MARKET RESPONSES TO PRICING FEDWIRE DAYLIGHT OVERDRAFTS*

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On an average day, about 1,100 U.S. depository institutions generate some $104 billion in funds transfer daylight overdrafts and another $55 billion in overdrafts from the transfer of book-entry U.S. government securities. Daylight overdrafts represent intraday negative reserve account balances on Fedwire (the Federal Reserve's wire transfer network) and uncovered net debit positions on CHIPS (a similar network owned by large New York banks). These overdrafts can last anywhere from a few minutes to most of the day, the latter being more common at the largest institutions.

Daylight overdrafts came into existence because it was less costly to use free intraday credit than to hold large intraday balances to cover the exponential growth in large dollar payments during the 1960s and 1970s. Until recently, there were no controls or costs associated with the use of daylight overdrafts. Thus free intraday credit led to market practices for many types of financial transactions that relied on overdrafts in order to be funded. There was no reason to develop alternative payment arrangements that would conserve on the use of this credit.

For example, in markets for federal funds, Eurodollars, and large certificates of deposit, borrowers commonly repay funds on maturing instruments in the morning but do not receive newly borrowed funds until later in the day. These repayment arrangements frequently occur even if a borrower renews or "rolls over" a maturing money market instrument with the same lender for an identical amount. A similar payment pattern is associated with commercial paper and certain types of third party or corporate payments, where payments are made in anticipation of receiving covering funds later in the day. These payment patterns can lead to daylight overdrafts in a bank's reserve account or in a customer's bank account. The purpose of this article is to consider what might happen if overdrafts are made more expensive or difficult to incur. The analysis will concentrate on funds transfer overdrafts. Similar responses are expected for U.S. government security book-entry overdrafts as well.

I. Recent Policy Initiatives

Current payment practices create credit risk for the Federal Reserve, which operates and provides for the finality of payments made over Fedwire. Should an institution fail unexpectedly while in overdraft, Reserve Banks would be exposed to losses. In addition, net debits on CHIPS, a private large dollar payment network, create systemic risk. An unexpected failure of a large CHIPS participant could cause other participants to fail in a domino-like fashion. Alternatively, if systemic risk is eliminated through a discount window loan to a failed CHIPS participant, the Federal Reserve is exposed to losses in its role as lender of last resort.

Payment system risks have been addressed by the Federal Reserve and banks and thrifts. In 1986, they and other federal and state supervisory authorities jointly implemented a system of quantitative limits on overdrafts and a program of upgrading internal credit, monitoring, and operational controls on both interbank overdrafts and overdrafts of customer accounts. These policies are currently being reexamined by the Federal Reserve. Among the possible next steps examined were: (1) further reductions in the existing quantitative limits (caps) on overdraft levels (they were reduced by 25 percent during 1987-88); (2) explicit fees for interbank overdrafts incurred on Fedwire; or (3) requiring clearing balances to cover overdrafts on Fedwire.

The alternatives would all have the same general effect. Overdrafts would be more expensive (implicitly or explicitly) than they now are and institutions would seek low cost ways to reduce them. After much study, the Board of Governors has chosen to seek public comment on the second alternative; that is, explicit prices on Fedwire daylight overdrafts.[1]

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[1] The study documents are Board of Governors of the Federal Reserve System (1988) and Large-Dollar Payments System Advisory Group (1988). The public comment document is Board of Governors of the Federal Reserve System (1989).

It is understood that pricing Fedwire overdrafts would be combined with settlement finality on CHIPS so participants on both large-dollar payment networks would have incentives to reduce overdrafts. At the same time, settlement finality on CHIPS would reduce systemic risk by having participants absorb more of the risks their network creates.[2] It also raises the implicit cost of permitting overdrafts on CHIPS and, to some extent, would reduce the likelihood of participants shifting overdrafts to CHIPS to avoid Fedwire overdraft charges.

If Fedwire overdrafts become more expensive to incur, at least four things could occur:

1. Payment reserve efficiency could improve through the use of "delayed sends" (where the sending of less time-critical payments is delayed until covering funds arrive);
2. Payments could shift from Fedwire to CHIPS;
3. New payment netting arrangements could be expanded (e.g., rollovers and continuing contracts for funds transfers); and
4. An intraday market could develop where funds can be borrowed earlier or securities delivered later, for a fee, to cover payments which would otherwise result in overdrafts.

The four responses are listed in the order of their likely increasing cost. As such, they represent an upward sloping supply curve.[3] In what follows, each of the four market responses are analyzed in more detail. Where possible, approximate estimates of their likely effect on Fedwire overdraft reduction are presented. The conclusion is that very large reductions in Fedwire overdrafts could result from relatively small price incentives.

II. Improving the Efficiency of Payment Reserve Use

Pricing overdrafts will induce banks to use their existing stock of payment reserves more efficiently. This will be reflected by a rising turnover ratio. Instead of sending payments as fast as they can be entered into a network—creating overdrafts as a result—internal operating controls can be used to delay the entering of certain types of payments until covering funds arrive. This will mean that the same value of payments can be sent over the day with a smaller amount of payment reserves, which increases the turnover ratio.

Some large banks use such internal controls today to keep their overdrafts from exceeding a certain percentage, say 80 or 90 percent, of their cap. Because some payments will be in a queue, this arrangement can lengthen the time it can take to complete a payment. But fewer payments will be made without cover and this means lower overdrafts and payment risk.

