidity management by the authorities is that they understand the banks' demand for excess reserves and are able to anticipate changes in this demand. For this, authorities need to forecast with reasonable accuracy the autonomous transactions affecting excess reserves that the central bank may need to offset through open market operations. (See Box 2.2.) Of these autonomous transactions, government receipts and payments are often the most unpredictable. The central bank must also have the tools for flexible and prompt intervention.

Poor liquidity management is often the major factor that prevents a central bank from maximizing the incentives for commercial banks to actively manage their liquidity risk. It is thus often the major barrier to developing market liquidity and achieving moderate volatility in interest rates in the money market. Poor liquidity management can result from both poor knowledge of banks' demand for excess reserves and from poor ability to forecast the autonomous transactions that affect excess reserves.

If the central bank systematically over- or under-estimates banks' aggregate demand for excess reserves, the amount of excess reserves it leaves in the banking system will be biased toward either surplus or shortage, resulting in either volatility in interest rates or an undesired trend in rates. Both these cases inhibit the development of transactional liquidity in the money market by creating one-way markets in which all participants are on either the bid or offer side. A sizeable surplus removes any incentive to transact, as there is no need to manage liquidity to meet reserve and settlement
Managing the Level of Excess Reserves: Importance of Government Cash Management

Good government cash management is critical for good liquidity management, important for debt management, and necessary for effective collaboration between the sovereign debt manager and the central bank. Good cash management is the most important contribution that the debt manager can make to developing the money market.

Controlling the level of excess reserves is an important part of avoiding excessive volatility in money market interest rates, irrespective of whether the central bank has an interest rate or quantitative target. A shortage of excess reserves will cause banks to compete to acquire more, driving the overnight rate up. A surplus will cause banks to try to sell their surplus, driving the overnight rate down. The figure in the box shows the daily smoothing of excess reserves by the Reserve Bank of New Zealand in 1990. The RBNZ's operations (daily open market operations, weekly bill auctions, etc.) are based on sufficiently accurate information that they offset the autonomous flows (dotted line) almost exactly each day. This results in very stable levels of excess reserves (solid line).

Notes: "Deficit" and "surplus" refer to government deficit or surplus on a given day. When there is a deficit on a day, the government is having a net expenditure and the government cash flows line (dotted) is above zero. In consequence, the RBNZ has to withdraw funds to offset the government actions and RBNZ's influenced flows (diamond line) is below zero. When there is a "surplus," the government is receiving net revenue and the dotted line is below zero.

Continued...
### Box 2.2. (Continued) Managing the Level of Excess Reserves: Importance of Government Cash Management

Examples of transactions that affect the quantity of excess reserves, and the initiating party, are:

- **Government:**
  - Revenue deposited to, and expenditure from, accounts at the central bank.
  - Maturing debt.
- **Banks:**
  - Purchase and return of notes and coin.
  - Use of central bank on-demand accommodation facilities.
- **Central bank:**
  - Open market operations.
  - Foreign exchange transactions with banks.
  - Change in reserve requirements.

Often the central bank's major problem in accurately managing the level of excess reserves is a poor ability to forecast the autonomous transactions affecting excess reserves, particularly government revenue and expenditure. Without good forecasts of the autonomous factors, the central bank's market operations (e.g., Treasury bill sales, repurchase operations) will not maintain excess reserves in the target area. The central bank's poor forecasting is, in turn, usually the result of poor government cash management; i.e., the central bank is unable to obtain good information on future government revenue and expenditure from the Ministry of Finance.

Lacking adequate tools with which to manage the level of excess reserves can cause similar problems to those caused by poor forecasting. Central banks typically have a range of methods available to supply and withdraw funds from the market. These methods include sales of government securities and foreign exchange, repurchase and reverse repurchase transactions (repos), and accommodation windows. When central banks do not have means available to them, market volatility results. Figure 2.3 shows, in the case of Zambia in 1998, the undesirable patterns of reserve needs, while a sizeable shortage removes the ability to transact, as no one is willing to trade.33

