INTRADAY CREDIT: RISK, VALUE, AND PRICING

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I. Introduction

Electronic payment networks are of value because they provide certainty of payment, security, timeliness, and low cost relative to the dollar value transferred.[1] Timeliness is particularly important to money market participants who want to be able to act immediately on changes in market conditions, but it does not come without cost. While banks have invested heavily in speeding up wire transfers, the same level of emphasis has not been placed on controlling wire transfer risk. Because the banking system does not exactly synchronize the increasing volume of intraday payments activity, outgoing transfers are not always adequately funded by the originating party. Consequently, wire transfer networks are characterized by exposure of participants to *intraday credit risk,* that is, risk that lenders may not be repaid at the end of the business day.

Traditionally, bank regulation has focused on risks reflected on bank balance sheets. For example, bank supervision attempts to reduce credit risk from loan losses by examining asset quality, while capital requirements seek to build a protective buffer into balance sheets. More recently, regulators have also become concerned with risks connected with growing off balance sheet activities such as letters of credit and loan commitments.[2] Now, intraday credit risk associated with wire transfer networks is attracting attention. This risk cannot be measured by traditional methods that focus on balance sheets showing banks' financial positions only at the end of the day. Even looking at contingent liabilities off the balance sheet does not help here. Rather, one must look at payment activity *during* the day to see how intraday financial intermediation affects the banking system.

The purpose of this article is to develop a framework to illustrate why intraday credit risk exists and what determines its level. The analysis will show how pricing intraday credit could lead to behavioral changes that would reduce intraday risk exposures. In addition, the empirical section of the paper will explore ways in which pricing might be put into practice.

Most discussions of risk on wire transfer networks assume either explicitly or implicitly that intraday credit risk arises from the inherent nature of electronic funds transfer systems.[3] By this assumption, the level of risks faced by payments system participants is attributable to such institutional factors as the large volume of wire transfers, a high degree of interdependence among banks, the speed with which funds change hands, and the extreme difficulty of exactly matching inflows with outflows. In contrast, it will be argued here that risk levels and the institutional factors that determine them are primarily a product of the existing legal and regulatory environment rather than simply intrinsic to the technology of wire transfer systems. If laws, regulations, and expectations regarding Federal Reserve policy were different from what they have been thus far, institutional practices and levels of intraday credit risk would also be different.

II. Risk and Wire Transfer Networks

At present, the two major wire transfer networks are Fedwire and the Clearing House Interbank Payment System (CHIPS). The form intraday credit risks take differs for each network.[4] On Fedwire, transfers take place by debiting the reserve account of the sending bank and crediting the reserve account of the receiving bank. However, the sending bank is not required to have funds in its reserve account sufficient to cover the transfer at the time it is made. Rather, the transfer must be covered by the end of the day. Allowing reserve balances to become negative during the day leads to "daylight overdrafts," and it is these overdrafts that are the major source of risk to Federal Reserve Banks from Fedwire. Since a Fedwire transfer becomes final when the receiving institution is notified of the transfer, the Federal Reserve could not revoke the transfer if the sending institution failed to cover its overdraft by the end of the day. Thus, the receiving institution would have its funds while the Fed would be left with the task of collecting the payment from the defaulting sending bank. Credit risk in this case is borne by the Reserve Banks and possibly by the public.

The views in this article are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of Richmond or the Board of Governors of the Federal Reserve System. The authors wish to acknowledge the expert research assistance of William Whelpley. Section IV and the box on pp. 8-9 are based on Humphrey et al. (1987).

[1] The most important wire transfer networks are described in more detail on p. 4.

[2] Bennett (1986) and Summers (1975).

[3] See, for example, Association of Reserve City Bankers (1983) and Smoot (1985).

[4] For a more detailed discussion of risks on electronic funds transfer networks, see Mengle (1985).

WIRE TRANSFER NETWORKS

Fedwire is the wire transfer network operated by the Federal Reserve Banks. Currently, approximately 200,000 Fedwire funds transfer transactions totaling over $500 billion occur on an average day. Mean transfer size is about $2.5 million. Transfers involving book-entry U.S. government securities total well over 30,000 per day for a total daily value of over $260 billion. Average securities transfer size is $8.7 million. Both funds and securities transfers have grown dramatically over the past decade. An important distinction between Fedwire and other networks is that settlement of transactions made over Fedwire is immediate, inasmuch as it occurs by means of credits and debits to depository institution reserve accounts on the books of the Federal Reserve Banks. Because the immediate settlement feature means that Fedwire transactions constitute "good" or final funds as soon as notification of payment is made, banks participating in Fedwire as receivers of payments are relieved of risk. The risk that the sending bank may not be able to fund its position is borne by the Federal Reserve when it accepts and settles a Fedwire transfer.

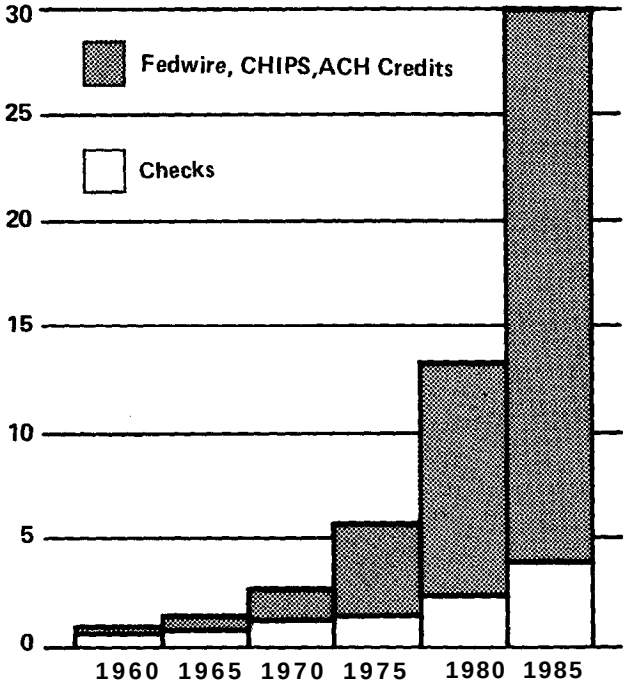
CHIPS The Clearing House Interbank Payments System (CHIPS) is a privately operated funds transfer wire network associated with the New York Clearing House. About one-half of its transfers concern international dollar transactions involving U.S. depository institutions. As of the end of 1986, approximately 114,000 funds transfers amounting to almost $425 billion were transacted on CHIPS daily. The average transaction was approximately $3.7 million. CHIPS was started in 1970 to efficiently transfer interbank balances involving international transfer of dollars on the books of the twelve New York Clearing House Association banks. This essentially eliminated the use of the paper draft to effect the transfers. While payment messages are sent over CHIPS throughout the business day, actual settlement of net debit and credit positions takes place at the end of the day through a special account at the Federal Reserve Bank of New York. Membership in CHIPS for other depository institutions is provided through an associate membership arrangement. Associate members must settle their CHIPS transfers on the books of one of the twelve New York banks (also known as settling banks).