Efficiency in the use of payment reserves: Fedwire, CHIPS, and Switzerland Some large banks on Fedwire have used delayed sends as a simple and low-cost method to control funds transfer overdrafts. Even so, the total effect for all Fedwire users has been to keep the turnover ratio of the value of Fedwire funds transfer payments to payment reserves roughly constant over the three years ending in mid-1988. Even though Fedwire funds transfer payments rose by 41 percent (Table I), payment reserves (reserves plus overdrafts) rose by 36 percent. The net effect was to increase the Fedwire turnover ratio from 6.04 to 6.26, only a 4 percent rise in efficiency.

The situation on CHIPS has been quite different. On CHIPS, payment value rose 120 percent over the same three-year period (Table I) while payment reserves (net debits or overdrafts) fell slightly by 1 percent. As a result, the turnover ratio more than doubled from 6.39 to 14.14 and generated a 121 percent increase in payment reserve efficiency. Anecdotal information suggests that this increased efficiency was the result of controls on the timing of the entry of payments into the CHIPS network. The incentive was the imposition by CHIPS participants of relatively stringent bilateral net credit limits on other participants and relatively low net debit caps imposed by CHIPS rules. (In contrast to the Fedwire cap, the CHIPS caps were low enough to be binding or close to binding on many of the large CHIPS participants.) Data on CHIPS time of origination suggest that the actual value of delayed sends associated with such a marked increase in the efficiency of payment reserve use has been small.[4]

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[2] Payments over CHIPS are currently provisional until end-of-day settlement. Under settlement finality, participants receiving CHIPS payments will be required to provide funds to assure settlement in case a sending participant in a net debit position fails to settle. There can be no settlement unwind in the event of a failure to settle by one or more CHIPS participants.

[3] Because it is unlikely that there will be much of a shift in wire transfer volume or value to checks or ACH, this potential response is not discussed.

[4] In the fourth quarter of 1985, the dollar share of CHIPS payments made between the opening of the network and noon, between noon and 3 p.m., and between 3 and 4 p.m. was, respectively, 48, 33, and 14 percent (for a total of 95 percent). In the fourth quarter of 1987, these shares were 46, 38, and 11 percent. Thus the shift from the morning to the afternoon affected 2 percent of all payments made over CHIPS (or 2 percent/48 percent = 4 percent of the morning payments value prior to caps). Belton et al. (1987), Chart 5.

Table I

FEDWIRE AND CHIPS PAYMENT RESERVES TURNOVER RATIOS

($ billions)

	1985:Q2	1988:Q2	Percent change
Fedwire:			
Funds transfer payments	$428.0	$605.0	41
Payment reserves:			
Reserves at Reserve Banks[1]	$ 23.0	$ 37.6	63
Funds transfer overdrafts	$ 47.9	$ 59.0	23
Total	$ 70.9	$ 96.6	36
Turnover ratio:	6.04	6.26	4
CHIPS:			
Funds transfer payments	$288.0	$635.0	120
Payment reserves:			
Reserves at Reserve Banks	0	0	0
Funds transfer overdrafts	$ 45.1	$ 44.9	-1
Total	$ 45.1	$ 44.9	-1
Turnover ratio:	6.39	14.14	121

[1] Assumes that all reserves are, in effect, used for funds transfer, not book-entry security transfers which currently do not have a cap.

Because each $1 of delayed sends can reduce overdrafts by $1, small improvements in payments timing and synchronization can lead to large decreases in the use of overdrafts to support the same value of payments.

Far greater increases in payment reserve efficiency have been achieved in Switzerland (see Box 1). In little over a year, funds transfer payments in Switzerland (Table II) rose by 11 percent but payment reserves fell by 88 percent. This led to a dramatic rise in the turnover ratio. The ratio rose from 2.77, a level of less than half that on Fedwire or CHIPS prior to caps, to 25.37, a level almost twice as high as CHIPS or four times as high as Fedwire after caps. This striking change was the result of developing a central operating facility that processes a payment on a first-in-first-out basis and automatically queues payment orders which would create an overdraft. In effect, Switzerland has an explicit policy of centralizing delayed sends where reserve balances alone are used to fund, over the day, all payments entered. Daylight overdrafts have been eliminated. The queueing process has not created an intraday market in funds of securities although, on some occasions, banks have had to purchase funds to permit certain payments to be made.

Potential for improved payment reserve efficiency in the United States The Swiss experience with increased payment reserve efficiency is unlikely to transfer to the United States intact. Because the Swiss system is centralized, payments in each participant's queue are sent out as soon as covering funds are received. Also, early payments are encouraged by lower transaction fees in the morning compared with later in the day. Early entering of payment messages increases payment reserve efficiency by minimizing the accumulation of idle reserves or net credits by all participants. If some participants entered all their payments later in the day, others would be forced to increase the size of their queues in order to handle the same value of payments.

While the composition of payments being sent over the Swiss network are different from those over CHIPS or, especially, Fedwire, in the current environment this should not affect the efficiency of

Table II

CHANGES IN OVERDRAFTS AND RESERVE BALANCE TURNOVER UNDER SWISS INTERBANK CLEARING SYSTEM

	1987:Q2	September 1988	Percent change
Funds transfer payments	$61.6	$68.5	11
Payment reserves:			
Reserves at Swiss National Bank[1]	$ 5.1	$ 2.7	-47
Funds transfer overdrafts[2]	$17.1	0	-100
Total	$22.2	$ 2.7	-88
Turnover ratio:	2.77	25.37	816

[1] Actual reserves were higher but the amounts shown here were the values transferred to a special account to be used to settle payments.