33. The relationship between the size of the surplus and shortage of excess reserves and conditions for a two-way market (surpluses and shortages of excess reserves are reasonably evenly spread between participants) may be seen in the case of Malawi in 2000. On the 65 percent of occasions when the opportunities for trading were minimal, the average absolute level of excess reserves was 450 million kwacha. This contrasts with the average absolute excess reserve level of 48 million kwacha on the 15 percent of occasions when conditions for two-way trading were met, and the 150 million kwacha of average absolute excess reserves on those occasions when trading was possible but some participants would be left significantly long or short.
accounts and overnight rates that can result when reserve accounts fluctuate. Such patterns suggest the absence of central bank repurchase operations (see below) to manage the level of liquidity within the month. This led to a repeating pattern of surplus excess reserves in the middle of the month due to net government expenditure (all on the offer side) and shortages at month-end due to net government revenue (all on the bid side).

2.2.2 Avoiding Excessive Volatility in Excess Reserves and Money Market Rates

Creating the incentives for banks to actively use the money market to manage their liquidity risk should be combined with steps to avoid excessive interest rate volatility. Excessive interest rate volatility reduces the volume of trading in the market, adds an uncertainty premium to interest rates, inhibits the development of a money market yield curve, and diminishes the transparency of monetary policy signals.
The money market yield curve out to 90 days or so typically slopes upward, even though at times expectations may invert the yield curve, bending the longer-term bond market segment down. The overnight rate is determined by the central bank's policy objectives and operating procedures. Longer money market rates are sensitive to current and expected liquidity conditions, monetary policy expectations, and the degree of risk perceived in extending the term of funding.

In developing-country markets, the illiquidity or volatility of the money market may be severe enough to limit the ability of investors to undertake maturity transformation along the yield curve. If the market for overnight funds is liquid and the overnight rate is relatively stable, a bank may feel it is worth the risk to take on a funding mismatch by borrowing overnight, adding a margin, and lending for 14 days. The lower the risk of term extension and the more competition, the lower the margin will be. If the 14-day market is liquid and stable, the bank may fund at 14 days and lend at 30 days, and so on. In this way, liquidity is established across the yield curve. (See Figure 2.4.) Banks will only accept the maturity mismatch required to create a liquid yield curve if the availability of funds (liquidity) and the variability of interest rates (interest rate risk) is manageable at each maturity. Lack of liquidity, erratic liquidity, and excessive interest rate volatility will make the risk of undertaking the mismatch too high, and development of the yield curve will be inhibited.

2.2.3 Central Bank Interaction with Market and Interest Rate Volatility

The ability to manage the quantity of reserve money accurately will give the central bank freedom to provide incentives to market liquidity and to restrain volatility of interest rates. Unfortunately, the single greatest problem most central banks face is poor ability to manage the quantity of excess reserves. They are not able to forecast well the autonomous transactions that affect the level of excess reserves, often because of poor government cash management. (See Box 2.2. and Box 2.3.)

In the absence of accurate liquidity management, the central bank needs to adopt offsetting operating tactics. The central bank's choice of settings for the target level of excess reserves, the reserve compliance period, and accommodation policy will be constrained by the need to compensate for the possible effects of poor liquidity management on market volatility.
Money Markets and Monetary Policy Operations

Box 2.3. Why Do Differences Occur Between the Treasury's Funding Needs and the Central Bank's Liquidity Management Needs?

The transactions that affect the level of excess reserves are grouped below to illustrate the reasons for divergences between the public sector borrowing requirement, which are the concern of the Treasury, and fluctuations in the level of excess reserves, which are the concern of the central bank. In the list below, (+) indicates that the transaction increases excess reserves and (-) indicates a decrease.

**Government transactions**

a. Revenue (-)
b. Expenditure (+)
c. Debt maturing and interest paid (+)
d. Debt sold (-)

**Central bank transactions**

e. Purchase of foreign exchange in the market (+)
f. Sale of foreign exchange to the market (-)
g. Purchase of note and coin from banks (+)
h. Sale of note and coin to banks (-)
i. Decrease in reserve requirements (+)
j. Increase in reserve requirements (-)
k. Open market operations (+) or (-)
l. Maturity of open market operations (+) or (-)
m. Banks obtaining funds from accommodation facility (+)

The Treasury is concerned with transactions (a) through (d). The central bank is concerned with transactions (e) through (m).

