

Daylight overdrafts: Rationale and risks

Douglas D. Evanoff

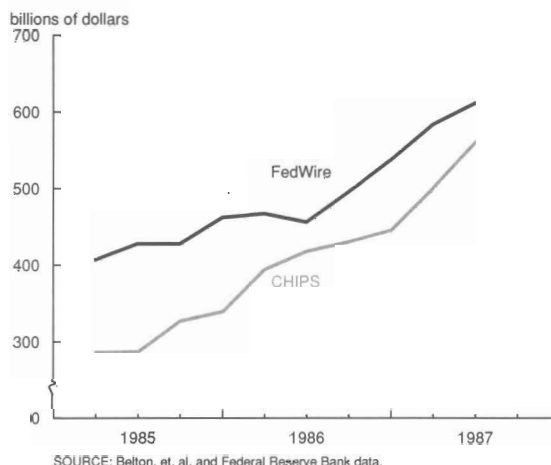
The U.S. payments system consists of thousands of economic agents transferring claims to financial assets. Although disagreement may exist on specific payment system issues—such as externalities, public-good aspects, and the proper oversight role of government—few people doubt the importance of a smoothly operating payment system to the efficient functioning of the economy. In fact, it has been argued that the necessity of assuring an orderly payment system is the major justification for regulation of the banking industry (Mussa 1986). Other observers emphasize the important role of the payment system but are less convinced about the need to regulate its operations closely.

Payment system risk resulting from non-secured intraday credit extensions has recently come under increased scrutiny by banks and federal regulators. This paper analyzes that risk and, in particular, addresses issues related to intraday or daylight overdrafts on large-dollar transfer networks, i.e., the Federal Reserve's wire transfer system (FedWire) and the Clearing House Interbank Payments System (CHIPS). First it briefly describes the problem, some factors causing it, and the existing approach used by the Federal Reserve to contain the risks associated with daylight overdrafts. Next, a basic supply-and-demand model is utilized to determine the optimal levels of intraday credit and to analyze how changes in public policy, industry practices, and transaction activity could alter the level of overdrafts. The merits of alternative policies to limit daylight overdrafts are also considered.

Payment system risk

The largest dollar volume of transfers in the U.S. occurs through two large-dollar electronic transfer systems—FedWire and CHIPS.¹ Volume on these networks has grown significantly in recent years (see Figure 1). There are numerous reasons for this growth, including the maturity of financial markets, accounting practices, bank regulation, and profitable

Figure 1
Average daily payments volume on large dollar transfer networks



banking opportunities. The 1981 introduction of same-day settlement for CHIPS is believed to have had a significant effect on that network's volume.²

These networks process transactions of comparable dollar magnitudes, although there are significant differences in the type of transactions and the mechanics involved.³ Because the Federal Reserve guarantees the transfers, transactions on FedWire are transfers of final "good funds" between financial institutions.⁴ CHIPS is a private network on which provisional transfers are recorded, followed by the actual settlement of net positions for each participant at the end of the day through the Federal Reserve.

Regardless of differences between the two networks, similar risks can arise. Using either network, an institution can transfer funds that are not actually in its account at the time of the transfer, thereby creating a "daylight" over-

Douglas D. Evanoff is a senior financial economist at the Federal Reserve Bank of Chicago. Helpful comments were provided by Herbert Baer, Bob Fitzgerald, Matt Gelfand, Dana Johnson, Randy Merris, Bill O'Connor, Chris Pavel, and Richard Simmons.

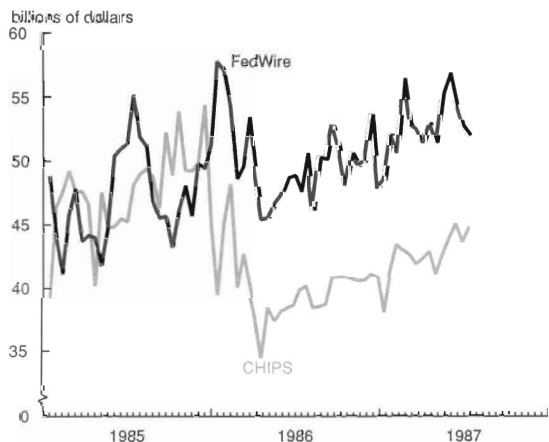
draft.⁵ If, by the close of business, a bank is unable to cover transfers sent during the day, someone must bear the burden of the default. For transfers on FedWire, the Federal Reserve and, ultimately, the taxpayer would absorb the loss. CHIPS would utilize a potentially complex "unwinding" process in which all transfers initiated by the failing institution would be reversed. This unwinding, it is argued, could lead to defaults by other institutions that depend on funding from the initial defaulting bank. In a worst-case scenario, failure would spread throughout the banking system in a domino fashion.