[2] Daylight overdrafts ranged between 20 and 30 billion Swiss francs so 25 was chosen, giving an "average" daily dollar value of $17.1 billion with an exchange rate of 1.46 Sfr. to $1.

Source: Letter from Dr. Christian Vital, Director, Swiss National Bank, October 10, 1988.

Box 1

Efficiency in the Use of Payment Reserves: The Swiss Experience

The experience of Switzerland is instructive as an example of an extreme case in which delayed sends are a direct and desired result of a national policy to reduce overdrafts. In the second quarter of 1987, daylight overdrafts in Switzerland were $17.1 billion (using the exchange rate of $1 = 1.46 Swiss francs). Reserves at the Swiss National Bank which were used to settle payments were $5.1 billion. Total payment reserves in use were thus the sum of these two components ($22.2 billion) and were associated with $61.6 billion in payments, around 10 percent of the value of Fedwire funds transfer payments. This gave a very low turnover ratio of 2.77 (Table II), which was less than half of the 6.04 value for the United States on Fedwire.

The Swiss policy toward overdrafts has been to ban them, in effect, by setting up a centralized system that processes a payment only if no overdraft would be created; otherwise each payment order waits in the queue to be processed on a first-in-first-out basis once covering funds are received. Typically, the 156 participants in the facility enter so many payments in the morning (45 percent of the total are entered prior to the opening of the facility) that a waiting queue of around 30 percent of the entered payment orders is maintained until midday after which the queue drops off sharply and usually reaches zero by day's end. Over one-third of payments are made (and settled) within ten minutes of being validated while two-thirds are made within two hours. Only a very small volume of payments (2.5 percent) are in the queue for more than five hours.[1]

The fact that a payment queue develops for most or virtually all participants early in the processing day means that reserve balances and payment credits received can be reused immediately by other participants as initial out-payments are made. Thus, unlike the situation on Fedwire, and to some degree on CHIPS, large and small participants are encouraged to send payments early in the processing day and not to build up idle credits (payment reserves) for later use. On Fedwire and CHIPS, many small participants accumulate reserves and net credits early in the day and use them only later. Of necessity, this limits the increase in payment turnover efficiency achievable in the United States—which has almost 7,000 users of Fedwire and 137 on CHIPS, versus 156 on the Swiss system—unless all participants, not just the large ones, are encouraged to make payments when reserves are available.

The result for Switzerland of encouraging all participants to enter payments early (to minimize the accumulation of idle reserves) necessarily leads to the buildup of a queue of delayed sends but also leads to more efficient use of payment reserves. Prior to this development, each dollar of Swiss payment reserves supported $2.77 in payments. As of October 1988, each dollar of reserves supported $25.37 in payments. Overdrafts were zero even as an increased payment value was processed. One reason for the Swiss success is likely due to the very concentrated nature of banking in Switzerland. This has made it easier to resolve problems and simplifies the operational structure of the centralized payment queueing system.

The Swiss experience illustrates that delayed sends, if properly handled, are not inherently bad since overdrafts can be markedly reduced by increasing the efficiency of payment reserves. It also supports the anecdotal evidence that the observed increase in payment reserve efficiency on CHIPS was brought about largely by an internal policy of delaying sends at individual banks.

Currently in the discussion stage is a new CHIPS operating rule specifying that a significant proportion of each participant's payments should be sent by noon. At present, many smaller participants fall short of this figure while the larger banks exceed it. Because the larger banks now send more than 50 percent of their payments value prior to noon, the proportion of all CHIPS payments sent by noon also exceeds 50 percent but this burden is borne by the larger banks. By contrast, only 20 percent of Fedwire funds transfer payment value is sent by noon. If CHIPS adopts such a new payment rule for each participant, the accumulation of idle payment reserves (net credits) should fall, resulting in a further increase in payment efficiency. This will also relieve some of the delayed send burden currently borne by large CHIPS banks. In the CHIPS case, as well as that for Switzerland, these results have been induced by having a binding cap (which in the Swiss case is zero). Pricing, as is being proposed for Fedwire, can achieve the same ends.

[1] These and other data are contained in Vital and Mengle (1988) and Vital (1988).

payment reserve use. In the Swiss case, over 90 percent of the value of payments handled are from foreign exchange transactions. In contrast, foreign exchange transactions on CHIPS account for 55 percent while Eurodollar transactions comprise 28 percent. Fedwire handles virtually no foreign exchange transactions but instead concentrates on federal funds, Eurodollars, and commercial paper. These are, respectively, 42, 10, and 10 percent of total Fedwire payment value. As long as there is no important intraday market in funds or securities, timeliness of payments should not be more important for any of these different types of payments. The exception is where institutional practice has evolved to make it important, as for morning return of overnight federal funds borrowings and third party real estate and other contract settlement payments.

In the United States, delayed sends are not queued in a centralized location; instead the queueing occurs at individual banks before the payment orders enter Fedwire. This fact, and the lack of an incentive for all participants to minimize the accumulation of idle reserves or credits, likely means that the upper limit to the turnover ratio in the United States will be considerably less than that for Switzerland. It also means that the costs of implementing delayed send arrangements in the United States will exceed those for Switzerland (even after adjusting for the different payment volume levels) because each bank will have to develop and refine its own system rather than having a centralized arrangement. Overall, however, it may not be unreasonable to assume that Fedwire could achieve one-half the payment reserve efficiency increase recently experienced by CHIPS. If realized, such an improvement in efficiency could reduce Fedwire funds transfer overdrafts by 63 percent and thereby effect a significant reduction in payment risk with no offsetting increase in risks elsewhere.[5] If, instead, only one-fourth of the CHIPS payment reserve efficiency is realized on Fedwire, then overdrafts would fall by 39 percent.