In practice, the major differences between the Treasury's demand for funding and the central bank's desire to manage liquidity have two sources: (i) central bank foreign exchange transactions and (ii) note and coin transactions. Foreign exchange transactions are usually a problem when the government is funding domestic expenditure through foreign borrowing or grants and, at the same time, the central bank needs to build up foreign exchange reserves. The domestic expenditure's impact on excess reserves needs to be sterilized, and this can be achieved either by selling the foreign exchange received from the foreign borrowing or by selling domestic debt. The ministry does not want to sell debt, as it has already financed the expenditure offshore. The central bank does not want to sell the foreign exchange, as it wants to build up foreign exchange reserves. The problem is lack of coordination between debt management and reserves management.

Banks' purchases of bank notes can be very seasonal, especially in developing countries with seasonal agricultural production of major commodities. The seasonal impact of banks buying bank notes to meet client demand during the harvest and returning bank notes as the harvest passes will cause the central bank to want to sell, respectively, less and more debt than the government.

One tactical remedy is open market operations after final clearing has occurred, when the exact quantity of excess reserves is known. This tactic permits only daily control. However, greater market stability would result if the central bank were to use flow forecasts to select maturities for repurchase operations that smooth the profile of excess reserves some distance into the future.

Another procedure for managing liquidity is to adapt the target level of excess reserves to allow for forecasting errors. The target can be set a suitable margin away from the aggregate demand for excess reserves to reduce...
the frequency of large shortages or surpluses caused by poor forecasting. This procedure will, of course, induce less interbank activity.

The central bank can also moderate interest rate volatility through the design of its accommodation policy. An accommodation window with a preannounced secured lending rate and no limits on its use places a ceiling on the overnight rate. Similarly, paying interest on deposits left with the
central bank places a floor on the overnight rate. The narrower the differential between the rate on advances and the rate on deposits, the smaller the range within which the overnight rate will fluctuate. The advantage that this arrangement has for the central bank is that the overnight rate will clearly reflect its policy stance. The disadvantage of a narrow differential is a greater likelihood that banks will transact with the central bank rather than with each other. This will be a problem especially in less-developed markets, where banks are less sensitive to the marginal cost of funds. In a less-developed market, where banks may not have strong treasury systems, the differential may have to be several hundred basis points or more before banks will be drawn into trading with other banks.

In developing markets, a two-tier accommodation window can create appropriate disincentives for borrowing from the central bank by limiting the amount or frequency of such borrowing, while reducing interest rate volatility caused by central bank liquidity management errors. In this case, borrowing up to the limit occurs at the standard rate, which typically has a role in signaling monetary policy. Borrowing in excess of the limit occurs at the second-tier rate, a penalty rate, which is set at a large enough margin above the standard rate to encourage banks to use the money market. In this way, the first tier accommodates the central bank’s liquidity management errors without causing unnecessary interest rate volatility and provides an incentive for the more efficient banks to trade with each other. The second tier encourages such interbank trading without imposing this cost on the entire system each time the central bank makes a liquidity management error.

Accommodation policy is sometimes structured as a discount window. Banks can discount short-dated government instruments with the central bank or borrow from the central bank by pledging government securities as collateral, either at a predetermined rate or at a margin above the current market rate. A discount window facility that charges at a margin linked to the current market rate does not provide a stabilizing mechanism in the event of a spike in interest rates.

Paying interest on deposits by banks at the central bank may be difficult for some central banks that do not have the resources to meet the cost of interest payments, and where the Ministry of Finance is reluctant to budget for such payments. If these difficulties result in a zero or very low deposit rate, the central bank will not be able to set the spread between its deposit and lending rates to control volatility.
Accuracy in managing the level of excess reserves is more precisely described as accuracy relative to the reserve compliance period. As noted above (Section 2.2.1.1), a daily reserve compliance period (or no reserve requirement) requires daily accuracy in managing the level of excess reserves to avoid unnecessary volatility. A monthly reserve compliance period requires a lower degree of accuracy in liquidity management, as the averaging provision means that the quantity of excess reserves is not determined until late in the compliance period. This makes bank demand for reserve money flexible over much of the period.

