

Reducing Risk in Wire Transfer Systems

by E. J. Stevens

E.J. Stevens is an assistant vice president and economist at the Federal Reserve Bank of Cleveland. The author would like to acknowledge useful conversations with David B. Humphrey.

Introduction

Hundreds of billions of dollars in payments are made each day in the United States. The system that enables this enormous sum to change hands includes several different mechanisms. Probably the largest number of payments, but with the smallest total dollar value, are made by using coins and paper money. Another very large number of payments, with a daily total value in the neighborhood of \$75 billion, are made by using checks, credit cards, and direct transfers through automated clearinghouses. The smallest number of payments, but representing by far the largest total dollar value—frequently \$500 billion a day—are made using so-called wire transfers of funds.

Wire transfers move balances electronically at Federal Reserve Banks from one bank's deposit account to another's on the same day. Transfers can be carried out over any of several wire networks (large-dollar transfer systems) connecting banks to one another and to the Federal Reserve Banks.¹ In this way, banks make payments that handle their own short-term financing transactions as well as payments on behalf of themselves and their customers. These payments, in turn, reflect much of the dollar-denominated securities and foreign exchange market trading of the world.

March 27, 1986 was the effective

date of a Federal Reserve Board of Governors' policy to control risks in large-dollar transfer systems. Adjustment to that policy has been smooth, as expected, for two reasons.² First, consultation and public comment on the need for and nature of the program have been ongoing for a number of years. The actual policy was announced in May of last year. Since then, both the Federal Reserve Banks and private consultants have been conducting informational meetings for banks across the nation. Second, the risk-control mechanism that became effective on March 27 embodies only a modest initial effort at risk reduction. With the mechanism in place, however, future steps to reduce risk become more feasible. How smoothly future risk reduction can be assimilated will depend on the ease with which financing practices of banks and institutional arrangements for making certain kinds of payments can adapt to the rising cost of risk implied by the risk-control policy.

This article briefly describes sources of risk in large-dollar transfer systems and discusses major features of the new mechanism for risk control.³ Then, examples of potential changes

¹ The word "bank" will be used here in a generic sense, and includes commercial banks, thrift institutions, Edge Act and Agreement Corporations, U. S. Branches and Agencies of Foreign Banks, and New York Article XII Investment Companies.

² This expectation was supported by a survey done just before March. See "Findings: Survey on Implementation Status of Reduction of Payment System Risk," Bank Administration Institute, January 23, 1986.

³ A full description of the policy may be found in "Policy Statement Regarding Risks on Large-Dollar Wire Transfer Systems" (Docket No. R-0515), Board of Governors of the Federal Reserve System. Discussion of the risk problem is in: E. J. Stevens, "Risk in Large Dollar Transfer Systems," FRB of Cleveland *Economic Review*, Fall 1984, pp. 2-16.

in financing and payments practices that might facilitate future risk reduction are examined.

I. Risk Exposure

The risk being controlled is the threat that payments made over one of the large-dollar transfer systems can't be settled. None of these systems operates on a real time, cash-in-advance basis that would continuously settle by deducting each payment, minute by minute, as it occurs, from the balance in an account. Instead, they are "batched" settlement systems that update accounts only at the end of the day by the net of payments and receipts during the day. It is possible, therefore, for a depository institution to transfer large sums during the day before it has received all the funds needed to settle its account at a Federal Reserve Bank. If the needed funds can't be acquired, a settlement failure occurs.