III. Shifting Payments from Fedwire to CHIPS

A second market response to priced Fedwire overdrafts is a shift of Fedwire funds transfers to CHIPS. Priced Fedwire overdrafts could become unpriced CHIPS net debits if some Fedwire payments could just as easily be made over CHIPS. This option is available for those (larger) banks which use both networks and may apply even if CHIPS had settlement finality.

Incentives to shift The most obvious reason for shifting payments from Fedwire to CHIPS is the relative economic costs of overdrafting on the two networks. On Fedwire, the cost will be an explicit price for overdrafts. In contrast, on CHIPS the cost will be indirect and related to risks of settlement finality. With settlement finality, each participant will post an amount of collateral that will be related to the size of the bilateral net credit limit each bank sets for other participants. Thus receivers of CHIPS payments will in effect be "funding" the net debits of senders and bear some (unknown) risk of loss that the posted collateral may be used to cover the net debit of a failed CHIPS participant. When CHIPS receivers send about the same value of payments they receive, the arrangement may be viewed as equitable and results in CHIPS participants effectively selling their *own* intraday "funds," actually net credits, to *themselves* as a group. One participant cannot do this by itself; rather, all or most CHIPS participants have to participate, each one raising the bilateral net credit limit it places on the other and posting more collateral in order for the group to incur more net debits.

While the CHIPS arrangement requires cooperation among banks, such cooperation may be well worthwhile if the Fedwire overdraft price is high enough. It is high enough when the market's perception of the risk of loss of collateral on CHIPS is viewed as being smaller than the price being charged on Fedwire. This may be the case for CHIPS because the Fedwire price contemplated will be high enough to induce overdraft-reducing market responses on Fedwire, such as the use of rollovers and continuing contracts and perhaps even the development of an intraday funds market. If the Fedwire price can induce different market participants to lend funds to one another on Fedwire, then participants on CHIPS as a group should also be willing to extend their bilateral net credit limits to each other, effectively permitting each participant to reduce Fedwire overdrafts by increasing its own net debit on CHIPS.[6]

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[5] The CHIPS turnover ratio rose from 6.39 to 14.14. Applying half of this increase (3.88) to the Fedwire turnover ratio of 6.26 gives a new Fedwire ratio of 10.14. With a constant value of payments, the higher turnover ratio reduces the need for payment reserves from $96.6 billion to $59.7 billion in the second quarter of 1988. This is still greater than reserves at Reserve Banks ($37.6 billion), but overdrafts would be reduced from $59.0 billion to $22.1 billion, a 63 percent reduction.

[6] Cooperation among CHIPS participants is important because if only one participant shifted its Fedwire payments and overdrafts to CHIPS, then receiving CHIPS participants would find that their Fedwire overdrafts and costs had increased since they would be receiving a CHIPS credit payment in place of a Fedwire credit. In response, the receivers could lower their bilateral net credit limit to the sending participant, reducing the value of CHIPS payments received, and/or have the receiving customer instruct the sending customer to send a Fedwire payment as before.

In addition to the relative economic costs of overdrafts on CHIPS and Fedwire, bank accounting conventions might also encourage shifting. While the Fedwire charges will be directly reflected on the bank's annual income statement, CHIPS economic costs do not appear on the income statement unless a loss were to actually occur. This is also a reason why correspondent balances have often been favored over the payment of direct fees for the purchase of interbank services. Thus, even if the actual economic costs of incurring an overdraft on CHIPS were equal to those on Fedwire, CHIPS could be the preferred network to incur an overdraft, at least until a sizeable loss actually occurs.

How much may shift Fedwire payments could be shifted if there were unused or excess overdraft cap capacity on CHIPS. An idea of the potential for such shifts may be gained by calculating the difference between each participant's current CHIPS cap and its peak net debit. This represents an initial estimate of the value of each participant's excess cap capacity. Assuming the initial overdraft value which could shift to CHIPS to be the smaller of a participant's current Fedwire overdraft or excess cap capacity on CHIPS, the initial shifts would total to $6.7 billion. Because each $1 in Fedwire funds transfer payments of a single bank in or about to go into overdraft on Fedwire is on the *margin* associated with $1 in overdrafts, a shift of $6.7 billion in Fedwire overdrafts implies a similar shift in payment value to CHIPS.

While these estimates are correct if each bank acts in isolation, they cannot be summed. Once many banks simultaneously shift their payments to CHIPS, the marginal relationship for an individual bank of $1 in shifted Fedwire payments to $1 in reduced Fedwire overdrafts cannot be used. As other banks also shift their payments to CHIPS, the receipt of Fedwire credits will fall such that each $1 in Fedwire payments shifted to CHIPS will generate less than a $1 reduction in Fedwire overdrafts. Thus when many banks act together, the *average* relationship between Fedwire overdrafts and Fedwire payments is the more likely outcome. Here each $1 in shifted Fedwire payments would reduce Fedwire overdrafts by $.098 (not $1). Applying the average relationship between overdrafts and payments to the payment shift estimate would then provide an estimate of the reduction in Fedwire overdrafts.