### 2.2.4 Resources for Central Bank Open Market Operations

If the central bank has a sufficient portfolio of outstanding government securities to absorb liquidity, it can sell these outright to the market or use them in reverse repurchase agreements to the same end. Such open market operations may be done by the central bank as needed.

The repurchase agreement, whereby the central bank lends securities against cash, or the reverse repurchase agreement, whereby the central bank borrows securities against cash, has become the main instrument for market operations in many countries. In such agreements, government (and sometimes other) securities of any maturity can serve as collateral. The rate on these agreements is independent of the rate on the underlying collateral, and can be aimed at or close to prevailing secured interbank lending rates. The central bank can thus stabilize the interbank rate, while leaving room for change for rates on Treasury bills and other government securities.

The choice of reserve management methods to absorb excess reserves, however, will have little effect on liquidity if the central bank has insufficient access to securities needed for market intervention. If the central bank does not itself have sufficient resources, it may employ add-ons to Treasury bill auctions, issue its own bills, or accept deposits from banks for intervention purposes.

In many emerging countries, where a range of market intervention instruments has not yet been developed, add-ons to the Treasury bill auction are the main instrument for liquidity management. The central bank adds, for monetary policy implementation purposes, Treasury bills additional to those tendered to meet the government’s cash needs. Issues surrounding the use of add-ons include market development, budget costs and
sterilization of proceeds, and coordination between the government and the central bank.

Where government securities are already in circulation and financial markets are thin, using the same instrument by both the Treasury and the central bank avoids market fragmentation and supports the role of government securities as a tool for general market development. At the same time, add-ons may confuse the market, since participants may not be made aware of what portion of the tender will be used for implementing monetary policy and what portion for financing the government. Transparency to the market can, however, be achieved by announcing the amount of central bank add-ons.

Monetary tightening through add-ons raises budget costs, since add-ons increase the amount of government debt on which the Treasury must pay interest, and the resulting market tightening may drive up interest rates for government securities. Furthermore, the proceeds from central bank auction add-ons should not be available to the Treasury, but rather held in sterilized accounts, if liquidity is to be taken from the market. The cost to the government would also be higher, but less transparent, if the central bank conducted its own intervention and passed the cost on to the Treasury at the end of the year through lower profits or a loss the Treasury must cover.

Central bank/Treasury coordination of add-ons has proved to be a problem in some countries. In Mauritius, where large capital inflows forced the authorities to conduct massive absorption operations, the Treasury in 1991 discontinued its support for the use of government securities in monetary operations. In the Philippines in the early 1980s, an arrangement between the Treasury and the central bank initially permitted add-ons and froze the proceeds, but the Treasury later resisted allowing the full amount of add-ons desired by the central bank and insisted on modifying the arrangement to freeze the proceeds. The central bank then resorted to issuing its own securities to supplement the add-ons permitted by the Treasury. In 1987, the Treasury allowed for the possibility of overfunding the fiscal deficit for monetary reasons and to placing the proceeds in fixed-term deposits with the central bank.

34. The effect on interest rates will be greater the more closed and the less integrated with global markets the economy is.
35. See Quintyn 1994.
Alternatives to add-ons that are more under central bank control are central bank bills which are issued like add-ons as a market intervention instrument, or deposits by banks at the central bank. These obligations can substitute for Treasury bills where there is not yet a working Treasury bill auction. They also can be useful in post-chaos situations where the central bank is the only official institution with credibility. In addition, they can be a convenience in regional monetary arrangements where the multinational central bank finds it more appropriate to sell its own securities rather than those of individual national governments. Where central bank issues are under its control, they can be used flexibly, and market participants can distinguish monetary policy operations from Treasury operations. By changing the amounts auctioned, a central bank can alter the funds available to the market as needed for monetary purposes, without being confined to auction schedules for government securities. Central bank-issued securities have proved to be a useful early step for central banks that are developing instruments for market intervention.