Because CHIPS, a private wire transfer network, is a net settlement system, it presents a more complex set of risks. With net settlement, actual transfer of funds does not occur until settlement of net positions takes place at the end of the day. But bank customers may be given access to these transfers prior to settlement, creating credit risk that a sending bank might fail to settle. This leads to systemic risk, in which the failure of one system participant to settle its debit obligation to other participants in the network might, if the debit were large enough, lead to a domino-like pattern of settlement failures among other participants. Such risks are found on CHIPS not only because net debit positions and dollar values are large, but also because there is uncertainty regarding the precise rights and liabilities of all parties to a payment transaction in the event of a settlement failure. Statutory law is unclear in this area and, since a settlement failure has never actually occurred, case law has not developed to fill the void.

At the end of 1986, the size of the average funds transfer on Fedwire was $2.5 million. On CHIPS, the average funds transfer was $3.7 million. Securities transfers over Fedwire averaged $8.7 million. Given the growing number of such large transfers each day, there is increasing concern with the credit risks assumed by banks as they clear payments many times the size of their reserve positions. An idea of the size of payments relative to reserve balances may be seen in Chart 1, which shows the ratio of average daily payments through the major payment networks to average daily reserve balances maintained with the Federal Reserve Banks. This ratio is a rough measure of the leverage exerted using reserve balances to support payment activity. The ratio has increased steadily from only about .9 in 1960 to over 30 by 1985. The largest increase in payments has taken place on Fedwire and CHIPS, both of which are used primarily for money market activity and third party payments. The growth of wire transfers has far exceeded that of checks.

Chart 1

RATIO OF PAYMENTS TO RESERVES 1960 - 1985



Note: Payments are average daily dollar volume of checks, and Fedwire, CHIPS, and ACH credit payments. "On us" checks are excluded. Reserves are average daily reserve balances.

III. The Nature of Intraday Credit Risk

Demand for Intraday Credit[5]

Payments system participants value intraday credit on electronic funds transfer networks because wire transfer payments and receipts are not perfectly synchronized. Intraday credit is an alternative to delaying payments until they are funded by receipts. In addition, it eliminates the necessity of holding clearing balances large enough to cover all expected outflows of funds. By using intraday credit, payments system participants escape the costs of scheduling payments to match receipts, along with overnight interest and opportunity costs of maintaining higher reserve balances. In short, there would be little if any demand for intraday credit if it were not costly to schedule all receipts to arrive at a bank in time to fund payments to be sent out.

[5] In the remainder of this article, intraday credit will refer to both Fedwire daylight overdrafts and CHIPS net debits. Neither necessarily involves overdraft credit extended by banks to corporate customers.

The cost of synchronizing payments and receipts is likely to grow as funds transfer volume expands. Thus, anything that increases volume is likely to increase demand for intraday credit as well, other things staying the same. Contributing to higher payment volumes and demand for intraday credit are two legal requirements that cause banks and their corporate customers to use more funds transfers than would otherwise be the case.

First, prohibitions on paying interest on demand deposits held by medium- and large-sized businesses create incentives to reduce these deposits to the minimum each evening in order to put funds to work earning interest. The resulting investments in overnight money market instruments lead to a higher volume of Fedwire and CHIPS transfers than would otherwise occur. This means a higher probability that the banks through which these transactions are sent will go into overdraft. Second, Federal Reserve Banks cannot pay interest on reserve balances held by depository institutions. Since demand deposits are subject to higher reserve requirements than are other deposits, paying interest on reserves would reduce the cost to banks of paying interest on demand deposits.

Besides bridging payments and receipts, intraday credit on wire transfer networks also enhances the ability of banks and their customers to make an immediate payment considered final by all parties involved whether or not sufficient clearing balances are held at the time of the transfer. Without intraday credit, final payment could only be made if sufficient clearing balances were on hand. Alternatively, immediate use of funds would be possible using a check or cash, but the opportunity costs of using these other means of payment are relatively high.

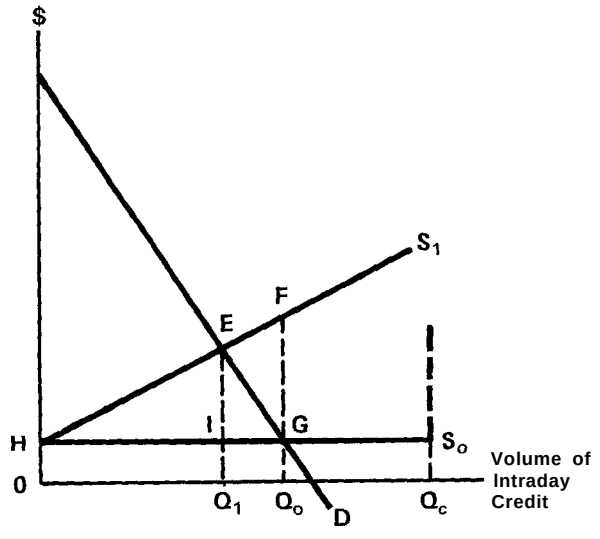
For example, in order for a check recipient to gain immediate access to funds, he or his bank would have to present the check for collection at the paying institution. If the check were written on a bank in another city or country, immediate (or same day) access to funds could be quite costly, if not downright impossible in certain situations. Thus, even if the explicit costs (in the form of charges and fees) of payment by check are lower than those of wire transfer, the implicit costs of getting the check to the payor bank, along with foregone interest when same day presentment is not feasible, are likely to be higher. As an alternative to payment by check, payment in cash would give the recipient immediate use of funds. Still, there is a relatively high risk of loss or theft. In addition, transporting large amounts of cash can be cumbersome and time-consuming. As with checks, the implicit costs of using cash to gain immediate use of funds are likely to be much higher than those for wire transfers. This more than offsets the relatively high observed explicit wire transfer costs.