But the payment shift estimate of $6.7 billion probably should not be used; it is likely to be a lower bound due to a feedback effect. While each $1 previously sent over Fedwire by a CHIPS participant to another participant will initially reduce the sender's Fedwire overdraft by $1, it will also reduce the receiver's Fedwire credits by $1. With fewer Fedwire credits, the receiver's Fedwire overdraft may rise by as much as $1 (if the receiver is already in overdraft on Fedwire). In response, the receiver may also shift payments from Fedwire to CHIPS and, in a dynamic interaction among the various CHIPS participants, may eventually succeed in increasing the Fedwire overdraft of the original sender.

The feedback effect will stop only when: (a) CHIPS receivers reduce their bilateral net credit limits; (b) Fedwire overdrafts by CHIPS participants equal zero; or (c) all CHIPS to CHIPS payments over Fedwire have shifted to CHIPS. The limiting case is (c) since the value of shifted payments under (a) or (b) could not exceed those of (c). With case (c), $204 billion in Fedwire payments could shift to CHIPS. Assuming that the average relationship between all Fedwire funds transfer overdrafts and payments holds for all CHIPS to CHIPS payments, then $20 billion in Fedwire overdrafts could shift to CHIPS ($204 × .098 = $20). This would represent a 34 percent reduction in Fedwire funds transfer overdrafts and a 45 percent increase in CHIPS net debits.

IV. Payment Netting for Funds Transfers

In markets for federal funds and Eurodollars, it has been institutional practice for some time for borrowers to repay funds on maturing instruments in the morning, even though they do not receive newly borrowed funds until later the same day. These repayment arrangements frequently occur even if a borrower renews or rolls over a maturing money market instrument with the same lender for an identical amount. A similar payment pattern is associated with certain types of third party or corporate payments, where payments are made in anticipation of funds to be received later in the day. These payment patterns create daylight overdrafts.

Payment netting represents a fundamental change in the institutional structure and underlying risk of participation in financial markets. Today, gross legal payment obligations typically lead to corresponding gross payment flows between two parties to a transaction. Certain types of netting would reduce the underlying legal payment obligations to net terms, leading to smaller net payment flows to satisfy legal obligations. Such an arrangement can significantly lessen *actual* risk between banks since legal exposures are reduced. And, since this directly translates into a reduced value of payment flows over Fedwire (or CHIPS), payment netting should also limit the size and growth of daylight overdrafts. Other types of netting merely involve the movement of net funds flows

which are equal to the difference in gross payment obligations between two consecutive time periods. This can also reduce overdrafts.

Types of payments that are easiest to net Funds transfer payment netting arrangements can perhaps be most easily applied in three different financial markets. These are spot and forward foreign exchange transactions, overnight federal funds borrowings, and overnight Eurodollar positions. Some idea of the effect of payment netting on Fedwire and CHIPS overdrafts is obtained by comparing the percent that overdrafts are of payments with the percent of nettable payments shown in Table III. On Fedwire, overdrafts are 9.8 percent while nettable payments are 52 percent. Thus if only a relatively small portion of Fedwire nettable payments were actually netted, daylight overdrafts would be significantly reduced. A similar conclusion also applies to CHIPS since overdrafts there are 7.1 percent while nettable payments are 83 percent.

Overdraft reduction from federal funds netting Overdrafts can be reduced through many different types of netting arrangements (see Box 2). This includes netting by novation for foreign exchange transactions along with rollovers and continuing contracts for overnight federal funds and Eurodollars. Overdrafts are also reduced with on-the-books settlement procedures or the use of term rather than overnight funds. In what follows, the overdraft reduction which could result from rollovers and continuing contracts is estimated.

With a federal funds rollover, all funds borrowed from one seller for one overnight period would be reborrowed from the same seller for the following period. Overdrafts would be reduced because both parties would have agreed that until the rollover arrangement is terminated, there would be no need to move funds back and forth between themselves. Since there is no change in the gross overnight position between the buyer and the seller, the net payment required is zero. For banks that regularly incur overdrafts, each dollar of overnight federal funds rolled over represents a dollar's worth of daylight overdraft reduction.

With a continuing contract, only part of the overnight position is continued to the next overnight borrowing period. Instead of sending two wire transfers for the gross amounts involved, a single wire transfer for the net change in the gross position (plus the previous days interest) would need to be sent. This too can reduce overdrafts but by a smaller amount than a rollover, depending on the size of the net difference in gross positions and hence the size of the single net wire transfer being sent.

Table III

IMPORTANCE OF NETTABLE PAYMENTS ON FEDWIRE AND CHIPS

(1988:Q2)

Type of Payment	Payment Value over Network	
	Fedwire (percent)	CHIPS
Spot and Forward Foreign Exchange	0	55
Overnight Federal Funds[1]	42	0
Overnight Eurodollars	10	28
Total:	52	83
$ All Overdrafts[2] / $ All Payments	9.8	7.1

[1] Includes 3-party repurchase agreements which will show up as a funds rather than a securities transfer.

[2] The overdraft/payment ratios do not include security transfer overdrafts.

Source: Federal Reserve Bank of New York, 1987.

The first step in estimating the potential effect of federal funds netting is to determine the underlying purpose of the federal funds being purchased. Toward this end, the Large-Dollar Payments System Advisory Group sponsored a recent survey of eight large banks in New York, Chicago, and elsewhere. The results are summarized in Table IV.