The existing incentive structure for institutions to monitor and account for payment system risk is believed to have promoted the growth of daylight overdrafts. The receiving institution on a FedWire transfer is provided good funds by the Federal Reserve regardless of the condition of the sending institution. No incentive exists for the receiver to monitor the sending bank, because only the Federal Reserve stands to lose in the event of a failure.⁶ This could cause daylight overdrafts to be greater than they would be in the absence of the Fed guarantee. Additionally, previous statements, as well as the actions of regulators, may lead institutions to believe that the regulators, out of fear of systemic failure, will intervene if a large institution defaults on a private transfer network such as CHIPS. The result is a tendency to ignore or play down risks associated with incoming transfers. The perception of little, if any, default risk increases the level of risk assumed beyond what private markets without a perceived guarantee would produce. This mispricing of risk on Fedwire is believed to have resulted in a significant increase in the level of daylight overdrafts.

Overdrafts and systemic risk

The growth in overdrafts has resulted in increased risk, which must be absorbed by payment system participants or the Federal Reserve. However, risk taking is not bad per se. It is an integral part of banking. Banks are in the business of managing risks, particularly those that are diversifiable. Many argue that, as long as payment system risk can be properly assigned, it should not be considered a major issue.

Figure 2
Daylight overdraft volume



SOURCE: Belton, et. al. Figures presented are biweekly average overdrafts which are derived by averaging each institution's maximum daily overdraft over the period.

The major public policy issue arises from the potential for systemic risk. While preventing contagious failures should be a goal of regulatory policy, no evidence exists suggesting that failures of this type have been common. Benston and Kaufman (1988), Benston, et. al. (1986), Rolnick (1983), and Aharony and Swary (1983) examined earlier periods and found few periods in which systemic risk appeared to be the cause of failures. However, if there were substantial evidence that daylight overdrafts would lead to systemic failure, it would justify regulatory intervention in this activity.

Such evidence was the topic of a recent study. Using actual transfer data, Humphrey (1986) simulated the effects of the unexpected settlement default of a major CHIPS participant.⁷ A similar exercise was conducted based on the default of a large associate participant, i.e., one settling through a major participant. It was assumed in each situation that settlement default by one party would lead to an unwinding of transactions, according to CHIPS guidelines. This unwinding of transfers would obviously affect the positions of other participants.⁸ Humphrey assumed that the unwinding would cause other participants to be unable to settle if their net position was negative and was deteriorated by an amount equal to or exceeding their equity capital. This then precipitated an additional round of unwinding. The simulation continued until all participants

in the hypothetical analysis were able to settle according to the above criteria.

The findings were quite dramatic. The hypothetical failure of a large participant resulted in nearly half (50) of the network's members, with over a third (38 percent) of the dollar payments, failing to settle. Repeating the simulation using data from a different day produced similar results except that the set of institutions most adversely affected by the settlement default was quite different from the set affected under the initial simulation. Thus, the study suggests that institutions cannot insulate themselves by closely scrutinizing the creditworthiness of participants with which they frequently conduct business. Rather, the various payments are too intertwined, complex, and irregular to allow an institution or regulator to predict the ramifications of a settlement failure.

The simulated settlement failure of a large associated member of CHIPS resulted in similarly discouraging results. A similar number of CHIPS participants (49) and dollar volume of transfers (31 percent) failed to settle. Simulations with an alternative set of daily transaction data produced only slightly better results. The failure of an institution initiating less than 1 percent of CHIPS volume still led to the failure of 33 institutions and the default of more than 22 percent of total system dollar volume.

Although on the surface the findings suggest that a regulatory function may be required, several factors may mitigate the problem of a failure to settle.⁹ The banks in these simulations may face a liquidity instead of a solvency problem. Although the magnitude of the loss is substantial, participants may be able to cope with the loss by using internal or external sources. Even late in the day, Fed Funds may be obtainable in the open market to offset the loss. However, the most important factor preventing settlement failure is access to the Federal Reserve discount window. In fact, in these scenarios the window should be accessible to allow it to perform its stated purpose, i.e., to lend funds on a collateralized basis to liquidity solvent institutions. If a bank failed to settle, systemic problems could be totally avoided if discount window credit were available to provide reserves to the remaining institutions. They would then be able to settle and continue operations in the following days until

appropriate court actions determined the portions of total debt positions to be absorbed by the various participants in the transfer network. Settlement failure by a participant does not imply that some funds will not be forthcoming to the remaining participants, even if the defaulting bank is insolvent. The problem is one of timing. Use of the discount window tides the remaining solvent institutions over until the affairs of the failed bank are settled.