Central bank-issued securities can be traded in the market, and thus can help facilitate development of a secondary market in countries without a Treasury bill market. However, central bank-issued securities have disadvantages. Where there is a Treasury bill market, central bank-issued bills may fragment demand, especially if Treasury bills and central bank bills carry similar maturities. Central bank-issued bills may be preferred because they are a transparent instrument, with their use clear to market participants. To avoid immediate competition with Treasury bills, some central banks have auctioned interest-bearing deposits instead of central bank-issued securities. Such deposits can serve the same purposes as central bank-issued securities, but are not (unless issued as certificates of deposit) marketable instruments that may be used in secondary market trading. (Interest-bearing deposits by banks at the central bank may also be used as part of accommodation policy.) The issuance of either central bank securities or deposits requires coordination between the Treasury and the central bank about timing, amounts, and, possibly, payment of interest that can prove to be difficult. A disadvantage of both central bank-issued securities and interest-bearing deposits is that they may impose a financing burden on the central bank. A further limitation of both central bank-issued securities

and central bank deposits is that they are normally limited in size because of the financing burden they place on the central bank and in order to keep Treasury securities as the centerpiece of official offerings.

Experience with central bank-issued securities has been varied. Some central banks find them useful, while others, after an initial experience, have ceased issuing or reduced reliance on them. Brazil found central bank-issued securities useful in absorbing liquidity in the stabilization programs that began in the mid-1990s. By 1998, nearly one-third of securities in the market were liabilities of the Central Bank of Brazil. The Central Bank of Brazil auctions central bank-issued securities weekly, while national Treasury securities are auctioned monthly. The Bank of Korea, which previously relied on central bank-issued securities for its open market operations, since 1999 has been using repurchase type agreements. The Bank of Mauritius, which has been issuing five-year Bank of Mauritius bonds, in late 1999 shifted its monetary control operations to emphasize repurchase-type agreements. The Central Bank of Chile’s monetary policy implementation relies essentially on regular auctions of its own promissory notes.

Once financial markets have reached a certain size and degree of liquidity, problems associated with central bank-issued securities become less significant. The central banks of Denmark and Sweden conduct transactions in central bank securities to influence market liquidity and often conduct repos on the basis of these securities. The Reserve Bank of New Zealand (RBNZ) employs a combination of primary issues of central bank securities, outright transactions in government and central bank securities, and repos on the basis of both securities. The RBNZ clearly separates its own securities from those of the government and defines their uses. Thus, there is no confusion in the market. The New Zealand government issues special securities for the central bank’s monetary purposes and pays the cost of both government and central bank securities used for open market operations.

37. See Banco Central do Brasil 2000a.
38. See Banco Central do Brasil 2000b.
There are two additional ways a central bank can obtain resources if it has an insufficient stock of government securities for use in open market operations. First, existing central bank loans to the government can be converted to government securities, preferably Treasury bills, which would be most useful for outright operations. As the existing loans may carry below-market rates and the Treasury bills would carry higher market rates, the government may, however, be unwilling to do this. Similarly, the central bank can convert holdings of low-yielding, long-term government securities to Treasury bills. The government may have a similar objection to this approach and require that the long-term securities first be marked to market. This might so reduce their value that the resulting Treasury bills would be insufficient for central bank purposes.

Another way for the central bank to obtain a sufficient stock of government securities would be to recapitalize the central bank, a step which may encounter political resistance. This was effected in the Philippines with the passage of the Central Bank Act of 1993. It was also carried out in Uganda in 1999.

The problem of obtaining sufficient central bank resources for open market operations pertains to operations absorbing market liquidity. Open market operations supplying liquidity to the market rely on the central bank’s ability to create money by crediting accounts held with it and do not require central bank resources in the form of short-term securities.

### 2.2.5 Infrastructure and Capacity

Three issues that particularly affect the development of money markets in developing countries are lack of treasury capacity in banks, lack of multilateral trading, and weak banks.

The money market will not develop if banks have inadequate incentives to develop treasury capacity, which is the ability to actively manage liquidity and interest rate risk. (See Box 2.2.) Accommodation policy, as discussed above, determines these incentives.

In less-developed markets, price discovery occurs between pairs of banks at discrete time intervals, and knowledge of these transactions is not available to the market. There is thus a lack of multilateral trading where price discovery is between all institutions in the market. This results in large differences in pricing within the market over relatively
short intervals and reduces the information content of market price signals. It is not possible to know, without discussion with the parties to the transaction, whether a higher rate represents an assessment of credit risk, liquidity pressure, or merely ill-informed transacting. Where trading information is more readily available, prices can embed all information available in the market and pricing is more multilaterally unified. The central bank can assist the development of better trading systems by encouraging the formation of a trading mechanism and of standard market trading practices. (See Chapter 7, Developing Secondary Market Structures for Government Securities.)