The demand for intraday credit is portrayed as the demand curve in Figure 1. The horizontal axis measures the dollar volume of intraday credit within a given time period, and the vertical axis shows the value placed on each additional dollar of credit. As is generally the case for other goods and services, the demand curve is expected to be downward sloping, although very little is known empirically about the curve. It is reasonable to say, however, that as the price of intraday credit is raised, payments system participants can be expected to use less of it. That is, banks will use more intraday credit so long as the extra revenue generated by the credit exceeds what must be given up to use it.

Changes in the overall value placed on intraday credit would shift the entire demand curve. For example, demand could shift due to structural changes in the banking system that make intraday credit less useful to banks. Specifically, if all unit banking states converted to unlimited branching, large banks in unit states that previously gathered funds through the federal funds market would now be able to provide some part of them internally through branches rather than continue to purchase them from other banks. Since fewer electronic funds transfers would be necessary, demand for intraday credit would decrease and the curve would shift to the left. The shift would likely be greater if, along with unrestricted intrastate branching, interstate banking were permitted on a wider scale than today.

Figure 1

MARKET SUPPLY AND DEMAND FOR INTRADAY CREDIT



The elasticity of demand, that is, the sensitivity or responsiveness of volume of intraday credit demanded to changes in its price, is determined by existing technological factors and institutional payment practices. Since technology and institutional practices are costly to change quickly, demand may be expected to be more inelastic (that is, less responsive to price) in the short run than over a longer period. Given more time to adjust, banks would be better able to develop substitutes for intraday credit for processing payments. Examples of institutional changes that could serve as substitutes making the curve more elastic are discussed separately in "Institutional Changes That Reduce Intraday Credit Risk," page 8.

Supply of Intraday Credit

If intraday credit were supplied in a private market in which all parties bear directly the costs they incur, the supply curve for intraday credit would slope upward to reflect the increasing opportunity cost of additional units of credit. This cost would in turn consist of transactions costs plus two elements. The first is the value of intraday credit to suppliers, that is, the value suppliers place on using additional units of credit themselves.[6] The second is a premium to compensate suppliers for credit risks assumed. At present, however, there is no active private market for intraday credit. In order to both simplify the exposition and concentrate on the risk issues involved, the supply curve presented in this analysis will be assumed to reflect only transactions costs plus costs related to risks, and will abstract from the value of intraday credit to suppliers.

The current supply curve (S_0), showing how the marginal or incremental cost of additional units of intraday credit changes with volume supplied, is horizontal in Figure 1 because the only cost to banks of each additional dollar of intraday credit used is the transactions cost of the transfer. This transactions cost, represented by the vertical distance OH, is assumed to remain constant as volume increases. Higher volumes of credit extended during a period, however, mean higher potential losses, so the true opportunity cost of intraday credit is better portrayed as rising as more intraday credit is extended. The shape of supply curve S_1, then, illustrates the full social costs of wire transfer intraday credit due to risks to the payments system. But under the current institutional and regulatory framework, S_0 is the supply curve faced by depository institutions on both Fedwire and CHIPS, so private costs associated with intraday credit volume Q_0 diverge from actual costs to society by an amount equal to the area of triangle HFG in Figure 1. The reasons banks do not face the full costs they incur differ between the two networks.

[6] In loanable funds analysis, this is called the risk-free rate, and it reflects the pure time preference component of interest.

On Fedwire, the supply curve perceived by banks is horizontal mainly because the current charge levied by Federal Reserve Banks on each transfer does not vary to reflect the amount of intraday credit extended. Fedwire fees do not take account of the size of daylight overdrafts associated with the payments being processed, even though the Federal Reserve assumes the risk that a daylight overdraft will not be covered by the end of the day. Thus, the availability of unpriced daylight overdrafts guaranteed by the Fed leads to a supply curve (S_0) for banks that does not reflect the full costs they incur, and area HFG represents an implicit subsidy from the Federal Reserve to banks using intraday credit on Fedwire.

On private net settlement networks such as CHIPS, the supply curve faced by payments system participants diverges from the supply curve reflecting risks to society the same as occurs on Fedwire. This reflects the degree to which systemic risk may not be borne by CHIPS participants. The divergence is at least partly due to the belief of some CHIPS participants that the Federal Reserve as lender of last resort would intervene to prevent systemic failure rather than allow a chain of settlement failures to significantly disrupt financial markets. If payment network participants believe that regulatory agencies would likely take actions to enable a failing institution to complete settlement, then the consequences of one institution's failure to settle would not appear as severe to the other participants as would be the case if they had to bear the risk themselves. For example, if a discount window loan were extended to a bank failing to settle on a private sector wire transfer network, systemic failure would be averted. However, the assumed availability of such a loan would also reduce incentives for receiving banks to monitor the riskiness of sending banks. As a result, existing institutional arrangements on such networks are likely to be more risk-prone than would be the case if the Federal Reserve were expected definitely to take a "hands-off' attitude toward settlement failures regardless of the consequences for financial markets.[7]

Another factor contributing to the divergence between costs perceived by CHIPS participants and costs to society is the lack of a uniform body of law dealing with electronic funds transfers. The Uniform Commercial Code and CHIPS rules are silent regarding when payment obligations between customers are discharged and payments are final. Consequently, it is not nearly as clear who would bear the risk if a sending bank on CHIPS were to fail to settle as it is with, say, check payments. Although receiving banks might attempt to revoke funds they had released to receiving customers, there is no assurance that they would be successful. If revocation is successful, receiving customers might then attempt to collect payment from sending customers. This could be a problem, however, if the sending customer had released funds to the sending bank that failed before settlement. Because the law does not specify whether the sending customer had discharged his payment obligation to the receiving customer, the assignment of risks between the parties to the transaction is unclear. In such an environment, incentives for receiving banks to monitor risks could be weaker for some participants than they would be if the assignment of risks and liabilities were more explicit.