It is also important to emphasize that such Federal Reserve advances would not constitute a bailout, because the affected institutions may ultimately receive less than full settlement from the CHIPS network. The disturbing results from the simulations would occur only in the case where the CHIPS unwinding process transpired in a vacuum without any funding assistance from outside forces.¹⁰

Regulatory response to daylight overdrafts

Until recently, overdrafts were not a major issue. In the late 1970s the Federal Reserve evaluated risk resulting from daylight overdrafts and found that large overdrafts were occurring and considerable risk existed which was not being adequately considered. As a result, the Fed began evaluating policy alternatives aimed at controlling such risk. Its initial objective was to prompt banks to view payment system risk as standard credit risk. That is, banks should realize that credit is being extended when overdrafts occur. The Federal Reserve sought public comment on various options to control overdraft-induced risk including 1) collateralization; 2) settlement insurance; 3) rolling settlement; 4) charging for intraday credit; 5) sender net-debit caps; 6) bilateral net credit limits; and 7) finality of payment.¹¹ The first four alternatives were tentatively rejected, and closer evaluation was given to the remaining three.

The initial program, adopted in 1985 for implementation in 1986, incorporated overdraft caps. The program required each institution incurring overdrafts on FedWire, or any private transfer network, to assess itself and determine a daily and a biweekly daily average limit (some multiple of capital) across all networks. Since implementation of the Federal Reserve's risk reduction program in 1986, the

growth in overdrafts has slowed (see Figure 2). During the same period, overdrafts as a percent of total payments have declined (Belton, et. al.). In January 1988, caps were lowered 15 percent with an additional 10 percent reduction tentatively scheduled in May. Private transfer networks that settle through the Federal Reserve were required to establish caps (bilateral net-credit limits and network sender net debit caps) on the amount of daily exposure to every other participant in the network. CHIPS is currently the only large-dollar transfer network toward which this program is directed. Future controls on the Federal Reserve's book-entry securities system are expected, and alternative policies are currently being evaluated.

Determining the optimal level of intraday credit

The purpose of the Federal Reserve's Risk Reduction Program was to contain the level of risk associated with overdrafts and to instill an understanding of the actual risks involved. Since the program began, financial institutions have come to realize that the risks involved are quite substantial and have taken steps to modify payment practices.¹²

Although it is generally understood that the previous level of daylight overdrafts was too high, the actual level of activity toward which the system should strive is unknown. Many fear that continued reductions in allowable levels eventually will have significant adverse effects on the functioning of the payment system. The prevailing attitude among policy-makers appears to be to continue lowering allowable overdraft levels until it begins to over-constrain the payment system. This approach, obviously, is an inexact process.

The "optimal" level of daylight overdrafts needed to support a certain level of transaction activity can be derived conceptually. While it is difficult to quantify this desired level, the conceptual derivation provides insight into the causes of overdrafts and the potential effect of changes in market factors and banking policy alternatives.

Daylight overdrafts occur because they have value. However, they also impose a cost on the entity providing the overdraft credit. Socially optimal behavior would result in a level of daylight overdrafts sufficient to cause the ben-

efit from the last dollar of overdraft to equal the cost of creating it. In analyzing overdrafts, both supply and demand factors need to be considered.

The demand for intraday credit

Intraday credit has intrinsic value for a financial institution because incoming and outgoing transactions are not synchronized perfectly. Lack of synchronization arises from several sources including 1) existing payment system practices; 2) regulatory accounting procedures, e.g., intraday timing of credits; 3) the time element involved with transferring funds; and 4) the uneven inflows and outflows associated with day-to-day activity of customers. Although the precise impact of each of these is unknown, each adds uncertainty and creates the potential for a mismatch between receipts and payments.

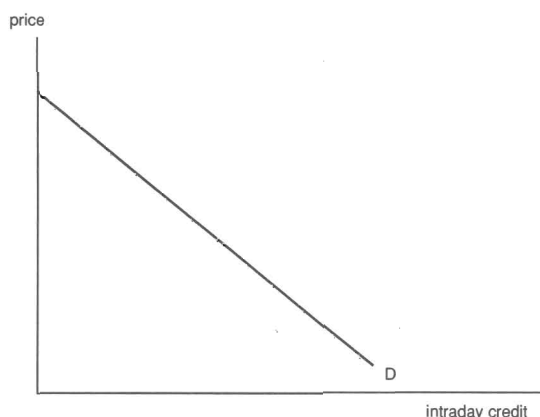
The demand for overdrafts is actually a derived demand because the overdraft itself does not provide direct utility or consumer satisfaction. Rather it can be considered an input that interacts with other factors and enables the financial institution to provide a service to customers, the completion of transactions, that has utility.¹³

Holding other things constant, in a private market the quantity of intraday credit demanded can be expected to decrease as the cost incurred by the user increases. As the cost increases, less overdrafting will occur, alternatives to overdrafts will be sought out, and total payment system transactions will decrease.

Additional factors that could change the demand for intraday credit (i.e., demand determinants) include those that affect the synchronization problem.¹⁴ It is evident that the demand for intraday credit is a derived demand, because any changes in payment system volume and elements affecting it would be a determinant of the demand for the credit. The price (cost) and availability of related inputs or procedures that can serve as alternative means to carry out transactions would similarly affect the demand for intraday credit. While some of these factors can be changed by financial institutions, many are outside the control of the individual firm.