A settlement failure is a rare event in the United States. Many banks have failed to open in the morning, but few in modern history have failed to settle their accounts at a Federal Reserve Bank the previous evening. Ultimately, who stands to lose in the event of a settlement failure depends in part on whether the large-dollar transfer system involved is a net settlement system, or Fedwire. The leading example of a net settlement system is CHIPS (Clearing House Interbank Payments System), a private telecommunications clearinghouse payments network operated by the New York Clearing House. Participants exchange provisional payments messages during the day, but payments become final only at the end of each day when the net position (receipts, minus payments) of each participant is settled through accounts at Federal Reserve Banks.⁴ Inability of a participant to settle in this type of system suggests that one or more other participants or their customers are at risk because the Federal Reserve will not effect a net settlement order at day's end if one or more participants have insufficient balances. On the other hand, Fedwire, a wire transfer system operated by the Federal Reserve, makes payments by transferring funds directly from one depository's account at a Federal Reserve Bank to that of another.⁵ Inability of a Fedwire user to cover its payments at the end of a day means that a Reserve Bank

takes the loss, because funds received by a bank over Fedwire during the day are irrevocable once notification of a payment is received.

In both cases, risk arises because a bank can send more funds before the end of a day than are covered by its initial balance, plus its receipts, to that point during the day. Such a practice results in a "daylight overdraft." For example, consider a bank continuously borrowing overnight in the federal funds market: each morning it returns the previous day's borrowing over Fedwire, but can't actually cover that return of funds until later in the day when new borrowing has been arranged and received. The risk is that a bank might be unable to arrange sufficient new borrowing and therefore fail to repay its daylight overdraft.

Daylight overdrafts reflect daylight credit provided to the overdrafting bank either by the Federal Reserve on Fedwire, or by other banks on a net settlement system. The practice of relying on daylight credit creates credit risk for banks vis-a-vis their customers, for Federal Reserve Banks vis-a-vis Fedwire users, and for participants in net settlement systems vis-a-vis one another. Systemic risk is also created in the last case because the unexpected failure of one bank to settle might have a ripple effect as that failure makes it impossible for other banks to settle. In such a case, there is the potential for causing a classic banking crisis that could disrupt financial markets worldwide.⁶ Rapid growth of large-dollar transfers relative to reserve deposit balances suggests that banks commonly resort to daylight credit to finance payments during the day.⁷

The Federal Reserve does not condone daylight overdrafts and, until relatively recently, they were probably rare. It was not until 1979 that the first measurement of daylight overdrafts was taken. Therefore, aggregate values of transfers relative to banks' deposit balances at Federal Reserve Banks is only suggestive of the likely growth of daylight overdrafts. Transfers were only about 20 percent of balances in 1950, 150 percent in 1970, but approaching 3000 percent in the past few years. Now, with use of powerful computerized accounting systems, it is possible for a bank to maintain an on-line monitor of its own and customers' daylight overdrafts. The Federal Reserve is able to monitor the daylight overdrafts of a bank across all large-dollar networks, at least after the fact. In the future, large-dollar trans-

4 This brief description simplifies a more complex settlement process. Only 22 banks' accounts actually receive a debit or credit at Federal Reserve Banks. Ten of these banks settle for the remaining 112 participants. A failure might reflect the inability of one of the 22 to settle its own position, or of one of the associate banks to meet its settlement obligation with a settling participant.

5 It is immaterial that the depositories may hold accounts at different Reserve Banks because the Federal Reserve Banks "settle-up" among themselves at the end of each day.

6 A thorough analysis of systemic risk is in David B. Humphrey, "Payments Finality and Risk of Settlement Failure: Implications for Financial Markets." Paper prepared for Conference on Technology and the Regulation of Financial Markets, New York University, May 1985.

7 Marcia L. Stigum cites the example of a large money center bank with daily payments $2\frac{1}{2}$ times its total assets. *The Money Market*, Homewood, Illinois, Dow Jones, Irwin, 1983, p. 585-6.

fer systems conceivably could operate on-line real time monitors that would prevent the use of daylight credit completely, thus requiring that cash be available in advance of each payment.

