Central banks play an important role at the center of modern payment systems because it is central banks' liquid liabilities—and more particularly reserves balances—that are the instrument in which the bulk of domestic payment obligations are legally finally settled. This pivotal role reflects, in part, the central bank's statutory legal tender monopoly in most countries. Nevertheless, this factor is sometimes disguised by the fact that, in today's world, settlement at the central bank is simply required by law in many countries.

The term “reserves” is being used in this chapter to identify those balances at the central bank that are available for banks to use as final settlement of payment obligations. This abstracts from cases where balances held under a legally imposed reserve requirement are not available for settlement purposes. Reserves are also commonly referred to as “settlement balances” or, more loosely, “clearing” or “correspondent balances” at the central bank.

Central Banking and the Payment System

A central bank typically has certain obligations authorized by law: control of inflation and fostering the stability and soundness of the financial system. Not all central banks, however, are legally responsible for financial system stability. In containing inflation, central banks increasingly are moving away from direct measures and relying on indirect instruments such as open-market operations, Lombard facility, rediscount window, and, to a less extent, reserve requirements (see Alexander, Balian, and Enoch, 1995). Indirect instruments are more effective the more well-functioning are financial markets because it is through these markets that monetary policy signals get transmitted to achieve their intermediate and ultimate targets.

The efficiency and effective functioning of the financial markets are affected by the payment system. The instruments available for making...
payments, the clearing and settlement facilities to which financial market participants have access, and whether there is a large-value transfer system (LVTS) all have important implications for the functioning of the financial markets. These instruments and facilities—together with the institutional and organizational rules and procedures governing them (in other words, the payment system)—greatly influence the speed, financial risks, reliability, and cost of transacting when financial market participants make payments. The more developed the payment system, the more liquid become the assets traded in financial markets (with lower associated risks), the greater the confidence that transactions will be effected as and when expected, and the lower the unit cost of transacting.

The payment system also contributes to integrating financial markets (both domestically and globally); indeed, the speed, transaction costs, financial risks, and reliability with which payments can be made interregionally and internationally are among the most important factors making possible financial market integration. On balance, such integration in turn facilitates monetary policy, inter alia, by increasing the ability of the monetary authorities to respond to shocks in a timely manner—since problems show up quickly in market data and indicators, and since the authorities’ policy actions get speedily transmitted through the economy. Global integration of financial markets generally requires that the monetary authorities have available a range of instruments and the ability to use them flexibly if monetary policy is not to prove more difficult as a result of such integration. Payment system development helps the authorities to achieve these requirements by making possible the use of many of these monetary instruments and by enhancing their effectiveness.

On the downside, the payment system is one transmission mechanism through which unsound financial and nonfinancial firms and other organizations can jeopardize the stability of the whole financial system, with adverse effects—even if only for a short period—on the real sector as well. As lender of last resort, and in trying to ensure the stability of the financial system, the monetary authorities may find themselves drawn into rescuing individual banks and segments of the capital market to counter systemic risks to the financial system (see Brimmer, 1989). The more fully integrated the financial markets and the more monetized the economy—and hence, normally, the more developed the payment system—the greater (in relative terms) are the systemic risks that arise, underscoring the need, inter alia, for greater coordination of cross-border prudential measures to contain risk and adverse spillover effects. The central bank (as the monetary—and typically prudential supervisory—authority) is therefore faced, as the financial system develops, with the choice of taking measures ex ante to reduce systemic risks emanating from the payment system or losing some control over its monetary policy.
On another plane, difficulties arise for monetary policy to the extent that inefficiencies and changes in the payment system cause unpredictable shifts in demand for, or supply of, base money. Major evidence of inefficiencies include high payment system float (level and variability), large-scale fraud, long delays in processing and settling payments, payment gridlock, frequent breakdowns in payment facilities and stoppage in operations, and a lack of clarity over important legal issues affecting payments (clearing, settlement, and so on)—such as bankruptcy laws, legality of documents in contracting, and enforceability of contracts and agreements.

When changes are occurring in the payment system because of reforms or endogenous changes, there are implications for the monetary policy decision-making process that go beyond simply the need to take account of the impact on demand for and supply of base (or reserve) money. Conceptually, four different, but closely interrelated, areas of decision making could be affected by payment system reforms and endogenous changes.

First are the monetary policy target and instrument settings—for example, the aggregate volume of reserves the central bank should supply for consistency between payment-related demand for reserves and the central bank’s desired monetary policy stance; the pricing or the quantity limits in standing central bank credit facilities; and the appropriate relationship between very short-term interbank interest rates (which the central bank directly affects) and other interest rates and financial variables (over which the central bank has less direct influence). Second are the choice and interpretation of appropriate target or indicator variables for monetary policy, at least during some transitional period—for example, the relative weights (or reliability as indicators) attached to price and quantity variables (interest rates versus reserve money) while demand for the key operational quantity variable (reserve balances) is shifting. There may be effects on quantity variables at the level of the banking system, as well as at the level of the central bank’s balance sheet, to the extent that, for instance, the velocity of transaction balances is altered. Third is the appropriate design of monetary policy instruments—for example, the design of reserve requirements or central bank standing credit facilities, or the nature and timing of central bank market operations, might need to be adjusted in light of the payment system reforms or endogenous changes. Fourth, of course, is the monetary policy transmission mechanism itself—for example, the efficiency with which central bank actions in respect of the supply of reserves feeds through to interest rates in different markets and thence through other economic and financial variables of ultimate interest.