Figure 3 depicts the demand for intraday credit for a particular level of payment system

Figure 3
Demand for intraday credit



activity, given fixed values for the determinants discussed above.¹⁵

The supply of intraday credit

The supply of intraday credit in a private market can be considered conceptually similar to the supply of any other product; that is, it slopes upward to reflect the costs to the producer. The pertinent costs would include 1) the transaction costs of initiating the transfer; 2) a credit-risk element that is expected to increase with additional amounts of credit; and 3) an opportunity cost incurred as a result of not having the funds available for alternative uses.

Prior to the Fed's current Risk Reduction Program, the transaction cost was the only applicable cost to wire initiators of transferring funds via FedWire. If an institution had a zero balance and the benefits from a transfer exceeded its cost, then it was beneficial to initiate. When the transfer was sent via FedWire, the Federal Reserve would supply the credit by passing "good funds" to the receiving institution. Thus, credit risk would be assumed by the Federal Reserve but not charged back to the sending institution. The opportunity cost of the physical transfer to the Federal Reserve, because of its unique position as central accountant, would be nearly zero.

If the funds were sent through private markets and accepted as "good" funds, then credit would actually be supplied by the receiver of the funds. The receiving bank would consider the credit risk involved and decide

whether or not to accept the transfer, expecting the funds to be made good by the end of the day. Again, if there are no limits on daylight overdrafts, the opportunity cost of "supplying" the funds approaches zero.

The supply curve for intraday credit, incorporating the three cost components, is shown in Figure 4. S_1 is the supply curve if only fixed transaction costs exist, while S_2 incorporates the credit risk incurred by the supplier of the funds. Supply is shown as an increasing function of price because, in a private market, additional units of intraday credit would be supplied only if the price received offsets the increasing cost (risk). S_3 incorporates the previous two costs plus the opportunity cost of supplying funds. Given the potential for unlimited daylight overdrafts, the opportunity cost approaches zero. Although included here for completeness, the opportunity cost is expected to be relatively minor and is excluded from the remaining analysis.

Figure 5 combines the supply and demand for intraday credit. This can be used to derive the equilibrium level and to better understand the Federal Reserve's cause for concern about daylight overdraft levels.

Given no limits on daylight overdrafts and no consideration of credit risk by users, the equilibrium level of intraday credit would be Q_1 . This depicts the situation on FedWire before the implementation of the risk reduction program. The Federal Reserve assumed all the payments risk, and the opportunity cost of intraday credit was essentially zero. With increased wire transfer capabilities and improved

Figure 4
Market supply of intraday credit

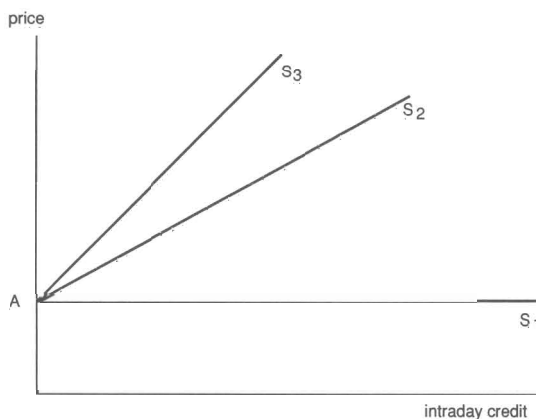
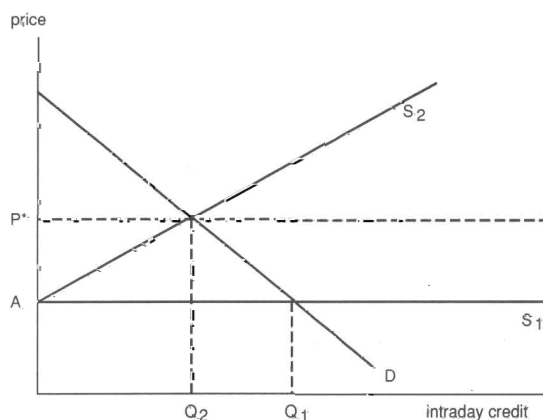


Figure 5
Market equilibrium level of intraday credit



communications among market participants, the number of profitable transactions grew in recent years, greatly increasing the amount of intraday credit.

A stated purpose of the risk reduction program was to encourage financial institutions to realize that credit risk was being created when daylight overdrafts occurred. If this risk, created by the sending institution, is also borne by that institution, then the equilibrium level of intraday credit declines to Q_2 .¹⁶ While it is difficult to quantify these costs with any degree of precision, it is expected that the cost generated from credit risk exceeds that from transaction costs at current levels of intraday credit. Thus, if the total credit risk of intraday credit were accounted for, the level would probably decline significantly.

We can use the above analysis to evaluate the effects of policy alternatives on the level of intraday credit. If both risk and transaction costs were accounted for, Q_2 would be the optimal level of intraday credit, with price equal to P^* . Currently, however, in FedWire transactions the risk is not borne by the sender. Similarly, if institutions expect receivers to be "bailed out" when settlement failure occurs on private networks, the risk will also not be accounted for by the institutions using these networks. Thus, excessive intraday credit approaching Q_1 will be utilized.