Daylight credit exposure is not a unique indicator of risk. Risk depends on the probability that institutions will not cover their daylight overdrafts by the end of a day, as well as, in the event of an actual failure to settle, the probability that claimants won't recover some or all of their loss in the liquidation of a failed institution. Payment system risk then depends jointly on the amount of daylight credit, on the soundness of institutions in daylight overdraft positions, and on the ability of depository institutions to control the amount of payments-related credit extended to other depository institutions during a day. Systemic risk—the risk that otherwise sound institutions will be swept up in a cascade of settlement failures—depends as well on the interrelatedness of institutions in the payments system. This is influenced heavily by the ability of the central bank, in its role as lender-of-last-resort, to prevent or isolate a settlement failure by providing overnight credit at the end of a day.

Reliance on daylight credit is not troubling in itself. Rather, it is the uncontrolled and unrationed provision of daylight credit that is troubling. As long as daylight credit is unrationed, risk creation is subsidized and daylight credit becomes overused. Fedwire has no explicit price for providing daylight credit and, because there is no well-developed private market for daylight credit, has little basis for setting such a price. Until the current risk-control policy began to be developed, Fedwire also did not have an effective limit on daylight overdrafts for any but visible problem banks.

It can be argued that there is implicit pricing of daylight credit in net settlement systems.⁸ Receivers of funds transfers (suppliers of daylight credit) face a cost in the form of some probability of loss. They therefore have an incentive to limit the amount of daylight credit they extend to each other participant. However, this argument is weak, unless the computerized net settlement system provides a feature that both allows participants to set such limits, and enforces them by preventing transfers that would breach a limit. Moreover, the whole argument breaks down when, as appears to have been the case, there is a widespread presumption among banks that the Federal Reserve, as the lender-of-last-resort, would lend to a participant that is otherwise unable to settle rather than let a settlement failure take place and risk a systemic wave of failures.

II. The Mechanism for Risk Control

The risk-control policy establishes three requirements for every net settlement system: 1) each participant should be able to set a bilateral limit on the net amount of daylight overdraft credit it is willing to extend to each other participant; 2) each participant should be subject to a limit on the amount of daylight overdraft credit it uses; 3) the net settlement system should include an on-line monitor to reject or hold payments that would breach either limit.⁹

In the case of Fedwire, banks will be subject to a daylight overdraft limit in the form of a dual "cap." One part of the cap limits a bank's average daylight overdraft position during a two-week required reserve maintenance period. The other part limits a bank's overdraft during any single day of that two-week period.

A potential problem with independent daylight overdraft caps for each large-dollar system is that they would not distinguish institutions using only one system from those using two or more systems. Consequently, each net settlement system must provide data to the Federal Reserve so that it can monitor the risk exposure each bank creates simultaneously over all systems relative to that bank's daylight overdraft cap on Fedwire. If a bank's overdrafts across all systems exceed this limit, the Federal Reserve Bank could counsel the bank and/or advise the appropriate examiner about the situation, or the Federal Reserve could reject a bank's Fedwire transfers that exceed its overdraft limit.

A bank seeking permission to run daylight overdrafts must undertake a self-evaluation of its creditworthiness, credit policies, and operational controls and procedures. This self-evaluation must include a review by its own board of directors, and the bank must maintain records as a basis for examiner inspection and comment to the directors. The bank thereby will establish its own overdraft limitations, but these must lie within Federal Reserve guidelines. The guidelines are expressed in terms of a multiple of the institution's capital. (See box.) Should this voluntary process not be taken seriously, "...the Board (of Governors) will reconsider its options, including the adoption of regulations designed to impose explicit limits on daylight credit exposure."¹⁰

In summary, each depository institution, including each Federal Reserve Bank, can now manage the net amount of daylight credit it extends to each other institution; each institution must undergo self-evaluation necessary to obtain

8 For discussion of risk and pricing, see David L. Mengle, "Daylight Overdrafts and Payment System Risks," *Economic Review*, Federal Reserve Bank of Richmond, May/June 1985 pp. 14-27.