The survey revealed that 79 percent of federal funds purchased were related to funding requirements, while 14 percent were used for end-of-day positioning for reserve requirement purposes. Finally, 7 percent were associated with trading activity, where the purchased funds were resold to other buyers later in the day. Unfortunately, not all three categories are equally amenable to payment netting. The successful implementation of rollovers or continuing contracts requires that the seller and buyer be the same between contract periods. This is most likely to occur for funding requirements but would be more difficult for end-of-day positioning or trading activity.

To estimate the portion of the federal funds market available for netting, one must determine how the various categories of purchased federal funds are settled. According to the survey, 20 percent of federal funds are already settled by rollover or continuing contract, or are term funds. And some 32 percent of purchased funds are settled on the books of the purchasing bank. Of course, neither of these settlement categories has many payments that go over a wire transfer network. As a result, the value of federal

Box 2

Overdraft Reduction Using Netting Arrangements

Foreign Exchange Netting

Overdraft reduction can be achieved a number of different ways. The most well-known netting arrangement is foreign exchange netting which is currently used in London and is under study for New York. The three salient features concerning foreign exchange netting are:

(1) It is currently bilateral in nature;
(2) The bilateral gross transactions flows are being continuously netted by legal agreement so that at any point in time the total exposure is only the *net* position; and
(3) There is a single settlement payment for this net exposure on the value date.

The bilateral nature of the transaction permits the counterparties full control over their credit exposure and so assists in limiting payment risk. And the ability to continuously net gross transactions effectively means that each new transaction is associated with a new contract for the new net amount due. Since the old contract is replaced each time a new gross transaction is initiated, this has been called *netting by novation*. Finally, one relatively small net payment replaces what could otherwise be a series of larger gross transfers over a wire network during the course of a day. This can contribute to overdraft reduction since fewer payments would need to be made and those that are made would be for a smaller dollar amount.

Netting Overnight Funds

A somewhat different arrangement would apply for netting overnight federal funds and Eurodollar transactions. Here a single bilateral gross borrowing position may be fully rolled over into the next time period with the same seller. This means that the borrowing and lending parties extend their current borrowing agreement to the next time period without the need to transfer funds over a wire network. With a rollover, there is no need to repay the previous night's borrowing and, after an operational delay, retransfer the same amount back again to fund the next overnight period.[1]

Alternatively, if only a portion of the full amount is being continued for the next time period with the same lender, only the net difference in overnight borrowings would need to be transferred (perhaps along with the interest earned from the previous overnight period). This has been called a continuing contract. Since either a rollover or a continuing contract would mean that small net payments would be made to settle changes in gross overnight or term borrowing positions with the same party, payment volume and overdrafts could fall.

Implicit Netting

Other arrangements in the funds market have the same effects as netting on payments and overdrafts. Two of the most important would be the use of term funds and on-the-books settlement. Overdrafts can be reduced when term funds are used in place of overnight funds since the repayment of borrowed funds and the subsequent reborrowing of new funds for the next period would naturally occur less frequently for term funding than for overnight funding. The effect on overdrafts is the same between overnight and term funds on the day the term funds come due, are repaid, and are refinanced for the next period. But on all other days, no such payment flows occur for term funds. Thus the use of term federal or Eurodollar funds in place of overnight funds can reduce the overdrafts as an average over, say, a two-week period.

On-the-books settlement is used today and is another way to reduce daylight overdrafts. A correspondent bank that receives a cash letter from a respondent institution would buy the same value of overnight federal funds from the respondent. It would then debit an internal "due-to" account rather than have the respondent draw down the funds with a wire transfer and later sell the correspondent (or someone else) federal funds. Repayment of borrowed funds could take place by crediting the internal due-to account the next day. Because the funds flows take place between accounts within the purchasing bank and not over a wire transfer network, they reduce external payment flows and their associated overdrafts.

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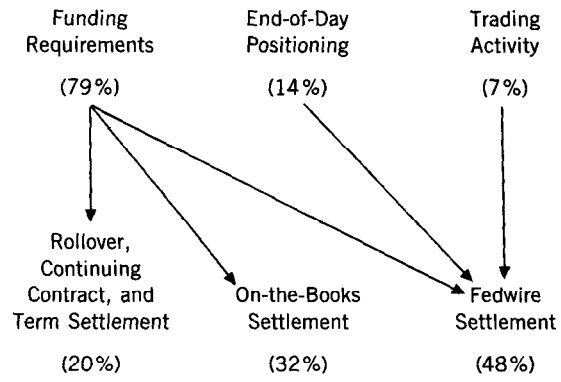
[1] Such an arrangement represents a special type of intraday market where the overnight seller of funds is also the intraday seller. When the buyer and seller differ each day, overdraft reduction can still occur by altering the time of delivery or return of overnight funds. See Section V.

Table IV

EFFECT OF FEDERAL FUNDS NETTING ON FEDWIRE



Federal funds available for netting = 27%

(48% − 14% − 7% = 27%)

Source: D. Humphrey, 1987. This survey was sponsored by the Federal Funds Netting Committee (a working committee of the Large-Dollar Payments System Advisory Group).

funds settled using the two procedures do not contribute significantly to daylight overdrafts. Thus only 48 percent of purchased federal funds—those that move and are settled over Fedwire—are available for new netting activity from a settlement standpoint.