Caps and pricing

The Fed can adjust for this misappropriation of risk by imposing caps on intraday

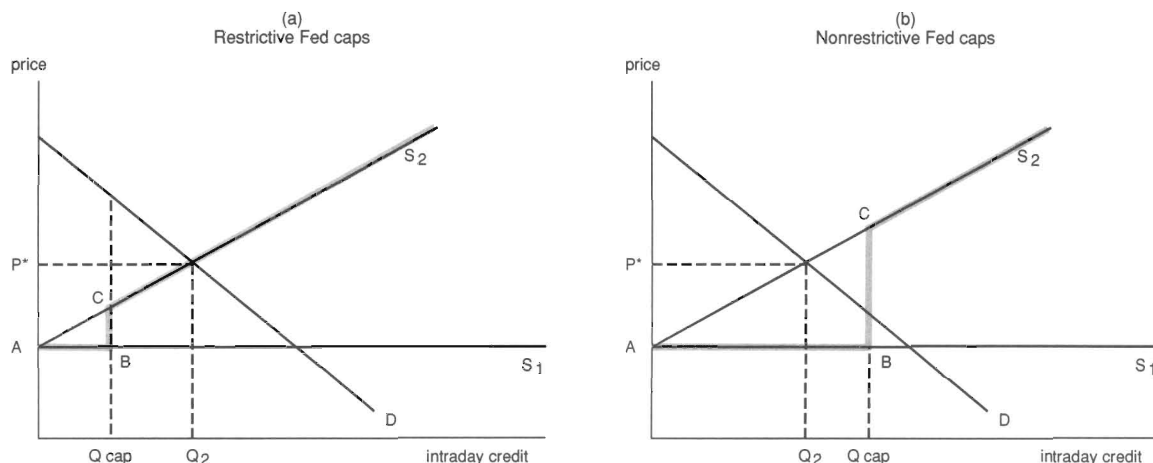
credit equal to Q_2 : the optimal level of intraday credit. Although banks would desire additional funds, the system constraint would preclude it if the Fed is the only source. This optimal level can be generated on FedWire if banks fully utilize credit limits.

Alternatively the Federal Reserve could charge for the extension of intraday credit. Ideally, the price would vary by institution based on the level of bank riskiness. However, assuming an average level of risk is generated and one price is charged to all institutions, the supply curve S_1 shifts upward to a price generating output Q_2 . The effect, shown in Figure 5 as producing P^* , would be to reduce intraday credit toward the socially optimal level.

This analysis conceptually generates the socially optimal level of intraday credit and considers policy alternatives assuming the Fed is the only source of credit. It implies that if the regulator has sufficient information to determine Q_2 , then either caps or prices could be used to generate the optimal amount of overdrafts. It can also be shown that setting overly restrictive caps or prices can lead to sub-optimal levels of credit, causing undue restraint on the payments mechanism. However, there is the potential for the development of a private market as an alternative source of daytime funding. As the Fed implements increasingly restrictive caps or prices, alternative means to decrease overdrafts will be utilized. A private intraday market is one of those alternatives. It is likely that other means to eliminate the need for intraday borrowings may first be utilized, resulting in a lower demand for credit in general (a leftward shift of the demand curve). However, as alternatives are exhausted, the use of private intraday borrowings may become the most viable means available to execute transactions.

The earlier analysis is modified slightly when alternative sources of funding are considered. If the Fed uses caps, restrained institutions will utilize their allowable overdraft and then consider alternative sources. Thus, the Fed will always be included as the initial source of funding. Institutions willing to supply funds to the market will consider the credit risks involved and be willing to extend additional loans at a rate sufficient to account for that risk. If all risk is accounted for, then the supply curve described earlier, S_2 , would be the

Figure 6
Managing intraday credit with Fed overdraft caps



relevant curve to depict the amount of intraday credit made available.