On both Fedwire and CHIPS, the height of the true supply curve (S_1) and the degree to which it slopes upward is influenced by at least two factors. First, since the marginal cost of intraday credit is largely determined by expected losses if an institution defaults, the supply curve will probably be higher as the riskiness of the banking system in general grows. Second, if banks augment their capabilities to monitor and control risks associated with intraday credit, the supply curve will likely shift down or become flatter. Thus, even if banks continue to perceive their supplycurve as the horizontal portion of S_0, policies that reduce risks connected with banking and that encourage risk control will have the effect of reducing the intraday credit risk associated with the divergence of private from social costs of intraday credit.

Equilibrium

Equilibrium in the market for intraday credit is found where the extra (or marginal) cost to a depository institution of an additional million dollars' worth of intraday credit equals its extra benefit in terms of facilitating payments or other benefits to the using institution. The equilibrium will determine the level of intraday credit risk in the payments system.

When individual payments system participants face the horizontal supply curve S_0 in Figure 1, they do not themselves face all the costs and risks they create. Equilibrium volume of intraday credit is Q_0 and total costs due to intraday credit risks are HFG. In contrast, if depository institutions face the full costs of their decisions as reflected in supply curve S_1, equilibrium volume of intraday credit is Q_1 and the total cost associated with intraday credit risk is the area HEI.

The difference in costs between using S_0 and S_1 as the supply curve is EFGI. Of this area, EGI represents a transfer from society in general to payments system participants in particular, while EFG represents a cost to all of society. Since actual costs to society exceed the value of the intraday credit to institutions participating directly in the payments system, risk levels are higher than optimal.

[7] Stevens (1984).

INSTITUTIONAL CHANGES THAT REDUCE INTRADAY CREDIT RISK

Many banks negotiate overnight federal funds purchases in the morning, leading to an inflow of funds to the borrowing banks later the same day. The following morning, the borrowings are repaid. The cycle repeats itself day after day for many net buyers of fed funds. Although the banks often end up borrowing similar if not identical amounts from the same lending banks each day, the borrowers repay most of their fed funds loans each morning in order to have the flexibility to react to changed borrowing requirements. In addition, they are able to take advantage of favorable rates that arise during the day. Finally, lending banks are assured control over their funds before they are re-lent.

These funding practices are encouraged by two aspects of the legal and regulatory environment. First, federal and state laws do not yet allow nationwide branching. If banks could branch nationwide, relatively more funds would be gathered internally from branches rather than externally from the fed funds market. Because fed funds flows move between banks over wire transfer networks, eliminating branching restrictions would mean fewer fed funds transactions and therefore lower daylight overdrafts. Second, in terms of regulatory environment, so long as daylight overdrafts are kept within a bank's net debit cap, there is no explicit penalty for overdrafting. Thus, branching restrictions give banks incentives to borrow more from each other than would otherwise have been the case, while the lack of penalties turn daylight overdrafts into a low cost liabilities management tool.

If branching restrictions continue, what institutional practices might be expected to change if intraday credit in the form of daylight overdrafts were priced? Many likely changes are relatively well known and involve both reduction of the daily payments volume over external wire transfer networks and elimination of the current gap in processing time between totally or partially offsetting payments. For example:

(1) *Rollovers.* The same amount of overnight (or longer) funds borrowing is renegotiated with the same seller. No funds move over the wire networks except the initial borrowing and the final repayment. Importantly, there is no time gap between daily repayment of borrowed funds and receipt of borrowings for the next time period. As a result, the value of payments over wire networks is reduced, the time gap is eliminated, and associated daylight overdrafts fall.

(2) *Continuing contracts.* Differing amounts of daily funds borrowings are renegotiated with the same sellers so only the net change in the position (including interest) is sent over the: wire. The value of the single net transfer is less than either the (early in the day) full repayment of the gross funds borrowed or the (later in the day) full reborrowing of an altered gross amount for the next period. Because the value of payments made is reduced and the time gap between the two gross flows eliminated, overdrafts fall.

(3) *Term funds.* Longer-term borrowings are substituted for overnight funding. Overdrafts fall due to the lower average daily value of funds sent and returned over the wire network, as well as the now more infrequent daily time gap between return of borrowed funds and subsequent reborrowing.

(4) *Intraday funding.* Excess funds or unused overdraft cap capacity are sold and sent to other payments participants to fund, for a price, what otherwise would be daylight overdrafts at the purchasing institution.

(5) *Netting by novation.* Gross bilateral payment obligations are netted using contracts among the parties prior to the value or settlement date. Both legal exposure to payment obligations and payment flows satisfying the obligations are reduced from gross to net positions. This eliminates the time gap between flows and thereby reduces both measured overdrafts and risk.

The first three institutional changes or alterations in interbank funding procedures existed prior to the Federal Reserve's risk reduction program and there is some anecdotal information that these procedures are being pursued more intensively than before. In addition, the American Bankers Association has formally supported the first two methods.

The fourth method-intraday funding- has apparently not yet been used to reduce overdrafts. This may be due to the extra costs that would be incurred relative to other overdraft reduction alternatives and because of the extra operational efforts associated with using intraday funds. It is possible that adoption of policies to price intraday credit (see p. 10) could lead to an intraday credit market in two ways. First, if the daylight overdraft fee on Fedwire were set at a very high level, banks might begin to

exchange intraday funds among themselves at rates lower than the administered rate. On CHIPS, if new risk bearing arrangements lead banks to perceive significant risks in the system, they may wish to borrow intraday funds to cover their net debit positions and reduce the risks. Second, if pricing were instituted in connection with caps that were so low as to be binding for many banks, institutions with unused cap capacity might lend to those constrained by the caps. In this case, there would be two prices for intraday credit, the administered Fed price and the intraday funds market price.