9 This was a feature of the Board's interim risk-reduction policy adopted in 1982.

10 Policy Statement Regarding Risks on Large-Dollar Wire Transfer Systems, p. 10.

The Cross-System Net Debit 'Cap'

At the heart of the new risk-control policy is a cross-system sender net debit cap. The sender is a bank, making payments over Fedwire. A net debit cap is a dollar limit on the amount of daylight credit a bank may draw by sending payments in excess of the sum of its opening balance and payments received up to any point during the day on Fedwire. The limit is "cross-system" in that, for banks that participate in net settlement systems such as CHIPS, the amount of daylight credit allowed under the limit set on Fedwire will be reduced by the net amount of daylight credit the bank has drawn on those net settlement systems.^a

Clearly, a bank's cross-system daylight credit use, or net debit position, must vary over a day, beginning and ending at zero, but rising above zero whenever the opening balance, plus payments received, fall short of payments made. The cross-system net debit cap has two forms. One is a limit on the two-week average of a bank's maximum daily net debit position, with the average taken over each two-week required reserve maintenance period. Averaging provides flexibility for banks to operate within the unpredictable ebb and flow of payments traffic, while abiding by the intent of the risk-control policy. The other form of the cap is a limit on a bank's maximum net debit during each day of the two-week period. This cap is higher than the two-week average cap, but effectively puts a limit on the flexibility built into the averaging process. If a bank is at the one-day limit for one or more days of the period, then it must be below the two-week average for one or more days in order to stay within the average.

Dual Cap

Multiple of Adjusted Primary Capital

Cap Class	Two-Week Average	Plus	Single Day
High	2.0		3.0
Above Average	1.5		2.5
Average	1.0		1.5
No Cap	0		0

The Board's Policy Statement includes a discussion of the cap-setting procedure banks should employ and how self-judgements of creditworthiness, credit policies, and operational controls and procedures might be combined into the single summary self-classification required to obtain a cap higher than zero.^b

a. The Fedwire limit will not be raised if a bank has been a net supplier of credit on a net settlement system.
b. Other details of the procedure also are included in the Statement, including a definition of adjusted primary capital; treatment of Edge Act and Agreement Corporations, U. S. Branches and Agencies of Foreign Banks, and New York Article XII Investment Companies; and implications for Book-entry Securities Transfers, Automated Clearinghouses, Net Settlement Services, and additional matters.

a nonzero limit on the aggregate net amount of daylight credit it draws from all systems during an interval; the Federal Reserve Banks will monitor the daylight overdraft positions of institutions on Fedwire relative to their self-imposed caps, normally after the fact, but net of any daylight credit obtained on other funds transfer networks.

III. Institutional Adjustments for Risk Reduction

Incredulity was a common reaction to early discussions of reducing risk on large-dollar transfer systems.¹¹ How could half-a-trillion dollars or more of daily payments possibly be resequenced so that, with only \$20-30 billion of cash deposits, those payments could still be made, but with less reliance on daylight overdrafts? Each sender might wait until enough payments were received before payments were sent, but every delayed send would, of course, mean a delayed receipt for someone else. Given the small cash base and limited time during which transfer networks are open (the working day sometimes extended into the evening), the result seemed more likely to be "gridlock" than smoothly functioning transfers of funds. The emphasis on creating a risk-control mechanism first, with high overdraft limits based on self-evaluation, seems to have submerged this kind of reaction. But when future steps are taken to use the mechanism to reduce risk, how will smoothly operating payments be maintained consistent with reduced daylight overdrafts and reduced risk?

Two kinds of changes, induced by market incentives, should take place that could achieve the desired result. One kind would purchase reduced risk directly, as individual banks reallocate their operating and portfolio resources to live within overdraft limits. The other kind would result from innovations in standard arrangements for interbank payments and financing.