Weak banks cause segmentation in the interbank market, which leads to volatility in the overnight rate and a lack of unified pricing. Given the lack of widely available price information, this can cause confusion as to the cause of interest rate differentials. Interbank transactions are typically based on unsecured lines of credit up to a limit, beyond which security is required. In situations where there are weak banks and reported information is not readily available or not trusted because of weak accounting conventions, security will be required. The requirement for security on all transactions constrains the flow of funds to meet settlement needs. It shrinks the effective size of the market, as often one or more banks will run out of eligible securities to offer.

When securities are in short supply, the banks needing cash will bid up the rate they are willing to pay. This can result in an interest rate spike or in a continuing two-tier market with weaker banks paying a higher rate than stronger banks. Interest rate spikes and lack of price unity are particularly troublesome in a market that is not transparent, so that the cause of the spikes and rate differentials is not clear to all market participants.

A central bank penalty-lending rate puts pressure on banks to turn to the market for their liquidity needs. As the penalty rate is based in part on market rates, the presence of weak banks with poor treasury management will greatly increase the effective penalty cost. This will add to market volatility and cause some confusion among the stronger banks, which may not see a consistent relationship between their own cost of funds and the cost of funds at the central bank. The problems caused by weak banks are solved only by their recapitalization, sale, merger, or closure.
2.3 Coordination Between Government Debt/Cash Management and Central Bank Open Market Operations

Government debt/cash management and central bank open market operations interface with market participants. Cash management is the short-term aspect of debt management and is sometimes placed in an organization separate from, but reporting to, the debt manager. Coordination is required to avoid conflicts between debt/cash management and open market operations.

The timing and amounts of government securities issuance will not always coincide with the needs of the central bank's open market policy. The government may need to issue securities when the market is already short of liquidity. The central bank must then choose whether or to what extent it will provide additional liquidity to the market to meet the government's needs. At a minimum, coordination requires that the issuer inform the central bank of its intentions in advance of taking action. At a maximum, the issuer may be able to adjust the timing and amount of borrowing to better conform to market conditions. Coordination may be simplified if the central bank acts both as agent for the government in securities issuance and in its own capacity for open market operations. In this case, the respective roles of the central bank and the issuer need to be made clear if the central bank is to retain sufficient independence for monetary policy and the market is not to be confused. Other organizational forms separating the issuance function from the central bank will more easily clarify the organizational roles but may require more explicit mechanisms for coordination. (See Chapter 3, A Government Debt Issuance Strategy and Debt Management Framework, for discussion of issues related to coordination in issuance of government securities.) Whatever the organizational form, there will be a need for accurate forecasting of government operations, and for coordination between the issuer and the central bank.

The choice of primary market participants can also cause coordination problems. (See Chapter 5, Developing a Primary Market for Government Securities, and Chapter 8, Developing a Government Securities Settlement Structure.) With regard to the choice of market participants, the optimum choice is probably wide participation. In contrast, the optimum choice for open market policy operations, as detailed above, may be limited to banks.
Money Markets and Monetary Policy Operations

A single set of primary market participants would be preferable, but in some emerging-market countries this must wait development of automated accounts and communication to permit delivery versus payment for securities transactions and prompt final settlement of both cash and securities transactions. As the purposes of government financing transactions and central bank open market operations differ, different groups of participants in these two operations need not be confusing as long as their distinct purposes are made clear.

Government debt and cash management can coordinate with monetary policy by moderating the effect of government expenditures and receipts on the banks' cash balances and by keeping the central bank informed of government cash flows. (See Box 2.4.) The only way to achieve accurate forecasting is to develop day-by-day forecasts for revenues and expenditures for items being received or paid by the government. The transactions that need to be forecast as part of improved coordination with monetary policy are those that cause a shift of funds between an account at the central bank and an account at a commercial bank, since those are the only ones that affect the government's net position at the central bank. However, full cash forecasting can be important for the government's own purpose, as good cash management can result in cost savings for the government through lower transaction balances and fewer mistakes in payments. Achieving an understanding of the importance of this project in each responsible government department is a major challenge, which requires good communication among government departments and between the finance ministry and the central bank.