The fifth method-netting by novation-is currently in the experimental stage. New legal contracts providing for this type of netting are now being used by some U.S. banks in the London forward foreign exchange market and there are plans for their possible application to certain types of transactions over CHIPS. There has been no known netting by novation application over Fedwire so far, but some transactions could probably be handled in this manner.

Federal Reserve analyses in 1980 and 1982, summarized in greater detail in Humphrey (1984, pp. 86-89), suggested that upwards of 80 percent of all Fedwire funds transfer plus securities transfer daylight overdrafts at large banks (deposits of $1 billion or more) could be eliminated if certain amounts of interbank overnight borrowing were shifted to term borrowing or multi-day continuing contracts. At the time of the analyses, large banks accounted for over 90 percent of all funds and securities transfer daylight overdrafts. About one-half of these banks could eliminate all their funds plus securities overdrafts by shifting 2.5 percent of overnight funding to term funding. For some of the remaining large banks, the shift would have to exceed 100 percent. However, many securities transfer overdrafts are to be collateralized in order to lower risk to Reserve Banks. With collateralization, the percentage shifts from overnight to term funding (or rollovers or continuing contracts) required to eliminate funds transfer daylight overdrafts (and the remaining securities transfer overdrafts that cannot be collateralized) would be reduced. As a rough approximation, the above required percentage shifts of 25 and 100 percent could fall to 13 and 50 percent. Thus, widespread adoption of some or all of the five institutional changes listed above would virtually eliminate funds transfer daylight overdrafts from Fedwire.

Note, however, that it is not necessarily in the interest of the payments system to purge the system of all intraday credit risk, but rather to ensure that costs to everyone do not exceed benefits. So long as the value placed on an additional dollar of intraday credit by payments system participants is greater than the cost in the form of risk to the rest of the payments system, it is in the interest of payments system participants and the rest of society to incur that risk. Thus, the purpose of risk control policies is not to eliminate risks, but rather to confine them to levels considered acceptable.

Policies to Control Risks

Caps and Limits In recognition of concerns about intraday credit risks, the Board of Governors of the Federal Reserve System in 1986 implemented a voluntary program to limit intraday credit and improve control over risk by users of all large dollar wire transfer networks.[8] The current program is voluntary and consists of three main elements.

(1) Banks using any large-dollar wire transfer system are requested to perform a self-evaluation based on their operational and credit controls, policies, and procedures, as well as their creditworthiness or ability to fund themselves to cover unexpectedly large funds outflows or reduced inflows.

(2) Based on the results of the self-evaluation, each participant adopts a total ratio of Fedwire daylight overdrafts plus CHIPS net debits to capital as its limit on how much a participant may send out in excess of what it receives across all networks. The ratio is called a cross-system net debit cap multiple.

(3) Participants also establish network-specific sender net debit caps as well as bilateral net credit limits (limits on how much a receiving bank may be a creditor to a particular sending bank) on CHIPS to obtain net settlement services from the Federal Reserve.

Under the policy, CHIPS participants are required to compute two net debit caps. First, cross-system caps covering Fedwire and CHIPS together are calculated as a multiple of capital. Second, a network-specific cap for CHIPS is based on a formula that attempts to capture the market's assessment of other CHIPS participants' soundness. If a bank only uses Fedwire, then its cross-system cap and its network-specific cap are one and the same.

In Figure 1, the risk control policy is illustrated as the vertical portion of the supply curve, S,. While intraday credit within the caps is still not explicitly priced, it is not permitted to rise beyond the level of the caps, Q_0.

[8] Board of Governors (1985).

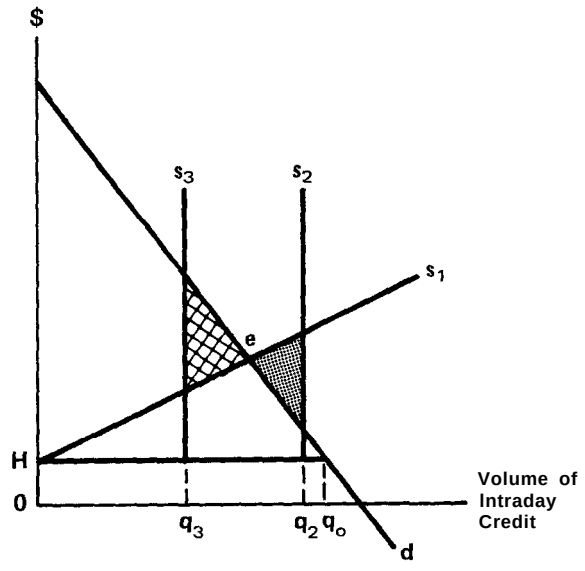
This shows an advantage of net debit caps, namely, they are sure to restrict overdrafts to levels specified by policymakers. In terms of Figure 1, they are designed to limit intraday credit, and they do not necessarily shift the supply curve faced by depository institutions from S_0 to the curve reflecting all costs to society (S_1).

A disadvantage is that caps could either underconstrain or overconstrain intraday credit. Figure 2 shows two possible effects for individual institutions rather than for the entire market. The cap level represented by s_2 brings about some reduction of overdrafts below the unconstrained overdrafts level. While such caps are binding for a very small number of institutions, they underconstrain because they allow a level of intraday credit (q_2) above the equilibrium level that would prevail if banks faced the full costs of their decisions (q_0). The dotted area in Figure 2 shows how underconstraining leaves an excess of intraday credit risk costs over the value of the intraday credit to the participant. On the other hand, the cap level represented by s_3 reduces intraday credit so low that it overconstrains. The crosshatched area in Figure 2 shows that some overdrafts are restricted even though their value to the institution exceeds their cost to society.