Direct Risk Reduction: Banks may reduce the amount of daylight credit they extend as well as reduce their own use of daylight credit simply because nationwide attention has focused on the problem. Heightened awareness and better information may bring more prudent behavior. While many banks have monitored and managed their own and their customers' daylight overdraft positions for many years, others apparently have not. As a result of the educational program and preparation accompanying implementation of the Board of Governors' risk policy, banks now may be less generous in accommodating other banks' and customers' use of daylight credit, thereby reducing their own need for daylight credit. Setting more prudent limits, or col-

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lecting fees for scheduled extensions of daylight credit to customers, would have this effect. Similarly, with the ability to specify binding bilateral net credit limits in net settlement networks, banks may be less generous in accommodating other banks' use of daylight credit. Risk reduction will then result both from reduced daylight overdrafts and from improved credit quality resulting from continuous, explicit risk management.

Banks also might delay making some payments until later in the day in order to reduce their reliance on daylight credit. Of course, the resulting delayed receipts might increase reliance on daylight credit at other banks. However, many depositories and customers never use daylight credit and, in fact, maintain positive balances throughout the day. Thus, some overall reduction in daylight credit is possible through more careful management of the timing of payments.

Banks could elect to hold larger overnight balances at Federal Reserve Banks from which to make payments during the day. This might seem to be an expensive adjustment costing a bank the foregone earnings on those extra reserves. However, a bank can elect to hold additional sums as a clearing balance on which earnings credits can be used to pay for priced services. In either case, banks might make this a part of a least-costly method of reducing daylight overdrafts.

Risk declines as bank capital grows, providing more room for institutions to operate within caps set on a "times capital" basis. Maintaining a higher capital position might also seem to be an expensive adjustment, but may be worth the price. Moreover, many banks are already adding, or planning to add, to capital as they adjust to potential loan quality problems and comply with regulatory guidelines for safety and soundness. Even without any change in daylight overdraft practices, more highly capitalized institutions might present lower risk.

Another fertile field for reducing daylight overdrafts lies in the liability management of depository institutions. About two-thirds of Fedwire transfers reflect federal funds transactions, as borrowing banks repay the previous day's borrowing and then, typically, replace that with fresh borrowing for the current day. Extending the maturity of bank financing could yield substantial dividends in reduced Fedwire traffic and reduced daylight overdrafts of Federal Reserve Bank accounts. Risk exposure of the Federal Reserve Banks certainly would decline, but risk exposure of others might grow. Longer-term financing would add to lenders' risk of illiquidity (that is, of using costly methods to meet unexpected needs for cash) and, all else unchanged, add to lenders' and borrowers' interest rate risk (that is, of unexpected changes in maturity rate spreads). Uninsured lenders, replac-

ing overnight with longer maturity loans, would also face a slightly different credit risk. No longer could they rely on Federal Reserve Banks to assume credit risk each morning, as they had when overnight loans had been returned. The "musical chairs" of repayment thus would be spaced further apart.

Moving the bearer of risk from Federal Reserve Banks to private market lenders does not represent evasion of risk-reduction policy. Widening the scope of market scrutiny and the opportunity for risk pricing should be expected to encourage more conservative behavior by borrowing banks.

Innovations: Substantial reductions in daylight overdrafts at individual banks could emerge from innovations in some long-standing market practices. Some of these innovations might only evade the risk-control mechanism by shifting risks outside the monitor, and will not be acceptable.¹² Others would, in fact, reduce risk and are to be encouraged. Distinguishing between the innovations will require careful investigation. The three examples of suggested changes discussed here might be acceptable if carefully structured and are offered to indicate the range of ideas being developed in the market in response to the risk-control policy.

An alternative to replacing overnight financing with longer-term borrowing would be to develop a "rollover" practice in overnight credit markets. Borrower and lender might agree that, unless either wished to terminate the entire credit, all or part would be rolled over at the relevant daily rate each day. A single daily transfer could cover interest, plus any agreed change in the outstanding amount of the loan. This would eliminate the need to transfer the full amount of borrowing both back and forth each day. Credit risk from overnight lending would remain, but would not become a daily daylight payment risk either for the Federal Reserve or for participants in net settlement systems.