The very bottom of Table IV shows a final estimate of the amount of federal funds available for netting. The estimate is derived by taking the 48 percent settled over Fedwire and subtracting the 14 plus 7 percentage points of federal funds associated with end-of-day positioning and trading activity. The net result is that 27 percent of the total federal funds market could be available for netting.

The size of the overnight federal funds market averaged $186 billion a day in 1988.[7] This includes collateralized federal funds as well as brokered federal funds (about $50 billion), although the latter may not be as easy to net. Thus, 27 percent of $186 billion yields $50 billion as the dollar estimate of the value of federal funds available for netting. Since funds transfer daylight overdrafts are $59.0 billion, the possible effect of federal funds netting could be to reduce Fedwire funds transfer overdrafts by 85 percent.[8]

Impact of payments netting on sellers of overnight funds

One should also consider the needs of the funds suppliers. While payment netting by funds purchasers can reduce the need to make payments and thus incur overdrafts, some funds suppliers may consider themselves disadvantaged. First, although this particular effect is likely to be small, federal funds netting by funds sellers increases total exposure from around 18 to 20 hours today, in a typical overnight arrangement, to 24 hours with netting. Today, borrowed funds are often routinely returned to the seller in the morning and then sent back to the same or another borrower 4 to 6 hours later. Under a rollover or continuing contract arrangement, however, the morning and afternoon funds flows do not take place. Second, there may be some federal funds sellers that have come to rely on the early morning return of funds lent out the previous afternoon to prevent their own payment activities from creating an overdraft.

While it is not possible to accurately quantify the likely influence these two effects may have on the amount of federal funds available for netting, there are grounds for believing their influence will be small. One reason is that most of the funding activity in the federal funds market is between large bank buyers and either small bank sellers or nonbank sellers. Nonbank sellers include the Federal Home Loan Banks and the Credit Union Centrals, which are estimated to sell 44 percent of all federal funds purchased. These sellers typically do not have overdraft problems nor do they have much large-dollar wire transfer payment activity. Thus most of them would not find that they had created an overdraft problem where none existed before if they entered into a federal funds netting arrangement for a portion of the funds they sell.

The one instance in which a seller would have difficulty supplying federal funds under a netting arrangement is if the supplier is itself a large bank that either has or would have an overdraft problem if it did not have use of its own funds for 4 to 6 hours each day. But large bank buyers purchase funds primarily from large bank sellers for end-of-day positioning and trading activity, both of which have been excluded from the estimate of the value of federal funds available for netting. In sum, it is unlikely that the needs of the federal funds seller will

[7] The end-of-day *stock* of purchased federal funds was $147 billion and reflects the 79 percent of the market related to funding activity (Table IV). This figure is adjusted upward to include end-of-day positioning (14 percent) and trading account activity (7 percent) which contribute to the federal funds market *flow* during the day but would likely, on average, be excluded from the end-of-day stock measure: $147 billion + .14(X) + .07(X) = X = $147 billion/.79 = $186 billion.

[8] These results are consistent with those performed earlier using 1981 data and a different technique. Humphrey (1984), pp. 86-89.

be an insurmountable obstacle in making payment netting a workable arrangement, especially if pursued aggressively by federal funds purchasers.

There is no hard information on what the costs of federal funds netting might be. Anecdotal evidence suggests, however, that the ongoing cost of federal funds netting could be zero for small sellers of funds, such as downstream respondents with other business relationships with the purchasing bank. At the higher end of the range, it could be 12 basis points (at an annual rate) for large bank and nonbank sellers of funds, that can more easily sell large amounts in a national market.

Netting other payments There is not enough information on the current structure of the foreign exchange or Eurodollar markets to provide a numerical estimate of the effect of netting in these two areas on Fedwire (or CHIPS) daylight overdrafts. However, industry opinion is that many of the foreign exchange transactions over CHIPS will be amenable to multilateral netting by novation arrangements, similar to the bilateral netting in foreign exchange which now occurs in London.[9] United States banks are currently working on developing such a multilateral arrangement, with appropriate safeguards to ensure settlement and virtually eliminate systemic risk. Foreign exchange netting is being driven by a desire to reduce CHIPS and bank legal exposures and, importantly, by the new risk-based international capital standards which will require some capital to back these off-balance sheet activities. The Federal Reserve and other regulators have indicated that they will likely view the resulting net exposures (rather than the gross position) as those requiring capital, if the netting arrangement meets certain criteria.

Finally, there is the possibility of applying rollovers and continuing contracts to overnight Eurodollar funding transactions. Industry sources indicate that these arrangements would be feasible but the likely effect on overdrafts is unknown. However, the effects could apparently be substantial since Eurodollar transactions account for 28 percent of the value of CHIPS payments and 10 percent of Fedwire payments (Table III).

V. Development of an Intraday Funds Market

Probably the most operationally difficult response to pricing Fedwire overdrafts will be the development of a widespread market in intraday funds where the rates charged could vary hourly. The development of such a market would be difficult because at present even the most efficient banks can take up to half an hour or more to actually send funds once a trade has been negotiated. It is one thing to record when funds are sent or received and quite another to ensure that they are delivered to and received back from purchasers according to prenegotiated intraday periods. More likely, given the current practical operational conditions, a functioning intraday market would probably buy and sell funds for longer than one-hour time periods, say in three- to six-hour periods. A three-hour time period would be sufficient to reduce most overdraft peaks while a six-hour period would cover all but the most extensive overdraft durations and reduce average overdrafts.