Underconstraining overdrafts appears to be a more serious problem than overconstraining because it leaves the payments system with too much intraday credit risk. More important, there are no incentives for participants to reduce risk toward equilibrium levels. In contrast, attempts to constrain overdrafts by reducing them "too much" are less serious because even highly restrictive caps are not likely to be binding on all institutions. Different demands for overdrafts by different institutions would lead to incentives for development of a private market for intraday credit. In such a market, institutions on whom caps, are binding as shown by s_3 could borrow intraday funds (that is, excess cap capacity) at a negotiated price from those on whom the caps are not binding. Overall risk levels would be reduced not only by limiting overall intraday credit in the system as a whole, but also by diversifying intraday credit among a larger number of institutions.

Figure 2

EFFECTS OF RESTRICTIONS ON INTRADAY CREDIT
(INDIVIDUAL INSTITUTION)



Trading excess cap capacity is not the only way an intraday market could work. If some banks maintain excess reserve balances during the day while others incur overdrafts, an intraday market could arise in which funds were lent and repaid during the business day and were still available to lend out overnight. This type of market could arise even if daylight overdrafts were forbidden, since those who would like to incur overdrafts but cannot will have the option of borrowing excess reserves in order to fund payments that would have otherwise created overdrafts.

Pricing Intraday Credit Pricing could be brought about indirectly by policies that lead to development of an intraday credit market as just described. Alternatively, pricing could be adopted directly on Fedwire by levying explicit fees on daylight overdrafts. Likely market effects of pricing on Fedwire are shown in Figure 3. Fedwire overdrafts are priced at P_f. Banks will overdraft up to the point at which the price they pay is equal to the value they place on the credit.[9] Thus, charging a fee for Fedwire overdrafts has an effect similar to that of binding caps, that is, lower overdrafts.

On CHIPS, it is less clear how explicit pricing could operate. A possible solution is to devise policies that attempt to shift the supply curve faced by CHIPS participants from S_0 in Figure 3 to that reflecting the full costs to society (S_1). In other words, risk control policies could attempt to lead banks to internalize the risks in the payments system.

Shifting the supply curve could take the form of policies under which CHIPS and other net settlement networks bear more directly the risks of a settlement failure. For example, a sending bank could effectively post a bond against failure to settle its obligation by collateralizing its net debits. Alternatively, losses due to failure of one bank to settle could be borne by receiving banks that are creditors of the failed sending bank (receiver finality).

[9] For the moment, the analysis conveniently assumes that policymakers are able to select the "right" price. The problems involved will be dealt with presently.

Finally, risks could be shared by the receiving bank and its customers (settlement finality).[10] An example of how CHIPS participants could reduce risks under such policies is to not release funds to customers prior to settlement if the sending bank were either of questionable soundness or not known to the receiver.

Figure 3 shows the likely short-run and long-run effects of levying a fee on daylight overdrafts and adopting new risk bearing measures on CHIPS. On Fedwire, a policy of overdraft pricing within caps would effectively shift the supply curve from S_o up to level P_f. In the short run, relatively inelastic demand (D_{sr}) would lead to a reduction of overdrafts to Q_1. On CHIPS, since the supply curve faced by participants is now S,, volume of intraday credit demanded also falls to Q_1.[11] Over the long run, institutional change (as described on page 8) becomes less costly. This makes demand more elastic over time, as shown by the long-run demand curve D_{lr}. The result is that long-run volume demanded falls to even lower levels on both Fedwire and CHIPS.[12]

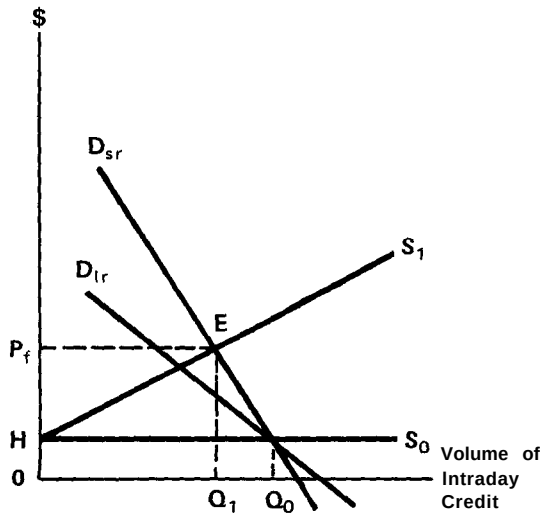
[10] In order for the above policies to be effective, all three require that banks know they will not be released from their obligations in the event of a settlement failure.

[11] If intraday credit were supplied in a private market, determination of a price would have to take account of the time value of intraday funds to suppliers. This would place the intraday private market supply curve above S,.

[12] It is also possible that improved risk controls over time would shift the supply curve down or make it less steep.

Figure 3

MARKET EFFECTS OF PRICING INTRADAY CREDIT



One objection to pricing is that, while it would provide incentives for most banks to reduce intraday credit, it would do little to discourage highly risky institutions from running excessive daylight overdrafts. This would be especially true of an institution in danger of imminent failure, the managers of which may be tempted to take desperate measures. The answer to this objection is to maintain net debit caps along with pricing. Daylight overdrafts would be permitted to those who pay the price so long as they did not exceed cap levels, but no overdrafts would be allowed beyond the caps. Thus, pricing could be used to regulate overdrafts for most institutions, while caps would still be there to protect the system against the highest risk institutions.

The most obvious problem with a policy of pricing intraday credit is that it is not immediately apparent what the price should be. While the price shown in Figure 3 fortuitously matches the price at which benefits of intraday credit to participants equal costs to society, there is no guarantee that such a price would necessarily be chosen. In practice, the price could be set too low or too high, although the distortions induced by too high a price could be alleviated by a private market for intraday credit. Because Fedwire credit risks are currently absorbed by Reserve Banks without explicit charge, however, no private market for intraday credit has yet arisen. In order to demonstrate some practical problems involved in using pricing to control intraday credit risk, the following section explores possible ways to estimate the value of intraday credit to payments system participants.