Access to a rollover loan, as well as its price, presumably would depend on the creditworthiness of the borrower as viewed with more intense lender scrutiny than for a typical overnight loan today. In this way, the transfer of risk from Federal Reserve Banks and participants in net settlement systems should generate incentives for more conservative behavior by borrowers.

Another substantial portion of the traffic on large-dollar transfer systems flows among banks that, for themselves or for dealer customers, are settling securities or foreign

exchange transactions. Current practice typically involves gross next-day settlement of securities transactions, meaning that banks send one another payments for each transaction. Each day, two banks active in handling security market operations typically will send each other multi-million dollar payments that are more or less offsetting. These payments are initiated and received in automated systems on the basis of trades known in advance because they were done on the previous day.

The alternative would be for two banks to offset the payments due to one another, replacing those two payments with a single transfer of the net difference due to one or the other institution. Daylight credit risk would be reduced if the banks adopted new legal agreements defining obligations to be for this net position rather than for gross positions.¹³ Heretofore, the incentive for this kind of economizing on payments traffic was primarily the cost of a funds transfer—at most a few dollars per transfer. The additional incentive of avoiding more costly means of daylight overdraft reduction might provide the impetus for devising offset arrangements. As in the case of federal funds rollover, offset payments would not eliminate all risk. Banks would be exposed to risk of a failure to settle the net amount due, but the amount at risk would be much smaller than the gross amounts now exposed.

Development of a day-loan market is another institutional change frequently cited as promising daylight overdraft relief. The Federal Funds market is the source of one-day maturity loans of cash in the form of deposit balances at a Federal Reserve Bank. Similarly, a day-loan market would be the source of loans of cash, but with same-day maturity. Just as banks may charge a fee to customers who daylight overdraft their accounts, so too, for a fee, banks might be able to borrow and lend cash for repayment later in the day. Such a procedure seems technologically feasible, especially if it were encouraged by provision for priority-funds transfer messages that would bypass a queue of payment orders on large-dollar transfer systems. Some banks will always have positive balances that might be loaned to others who want to make payments but who are at their daylight overdraft limits.

A day-loan market is not an institutional development that would directly reduce risk. Rather, it would transfer risk from the Federal Reserve Banks and the whole set of participants in net settlement networks to the institutions

making day loans. However, it may indirectly reduce risk by making exposures more visible so that market discipline would ration credit to risky institutions with increased certainty.

These three examples of institutional changes—rollover, offset, and day loans—have not happened yet, but they, and others like them, suggest promising ways in which market practices might be expected to adjust to future efforts to use the new risk-control mechanism to reduce risk in large-dollar transfer systems.

IV. Concluding Remarks

An important result of the risk-control policy now in place is that each depository institution's cross-system use of daylight credit can be monitored relative to caps that are themselves related to the institution's self-evaluated creditworthiness. Initial caps are not expected to result in any significant disruption in large-dollar funds transfer service. Nonetheless, some depository institutions are having to adjust their operations to meet the policy limitations. This, plus the adjustments of other institutions recently sensitized to the risks, should at least dampen the growth of daylight overdraft risk exposures. However, conclusions must await experience under the new limitations because payments patterns may change in response to these initial adjustments, perhaps creating daylight overdraft problems for institutions that had not previously experienced them.

Once the situation settles down, the Federal Reserve Board of Governors fully expects to move further toward reducing risk, perhaps, for example, by ratcheting down "times-capital" cross-system daylight overdraft limits. In the meantime, banks can develop operational and institutional changes that will reduce and redirect risk without disrupting the payments system. In return, Federal Reserve Banks' risk exposure on Fedwire should diminish and market discipline should play a larger role in controlling risk.

13 Such an arrangement, said to be the first of its kind, is expected to start operating soon in London, involving settlement of foreign exchange transactions among major international banks. See "International Financing Review," Issue 622, May 17, 1986, pp. 1496-7.

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