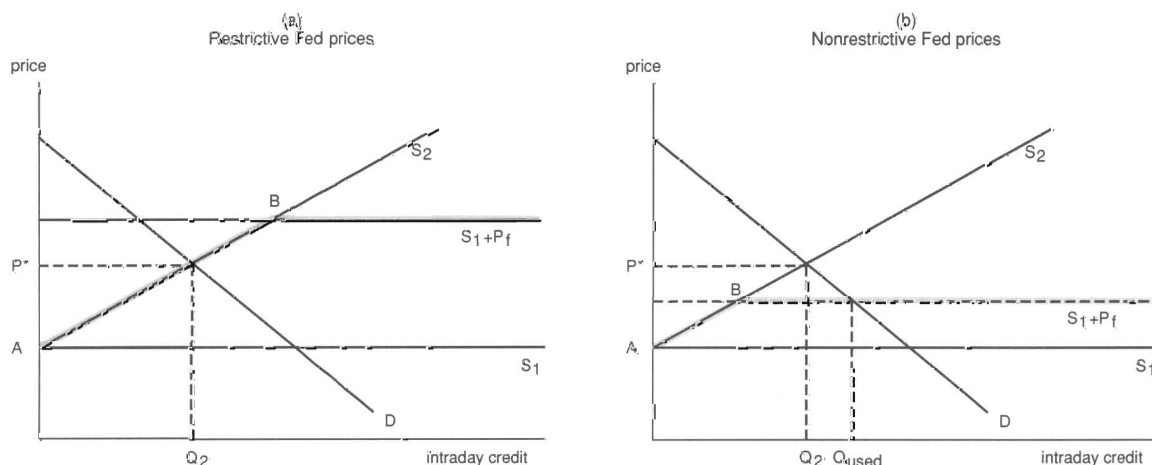
Institutions seeking intraday credit would first use their allowable overdrafts with the Fed and then buy residual funds at the market rate determined by the interaction of supply and demand factors. Risk would be shared by both the Fed and private providers of credit. The resulting perceived supply curve to borrowers would be the discontinuous relationship A-B-C-S₂, shown in Figure 6(a). In the example shown, Fed caps are restrictive and the residual demand, $Q_2 - Q_{cap}$, is obtained in the private intraday market at a price of P^* . Examples assuming the Fed cap is set accurately to obtain Q_2 or is not restrictive can also be constructed. The non-restrictive cap example is depicted in Figure 6(b). Here credit is overutilized from a societal view (Q_{cap} is used) and the Fed is the sole source of funding.

Pricing of overdrafts by the Fed would also create incentives for development of a private intraday market. As shown in Figure 5, the appropriate market price given payments volume, risk factors, and the resulting supply and demand of intraday funds is P^* . However, as in the case of caps, the funds can be provided by either the Fed or private institutions. The provider will be determined by the price set by the Fed. If it sets a price below P^* , then an excessive amount of credit will be used and the Fed will be the sole source of funding.¹⁷ Rational private suppliers of funds will not be willing to supply funds because prices below P^* will not adequately compensate them for

the risk assumed. Similarly, if the Fed price is set above P^* , then private sources will provide all intraday credit and the socially optimum level will again be reached. Figure 7(a) presents the case where the Fed sets a price above that required to generate the socially optimal level. The perceived market supply curve is A-B-(S₁ + P_f). Again, examples can be constructed in which the Fed price is set to produce Q_2 or where it is set below what is required to keep intraday credit below this level (e.g., Figure 7(b)). Therefore, if the price is set above or at P^* the socially optimum level will be obtained. Only under-pricing by the Fed would create excessive daylight overdrafts.

Both caps and pricing have problems as well as advantages. If the regulator had sufficient information to determine the optimal level of intraday credit, then either caps or pricing could be used to generate the optimal level of overdrafts. With caps, the institutions could continue to get free intraday credit but would be constrained to levels deemed reasonable by the regulator. However, the credit provided by the Fed would still be underpriced. Individual institutions could, therefore, use more of it than they would if a price were imposed. Caps also are not very flexible. Although we have presented the analysis assuming a fixed demand, credit needs change daily. The imposition of fixed caps may not allow for this changing need. Finally, evidence suggests that the risk of systemic failure is not closely related to the size of the overdraft of the failing institution. In the CHIPS simulations

Figure 7
Managing intraday credit with Fed pricing of overdrafts



discussed earlier, the hypothetical failure of a relatively small associate participant caused settlement problems for a number of other CHIPS participants. In fact, in one simulation where the failing institution generated less than 1 percent of CHIPS payments, the number of simulated settlement failures was nearly as large as when the failure of a large participant was assumed. Thus, caps may not solve the problem they are directed at, although there is little doubt that they improve the risk problem.

Pricing by the Fed would have the standard economic benefit of allocating intraday credit based on the need and ability of institutions to pay for it. However, determining the proper price may be difficult, particularly in an environment of changing demand. If it is too low, the Fed will become the sole source of funding and the resulting system risk will exceed optimal levels. Too high a price may decrease the overdraft demands on the Fed, although it would also provide incentive for the establishment of a private intraday market to avoid the constraint. This again would create a favorable spreading of risk. Underpricing appears to create the more serious problem and the Fed may want purposely to charge a relatively high price.¹⁶ This would result in lower Fed overdrafts and would encourage various alternatives, including the development of a private market which could more accurately set prices. This new market would redistribute funds during the day in a manner similar to that of the Fed Funds market's overnight funds distribution. Ideally the market could deter-

mine the rate and the Fed could tie its rate to that instead of devising one by fiat.

The decision between caps and pricing depends on how daylight overdrafts are viewed. If they are considered detrimental then caps or outright prohibition would seem appropriate. However, they should be deemed as a rational development of transaction activity, producing value for the institution involved and efficiency in the payments system. Given this view, the only issue is one of properly distributing the resulting risk.