IV.
From Theory to Practice: Determining the Value of Intraday Credit

There are several reasons it would be useful to know the value of intraday credit. For one, if the Federal Reserve were to seriously consider pricing Fedwire daylight overdrafts, it would be important to have some idea of the value placed on intraday credit by market participants. Further, it would give an indication of what the price of borrowed intraday funds might be if net debit cap reductions or pricing were to lead to a private intraday credit market. Finally, if policymakers wanted to quantify and compare the benefits and costs of further risk reduction efforts, estimates of the value of intraday credit would be essential.

If an intraday funds market now existed, it would reveal the value of intraday credit. No such market has yet developed to fund daylight overdrafts for at least three reasons. First, intraday credit risk on Fedwire is not borne directly by payments system participants, but rather by the Federal Reserve. Second, the current system of net

debit caps was initially designed to constrain only those institutions with the largest overdrafts and to reduce the aggregate dollar value of daylight overdrafts by only 5 to 7 percent. For the vast majority of institutions, therefore, caps have not yet been binding. Finally, less costly alternatives to purchasing intraday funds, especially rearranging the timing of nonessential customer payments during the day, have been available to reduce interbank overdrafts.

The failure of an intraday market for bank reserves to develop so far does not mean, however, that it is not practical. In fact, there already exist two markets that exhibit some characteristics of an intraday market. These are day loans to securities broker/dealers and intraday funding associated with the market for overnight funds.

Day loans are advanced by banks to securities dealers and brokers in order to permit payment by certified check to sellers at the time of delivery. The market for such loans is relatively small, averaging perhaps $10 billion per day, compared with total funds transfer daylight overdrafts of $76 billion per day. This market is almost entirely confined to New York. The loans are granted for periods less than a day (six hours or less), are expected to be repaid by the close of business, and typically cost 100 basis points (annual rate). Although collateralized by the underlying securities so that technically a legally perfected security interest is obtained through the loan agreement, day loans are usually treated as unsecured due to the difficulty of taking actual possession of the securities. Day loans developed because there is a lag between the time broker/dealers pay for securities, subsequently deliver them to customers, and receive payment for them. Brokers and dealers pay by certified check, and funds must actually be in their account in order for the check to be certified. Since the large securities purchases exceed broker/dealer working capital, a loan enables the check to be certified.

The overnight market for federal funds experiences rate fluctuations throughout the working day. Even if a bank starts the day with good information on its funding requirements, it is often necessary to enter the market several times during the day to deal with contingencies that had not been anticipated. Banks may purchase funds in the morning only to find, later in the day, they are not needed overnight and must be sold in the afternoon. It is in this restricted sense that an intraday interbank market already exists, but it apparently is not yet being used specifically to fund interbank daylight overdrafts.[13]

[13] The average opening federal funds rate over 1984-85 was 9.14 percent while the average (early) closing rate was slightly lower at 9.12 percent. Thus, borrowing in the morning and reselling the funds in the afternoon could cost 2 basis points (neglecting transactions costs) on average. By the end of the day when the market is thin, however, the average difference in rates turns negative to - 15 basis points. This spread between opening and closing rates would likely turn positive if banks attempted to profit by the spread by buying in the morning and reselling late in the afternoon.

Approximating the Long-Run Value of Intraday Credit

This section presents five methods which could be used to determine an approximate value for intraday credit on Fedwire. The methods are:

(1) Use the existing day loan market rate.
(2) Determine and use as a rate the costs of shifting from overnight to term funding.
(3) Determine and use as a rate the observed risk premium between bank certificates of deposit (CDs) and Treasury bills.
(4) Divide the overnight rate by eight to obtain an implied rate for overdrafts lasting three hours.
(5) Extrapolate an estimated yield curve backwards to determine an implied rate for three hours of overdrafts.

The first three alternatives develop prices that do not vary according to the length of time an institution is in overdraft. In contrast, the fourth and fifth alternatives attempt to determine a value for three-hour increments of Fedwire overdrafts, which is the average length of time a bank incurs these overdrafts.

Existing Day Loan Market Rate It is possible that the rate on day loans used by broker/dealers to finance securities purchases prior to delivery and payment by customers could be used to approximate a daylight overdraft price. While there is some variation in this intraday rate, reflecting the risk of the securities issued and used as collateral for the loan, the rate is largely administratively determined, has little variation over time, and is typically 100 basis points (on an annual basis).

In this alternative, the broker/dealer intraday funds rate of 100 basis points represents a market rate on a (technically) secured intraday loan for perhaps six hours, while Fedwire overdrafts subject to the cap are unsecured and typically average around three hours a day (for all overdrafting institutions).[14] Although day loans may be secured in the strict legal sense, the arrangements used are loose enough that the loans are usually treated as unsecured credits by the banks that make them. The time difference, however, is more significant, since Fedwire overdrafts are of shorter average duration than broker/dealer loans. Further, since broker/dealers purchase other services from lending banks in addition to intraday loans, the loans, may be priced as part of a package of jointly produced services. Thus the observed 100 basis point intraday loan rate may or may not equal the rate that would exist if fewer related services were purchased, as might be the case in a market for interbank intraday funding for daylight overdrafts.

[14] The average duration of overdrafts for large institutions (those with assets of $5 billion or more and who today account for 90 percent of all funds transfer overdrafts) is four hours. The average duration of overdrafts within 90 percent of each day's peak overdraft is about 90 minutes for all institutions and 45 minutes for large institutions.

Costs of Shifting from Overnight to Term Funding Overnight funding typically creates daylight overdrafts while term funding is one way they can be reduced (see page 8). The difference between the costs of the two funding methods can represent the cost of reducing daylight overdrafts. Charging an overdraft fee at least equal to this cost would eliminate the cost advantage of overnight funding and reduce daylight overdrafts by making term funding relatively more attractive.

Surprisingly, the cost difference between overnight and 7-day term funding has averaged - 2.2 basis points on an annual basis over 120 weeks during 1984-86. This suggests that 7-day term federal funds are on average cheaper than overnight funding. However, when 30-day term fed funds are compared with overnight funding, the spread becomes positive, averaging 4.5 basis points.