A government debt/cash manager might not only forecast government payments and receipts, but also conduct cash management operations that would tend to neutralize the effect of these receipts and payments on banking reserves. In doing so, the cash manager would remove an important task of the open market manager at the central bank, though the open market manager would still have the task of offsetting other autonomous transactions. (See Box 2.3.) While good government cash/debt management lessens the task of the open market manager and the coordination problem, complications might arise in execution because the government's cash manager might also be conducting simultaneous operations with the same market participants and with comparable instruments. Careful coordination would thus be required, which might limit the central bank's use of its own bills because the maturities of issues by both managers might conflict. The
Box 2.4. Elements of Sovereign Cash Management

Quality cash management requires accurate forecasting of the cash flows between the government sector and the banking system, to ensure that there is neither an undue surplus nor a squeeze in excess reserves. It is important that key banks, money market dealers, and investors have a high level of confidence in how the Treasury, debt office, and central bank manage this aspect of the financial system. The only way to achieve accurate forecasting is to develop a day-by-day worksheet or spreadsheet that shows revenues and expenditures for all items being received or paid by the government. This spreadsheet must contain all sources of tax receipts and other receipts such as dividends, government borrowing, and international aid flows. It must also contain all expenditures by each government department, which is best achieved by ensuring that each department is responsible for monitoring its own expenditures. Each day’s gross expenditure needs to be known across departments. Because actual cash flows will differ from the initial forecast, a process of review and updating is a basic requirement for improving the quality of the forecasts.

The spreadsheet should be extended out at least 3 months, and preferably be a 12-month rolling forecast, to allow the earliest possible identification of the days with unusually large cash flows. These are most likely to be the result of tax payments, debt repayments, proceeds from new borrowing, and pay days.

The staff who prepare the forecasts must be able to obtain reliable information from all government departments. This means that the job of knowing the expenditure of each department must also be reliably known by each department’s chief accountant or chief finance officer. Achieving an understanding of the importance of this project in each department is a major challenge and a key requirement for success.

Individual departments need to be brought into the process, be informed of the project’s objective, and motivated to provide high-quality forecasts. Forecasting also requires good communication among government departments and between the finance ministry and the central bank.

The Treasury or debt office staff who coordinate all the individual forecasts must update them daily as the departments revise their own forecasts. The staff must also have good lines of communication with the key individuals in each department and be able to contact them directly to follow up on late or incomplete forecasts or other items of doubt. Attention to detail and strict time-reporting deadlines are also important for accuracy and success.

Source: Maloney 2000

cash manager might also shift balances between government accounts at the central bank and accounts held at banks. Therefore, care must be taken to ensure that banks do not become overly dependent on government deposits and that moral hazard is not created—a problem that can be avoided with the help of prudential oversight. Coordination would be further complicated by a need, as markets and official intervention become more sophisticated, to distance the government cash manager from inside information about monetary policy available to the open market operations manager. Another possible complication is the practice, still existing in many countries, of allowing government overdrafts from its accounts at the central bank. Such overdrafts create new money which, if spent by the
government, adds to reserve balances and the probable need for offset by open market operations.

2.4 Conclusion

Money markets are essential for conducting indirect, market-based monetary policy operations and for providing the liquidity necessary for a market in government bonds and in private sector securities. The way market policy is implemented will largely determine the incentives that market participants have to buy and sell securities. A proper accommodation policy by the central bank will set the reserves held by banks with the central bank at a level sufficient to allow trading, but not so high that there is no need for banks to alter their holdings by borrowing or lending or by buying and selling securities. By careful management, the central bank can carry out its monetary objectives and encourage money market transactions without fostering excessive interest rate volatility.

A vital element in conducting effective monetary policy is knowledge of government cash flows, which, like central bank open market operations, also affect banks’ reserve balances. Government debt and cash management can coordinate with monetary policy by moderating the effect of government expenditures and receipts on the banks’ cash balances and by keeping the central bank informed of government cash flows. Money markets will not operate effectively if they are constrained by direct government controls over deposits, interest rates, and lending.
Bibliography


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