An additional concern with pricing is the potential ability of "high-rolling" or high-risk institutions to incur significant risk-generating daylight overdrafts. Thus, it has been proposed that both a cap and prices be imposed. However, controlling the high-risk institution appears to be a separate regulatory function. "Bad behavior" warrants separate regulation. It is perfectly appropriate for a regulator to require an institution to cease inappropriate behavior. But this would appear to be separate from the standard risk assignment or allocation process that should apply to payments activity and was the objective of the Risk Reduction Program. If, as proposed above, the Fed charged a relatively high price for overdrafts, it would obtain additional information about the condition of institutions. Frequent overdrafts on FedWire could be either poor managers of their accounts or be considered relatively risky by other institutions and therefore unable to obtain intraday funds at competitive rates. In either case the Fed could

serve in a consulting role and identify potential problem firms. Separate regulation, perhaps caps, may indeed be required for these firms. However, they are exceptional cases, and there seems to be little benefit in treating all firms as if they were potential problem firms.

Thus, the optimal level of intraday credit can be determined by finding the level where the additional benefits received are equal to the cost of the credit. Although this is derived conceptually, the assumptions seem reasonable and are consistent with economic theory. The preceding analysis indicates that, as long as risk is not accounted for, the level of intraday credit will exceed the social optimum. It appears that pricing would be the preferred means to reduce risk and to allocate it properly.

A few practical issues need to be addressed, however, to reduce the above analysis to a workable policy.¹⁹ For example, frequent overdrafters at the Fed will need to be subjected to close scrutiny, because it is likely that they have exhausted private alternatives and are using the Fed as a least-cost alternative. For these firms, separate regulation—perhaps caps—may be more important than implied in the above analysis.

A second issue concerns the quality of Fed operations. If the Fed decides to charge fees for overdrafts, then its transfer network should be of sufficient quality to allow a reliable flow of transactions. It would be unfair to charge for overdrafts when they were the result of computer down-time at Fed offices.

Another consideration is whether or not institutions will actually consider all costs when deciding on a market price for intraday borrowings.²⁰ For example, earlier we discussed the situation on private transfer networks in which participants believe that someone would come to the rescue of an insolvent institution that was unable to settle. As a result, institutions perceive the risks assumed to be less than the true costs borne by society. On private networks, this can be resolved by requiring participants to agree to and be legally bound to a form of multilateral netting by novation combined with a loss-sharing arrangement for obligations of the failed participant, that is, to settlement finality. With FedWire it could be accomplished by accurately pricing overdrafts or eliminating the Fed's provision of payment finality.

A final issue needing additional evaluation is the impact of Fed overdraft policy on

the implementation of monetary policy. As caps or prices become restrictive there will be a tendency for banks to hold excess balances to avoid overdrafts. This could spill over to overnight balances and affect the level of excess reserves. If the increase in excess balances is relatively constant and therefore predictable, the Fed's Open Market Desk will be able to account for the increase when implementing policy. If it is not predictable the Desk has an additional variable to consider when determining appropriate open market operations. The development of an intraday credit market could also have implications for the level and variability of the overnight Fed-Funds rate. The current "overnight" rate, which is essentially a 16-hour rate, may become intertwined with a rate from the intraday market. Thus, Fed Funds borrowed at noon for repayment the following morning will be priced at a rate different from the rate for funds borrowed at 4:00 p.m. Variations in the intraday rate could cause fluctuations in the one-day rate. While the actual effect is unknown, it would be surprising if the intraday and overnight rate did not become intertwined.

Conclusions

Because of the maturing of financial markets and increased use of electronic transfer systems to move funds, there has been a significant increase in large dollar payment system activity. The increase has occurred within an environment in which tradition, explicit and implicit guarantees, accounting practices, and regulations have imposed on banks a significant synchronization problem between incoming and outgoing funds transfers. This problem has been partially resolved by increasing the use of daylight overdrafts on large-dollar transfer networks. The Federal Reserve became concerned with the risk associated with these overdrafts and recently introduced steps to limit them and the attendant risk. Fear of potential systemic risk heightened the Federal Reserve's concern.

Given the environment in which banks operate, the use of overdrafts is economically rational. The existing incentive structure encourages overdrafts because they are the least costly alternative to synchronize payment flows. In this paper we utilize basic supply and demand analysis to show that the use of over-

drafts is warranted and that attempts to eliminate or decrease them to excessively low levels produce inefficiencies. However, they have been overutilized from a societal perspective because the resulting risk has not been properly assigned. Thus, policy alternatives should be considered which properly allocate the risk resulting from overdrafts.

The analysis indicates that, if sufficient information exists, either the imposition of overdraft caps or pricing of overdrafts can produce the socially optimal level. However, given that this information is not always available, the preferred policy may be to have the Fed stand ready to provide liquidity to the markets, set a relatively high charge on overdrafts, and closely monitor institutions which frequently approach it for funding. This would encourage the use of efficient alternative means to resolve the synchronization problem, including the development of a private intraday funds market in which the marketplace would set prices and allocate risk. Such a market would have numerous similarities with the current overnight market.