If an intraday market were to arise, it would probably initially take the form of adding a small premium to the overnight rate to give the borrower the right to return borrowed funds in the late afternoon. At the same time, a small premium could be given to sellers of funds for delivering them early in the morning.[10] Such arrangements skirt the operational problems noted above and parallel rollover and continuing contract arrangements except that the buyer and the seller of funds need not be the same for more than just one overnight period. Also, such simple arrangements would be similar to negotiating higher or lower rates for securities transfers depending on when the security is delivered against payment.

VI. Summary and Conclusions

The Federal Reserve has made a policy judgement that the credit risk of daylight overdrafts on Fedwire needs to be reduced. One way of doing so is to price Fedwire overdrafts. If pricing is used, four possible market responses can be expected to reduce overdrafts and the associated credit risk. Listed in order of their likely increasing cost to banks, they are: (1) improving the efficiency of payment reserves by delaying sends of less time-critical payments; (2) shifting payments from (priced) Fedwire to

[9] One large bank has estimated that foreign exchange netting by novation with 25 of its top foreign exchange counterparties could reduce its foreign exchange payments by 20 to 30 percent. *American Banker*, December 14, 1988, p.2.

[10] In this regard, intraday markets have evolved in Japan. Banks needing funds to cover intraday net debits can arrange to borrow from other banks for a couple of hours. The cost tends to vary between 7 and 11 basis points (annual rate). Morning borrowing, starting after 9:00 a.m. and ending before 1:00 p.m., is mainly used for drawing banknotes from the central bank early in the day, before inflows of sufficient funds arrive. Afternoon borrowing, starting at 1:00 p.m. and ending before 3:00 p.m., is primarily used for settling interbank payment positions at midday settlement (1:00 p.m.). Bank of Japan, New York Office.

CHIPS (which would have settlement finality); (3) expanding new payment netting arrangements (rollovers and continuing contracts); and (4) developing a market for intraday funds. The first three market responses, when combined, strongly suggest that Fedwire funds transfer overdrafts could be virtually eliminated even if the overdraft price were relatively low, because the cost per dollar of payments being made is also low. If in addition an intraday market develops, this conclusion becomes even more certain. The results are summarized in Table V.

Delaying sends of postponable payments is currently used by large banks on CHIPS. As a result, the CHIPS payment reserves turnover ratio (the ratio of payment value to net debits) rose 120 percent over the last three years. This is equivalent to reducing CHIPS net debits by over half if payment value were constant (instead of growing). Switzerland uses a centralized delayed send operating facility with payment queues to increase its payment reserve turnover ratio. So far, it has eliminated overdrafts but still processes the same value of payments over its (smaller) wire transfer network. Analysis suggests that the delay of certain less time-critical funds transfer payments on Fedwire could result in a potential 63 (or 39) percent reduction in funds transfer overdrafts. Such an estimated reduction is based on achieving only one-half (or one-fourth) of the improved payment reserves efficiency obtained by CHIPS over the last three years.

A second market response to more expensive overdrafts concerns the potential for shifting Fedwire funds transfer overdrafts and payments to CHIPS. Analysis of the current level of CHIPS participant to CHIPS participant payments going over Fedwire suggests that 34 percent of Fedwire funds transfer overdrafts could, at a maximum, shift to CHIPS. If such a shift occurred, overdrafts and credit risk for CHIPS participants would rise by 45 percent. However, the adoption of settlement finality on CHIPS clearly results in reduced systemic risk, even after the shift.

Third, there is the possibility of payment netting on Fedwire, specifically federal funds netting. It is estimated that federal funds netting (through rollovers and continuing contracts) could by itself reduce Fedwire funds transfer overdrafts by 85 percent. Such netting would apply only to funding activities.

Table V

SUMMARY OF MARKET RESPONSES TO PRICING FEDWIRE OVERDRAFTS

Market Response	Potential Fedwire Overdraft Reduction[1]
	(percent)
1. Improved Payment Reserve Efficiency:	
One-half CHIPS efficiency	63
One-fourth CHIPS efficiency	39
2. Shift Payments to CHIPS	34
3. Rollovers and Continuing Contracts	85
4. Intraday Funds Market	virtually unlimited

[1] Each estimate refers to a single market response in isolation. The responses are not additive, as this could involve double counting. Payments shifted to CHIPS could also be delayed, improving payment reserve efficiency. Once one market action is taken, the payment is no longer a candidate for another market response.

Based on anecdotal information, the extra cost of rollovers or continuing contracts could range from zero to 12 basis points (annual rate) per dollar of overdrafts incurred. Thus the Fedwire overdraft price would not have to be very high to induce this and other market responses.

When the above three market responses are combined, even allowing for some possible double counting, it would seem that Fedwire funds transfer overdrafts could be virtually eliminated. To the extent overdrafts remain, there is always the possibility of an intraday funds market evolving to take up the slack. If such a market were to arise, it is likely that unpriced delayed sends would become time-critical, would be priced intraday, and thereby would be absorbed as part of an intraday funds market. The most likely evolution of such a market would be the development of a price differential between early and later return of overnight borrowed funds, a differential that would likely be less than the Fedwire overdraft price. The Fedwire overdraft price suggested in the Federal Reserve's public comment document was on the order of 25 basis points (annual rate) per $1 in average (not peak) Fedwire overdrafts. Since this would apply to only 255 business days over the year, the realized rate would be only 70 percent of the specified rate or 17 basis points per dollar of Fedwire average overdrafts.

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