The following case is illustrative. In June 1987, the Swiss Interbank Clearing system (SIC) was introduced with no intraday liquidity facility
but with a queuing system instead. When liquidity requirements were
reduced in January 1988, the effects on money market rates indicated that
banks had apparently introduced improved liquidity management sys-
tems, probably in response to the SIC queuing system. Thus, monetary
policy turned out to be easier than expected. The Swiss National Bank
also was led to modify its Lombard facility to a flexible one in order to
enhance its ability to respond to money market rates in a timely manner
(see Rich, 1992; and Swiss National Bank, 1989).

Payment system initiatives and developments discussed in this book that
affect the central bank's monetary policy decision making in view of their
implications for the demand for base money and the actual operational
efficiency of the payment system include: (1) arrangements that reduce
float; (2) development of clearinghouses and refinements of risk-reduction
measures in those houses to facilitate safe and reliable netting arrange-
ments and less frequent intraday settlement cycles; (3) moves to electronic
payments (for both retail and wholesale payments); (4) centralization
of commercial banks' reserve accounts at the central bank; (5) moves from net
settlement to real-time gross settlement (RTGS) systems; and (6) intro-
duction of payment instruments that reduce the use of cash or even of
deposits.

Monetary Policy, Liquidity Management,
and the Payment System

As stated above, the demand for and supply of central bank reserves are
affected by the payment system. The size of the reserves buffer that banks
demand in aggregate (at given interest rates) depends on the size and vari-
ability—more strictly, predictability—of the daily flows between the
banks as a group and the central bank, as well as the flows between indi-
vidual banks. Related to the latter aspect, the size of the buffer will also
depend on the efficiency of market mechanisms for reallocating reserves
between surplus and deficit banks. The desired size of the reserves buffer
also depends on the institutional details of the payments system, includ-
ing the technology of payments and settlements.

Commercially oriented banks try to develop procedures and routines,
including changing payment arrangements and technology, to improve
the predictability and controllability of flows or to economize in other
ways on the amount of liquidity needed to service a given payments vol-
ume. Steps taken to improve banks’ liquidity management include intra-
bank settlement of interbranch payments; improved information and
accounting systems; centralization of a bank's accounts with a settlement
agent (most notably the central bank) rather than having each of its
branches maintain its own settlement accounts; speeding up of payment

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processing through technological innovations; and the introduction of multilateral netting systems (clearinghouses).

**Monetary Management and the Problem of Float**

Float is the effect of a time difference between the crediting of a payee’s account and the debiting of a payer’s account as a result of a payment transaction. The causes of float can include central bank or commercial bank operational procedures (for example, where the procedure is to credit customers’ deposit accounts when they lodge a check and before the payee’s bank itself receives credit for the check from the payer’s bank); weaknesses in the rules or regulations (whether bank-specific or more general) governing those procedures; transportation lags in the case of paper-based payments; delayed or only partial processing of payments because of insufficient resources to finish the task by the end of the business day; and delays because of the time taken to identify and rectify processing errors.\(^ {19}\)

The central bank has a strong interest in reducing significant float because of its implications for monetary management. At the operational level, the size, and even direction, of appropriate monetary operations is more difficult to set when float results in significant day-to-day volatility in the exogenous (nonmonetary policy) sources of reserves, both in the aggregate and between individual banks (see, for example, Young, 1986; and Hoel, 1975). In addition, large and variable float hinders the development of deeper and more efficient interbank and other wholesale financial markets (for instance, because of uncertainty of timing of settlement); hence it can be an impediment to the shift toward use of market-based instruments of monetary policy.

Forecasting and assessing demand for (and hence movements in) bank reserves, as well as broader money and credit aggregates, is further complicated by measurement issues, as well as by possible endogenous factors in float. In measurement, there are questions about the appropriate definition of “money,” in the face of significant float, that have been quite actively debated in the U.S. context.\(^ {20}\) There have also been questions about the measurement of float itself, which relate to specific accounting procedures for payments.\(^ {21}\) The issue of possible endogenous factors in...
float may arise in an inflationary environment, because higher inflation increases the incentives to create float and therefore may be associated with higher float—in the absence of enforceable limits on payments lags—especially in systems that are not very competitive.22

Short of more fundamental reforms to speed up the payment process, several more partial solutions can be (and have been) adopted to reduce float, if not eliminate it entirely. Funds availability schedules are a major example. Under such an approach, the credit for a check (or debit for a payment order) is delayed to a time equivalent to that in which the corresponding debit (credit) would normally be processed and posted. A related example is provisional crediting of a check, where the value is credited to the payee’s bank account, but the value cannot be withdrawn until the payment is finally settled. In some cases it may be possible to discourage float through imposition of appropriate pricing. When the United States adopted the Monetary Control Act of 1980, for example, measures to reduce the float by both availability schedules and pricing the remaining float were introduced (Young, 1986). The pricing involved an explicit interest charge by the Federal Reserve on the proportion of banks’ reserves that could be attributed to float.

A second approach is to try to reduce some of the operational delays and backlogs within and between banks. This can often be achieved through better staffing, improved operational procedures, and better training of processing staff, or through establishing dedicated document delivery services to reduce transportation delays where possible.

A third approach is for the affected parties to offset the costs of float (or to maximize gains from float) by more active cash and short-term investment management, including management of payments flows. Banks themselves may often assist their customers in such arrangements, in fear of losing them to competitors.

22Sundararajan and Sensenbrenner (1994) found some evidence that this occurred in Russia.