Daylight overdrafts involve risk similar to that of any credit extension. If treated as such and properly priced they will be utilized in a socially optimal fashion. The existing inappropriate incentives producing overutilization should be eliminated and policy should be considered which pushes the pricing and risk allocation decisions toward the private marketplace.

¹ Other private large-dollar networks have existed in the recent past. For a discussion of these and dollar volumes on the various networks see Humphrey (1984).

² Prior to this, CHIPS had next-day settlement. The potential for changes in account positions of foreign institutions held by CHIPS members was therefore greater in the earlier period. The delayed settlement, and resulting increased risk, produced a transfer service which was inferior to that which exists today. Thus, volumes were smaller.

³ For an analysis of transfer volumes and their purposes see "A Study of Large-Dollar Payment Flows through CHIPS and Fedwire" (1988).

⁴ The Fed actually provides final settlement for each transfer sent to a receiving bank and expects the sending bank to cover its position. We use the term "guarantee" in a non-legal sense throughout. Lawyers might quibble.

⁵ CHIPS is essentially a message network with final positions being settled at the end of the day. Physical transfer of funds does not occur during the day; therefore, actual overdrafts do not occur. However, participants are legally obligated to make payment on messages they have sent during the day. Thus, overdraft positions are being realized.

⁶ For customers with which the receiving bank regularly conducts business, there may indeed be knowledge about the creditworthiness of the sending institution. This knowledge would be obtained because the banks conduct business resulting in risky overnight exposure. However, payment system risk is perceived to be zero, resulting in no additional incentive to consider intraday risk. Obviously, the Federal Reserve does assume risk by guaranteeing FedWire transfers and would monitor the condition of the sending bank.

⁷ The element of surprise is important, or participants would have adjusted their exposure to the failing institution. In fact, the sudden unexpected failure of a participant appears to be the only type of failure that would present systemic problems.

⁸ The assumed failing institution actually had a net credit position, thus, the exposure of other institutions is less than would be the case with a true failure.

⁹ Humphrey listed these in his article, thus, it may be that the author was trying to emphasize the extent of complexity involved with the unwinding process more than analyzing systemic problems.

¹⁰ The simulations were also performed on CHIPS activity before bilateral credit limits were imposed by the network. It would be interesting to perform the same exercise under current procedures. If the size of the overdraft is not a major determinant of the total number of institutions and dollar value of transfers which fail, as one of the initial simulations suggests, the new procedures may have little effect on the simulation results.

¹¹ These are defined in detail in "Reducing Risk on Large Dollar Transfer Systems," Board of Governors of the Federal Reserve System, 1985.

¹² For example, in a private conversation an employee of a large money center bank stated that, in response to the Fed's initial concern about overdrafts, senior management asked for an analysis of the daily exposure of the bank. They were shocked to find the overdraft exposure exceeded that of total Latin American debt.

¹³ Alternatively the daylight overdraft could allow the financial institution to carry out a transaction for itself which has a positive expected return.

¹⁴ For a list and discussion of alternative means to improve the synchronization problem, see Mengle, Humphrey, and Summers (1987). These can be

considered alternatives to overdrafts and/or use of an intraday funds market (discussed below) in completing desired transactions.

¹⁵ The supply-and-demand analysis discussed is similar to that found in Mengle, Humphrey, and Summers (1987).

¹⁶ The risk component included incorporates the total risk from the credit; i.e., it is assumed to include any negative externalities generated by overdrafting institutions. As an overdraft occurs, the lending institution may account for the risk imposed on it, but additional risk may permeate throughout the banking system as the lending institution passes funds on to others, assuming they will be good funds. This generates the potential for systemic risk. Both risk components are assumed to be imbedded in S_2 . Also, the risk is created by the sender only if the receiver accepts the transfer and considers it "good funds."

¹⁷ There is an implicit assumption being made in the present analysis that each bank uses the same portion of its respective caps. Therefore, each bank fully uses its cap, then approaches the Fed. Actually, banks will use their cap at different paces; some using all of it, others none, and others only a

small fraction. The banks using their caps first would be the ones entering the market first for intraday funds. Thus, this could actually occur before Q_2 credit is used. In the graphics this would influence the sharpness of the break in the supply curves.

¹⁸ Mengle, Humphrey and Summers (1987) produced estimates between 100 and 125 basis points as "best guesses" of appropriate intraday rates. To be conservative the Federal Reserve could price at the high end of this range or above it. Obviously, more research is required before deciding on the actual rate. Federal Reserve pricing above the market rate would also appear justified, since individual firm pricing would not account for negative externalities resulting in systemic risk (Mengle 1985). However, any positive rate would have favorable effects (Flannery 1987).

¹⁹ Much of the discussion here assumes the development of a private intraday market. Thus, credit terms, conventions, etc. are presumably established by private parties.

²⁰ Consideration should be given to risk externalities not considered by the individual bank and implicit guarantees expected by bankers.

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