A possible advantage of using the cost of shifting from overnight to term funding as a price for daylight overdrafts is that it can be observed in the market. As such, it would reveal the market value placed on intraday credit by payments system participants. However, the observed -2.2 to 4.5 basis point average spread is a function of demand for term funding under current policies. Demand is likely to change significantly if new risk control measures lead more banks to use term funding to reduce overdrafts. At present these spreads fluctuate from positive to negative at different points in the interest rate cycle. Thus, they appear to be more a function of interest rate expectations than of the lower liquidity and higher default risk of the term instrument. So the observed spread between term and overnight funding would today be a poor indicator of the market value of daylight overdrafts.

If more banks turn to term funds as a substitute for overnight funds to reduce daylight overdrafts, one can expect two results. Fist, the observed spread should rise because the demand for term funds would rise while that for overnight funds would fall. Second, because of the shift in demand, the relative effect of interest rate expectations on the relative costs of term or overnight funds should fall. Consequently, the current low spread between term and overnight fed funds understates the spread that would likely be observed if risk control policies like pricing or cap reductions made overdrafts more costly.

Risk Premium between Bank CDs and Treasury Bills This alternative uses the current observed risk premium between 30-day bank CDs and U.S. Treasury bills to approximate an overdraft price that reflects the average risk involved in making an intraday loan to a bank. Over the last ten years, the risk premium has averaged 107 basis points for 30-day instruments, which is the shortest original maturity available for bank CDs. But this risk premium of 107 basis points is also affected by the different tax treatment of income from the two instruments as well as by their differing liquidity in secondary markets. Unless the tax and liquidity effects are believed to be small or can be separated from the risk premium, this measure must be considered only as a first approximation, one that probably overstates the true risk premium by itself.15

Divide the 24-Hour Overnight Rate by Eight to Obtain an Implied Three-Hour Rate So far, the alternatives presented resemble a charge for an overdraft line of credit in which a price is applied to the maximum amount of credit used during a day. If, in contrast, one wishes to determine the value of shorter increments of intraday credit, it is necessary to use ad hoc or statistical extrapolations to an unobserved maturity (here, three hours). This necessarily generates a certain amount of error even if the assumptions about the extrapolation process are accepted. The ad hoc procedure of dividing the 24-hour overnight rate by eight yields 124 basis points (annual rate) for an implied three-hour overdraft rate based on the 9.91 percent average overnight federal funds rate over the last ten years (1976-85). This implicitly assumes that funds can be lent out in eight three-hour increments or that daylight lending does not inhibit overnight reuse of the same funds by a different borrower. Such an assumption seems reasonable.

Extrapolate the Yield Curve Backwards to an Implied Three-Hour Rate Statistical estimation of a yield curve over 180-day, 90-day, and 30-day bank CDs, and overnight federal funds, gives an implied average three-hour overdraft rate of 9.74 percent. This computed rate is only 17 basis points lower than the average overnight rate over the last ten years. The estimated yield curve is very flat and spreads between instruments often shift from positive to negative over time. The approach gives results equivalent to situations where daylight lending would prevent use of the same funds overnight. Since it is expected that interbank funds borrowed to cover daylight overdrafts could be re-lent overnight to the same or a different borrower, the 974 basis point rate does not appear to be reasonable and should not be used as a guide as to what intraday credit would likely cost if a private market were to develop in the future.

Choosing between the Alternatives

Of the five alternative methods of estimating the intraday price for funds, at least two can be ruled out. Shifting from overnight to term funding can be excluded because the currently measured costs are too low (or negative) to

[15] Further, the spread fluctuates widely, making it even more difficult to distinguish the risk premium from tax and liquidity effects. See Cook and Lawler (1983).

be representative of what the costs would be if more institutions used term funding to reduce overdrafts. Extrapolating the yield curve backwards to a three-hour rate can also be excluded since it implies that funds lent intraday would not be re-lent overnight (and as a result raises the rate charged on an intraday loan to a level very close to the overnight rate). Since a private intraday funds market would probably not involve any restriction on using funds overnight, the rate obtained from the estimated yield curve is unrealistically high.

The remaining three alternatives, the existing day loan market rate for securities broker/dealers, the CD-Treasury bill risk premium, and dividing the overnight fed funds rate by eight, give rates which cluster around one another at 100, 107, and 124 basis points. As a result, a "best guess" of an equilibrium rate which might apply to daylight overdrafts in a private market currently lies in the range of 100 to 125 basis points.

In connection with the above illustrations of what a best guess of an intraday market rate may be, it should be emphasized that markets will change if daylight overdrafts were priced. Today most of the intraday credit risk exposure that creates the costs connected with Fedwire intraday lending is absorbed by the Federal Reserve at a zero explicit charge to users. If the Fed were to charge for the risk it absorbs, or if it were to reduce its risk exposure by tightening the net debit caps well below their current levels, depository institutions could be expected to explore ways of charging for the value of intraday credit they extend to their customers and internal bank profit centers as well. Because of such future efforts, the intraday credit cost estimates presented here should be thought of as only a starting point for daylight overdraft pricing or as points of departure for further research efforts. It is only with the development of an active private sector market for intraday funds and a better understanding of the costs involved in reducing overdrafts that an accurate idea of the value of intraday credit will be obtained.

V. Concluding Comments

The foregoing analysis makes several points. First, intraday credit has value to payments system participants, regardless of whether or not it is explicitly priced. Second, the volume of intraday credit and the associated level of intraday credit risk in the payments system result largely from a failure to require that the full risks and costs of daylight overdrafts be borne by their users. Third, policies seeking to control intraday credit risks may attain their objectives in at least two different ways. One is by limiting intraday credit by such means as sender net debit caps. The other places costs on the institutions that create overdrafts by pricing the risks involved. Finally, the empirical portion of the article suggests some possibilities for determining the price that may be charged for intraday credit if a private market were to develop. This price ranges from 100 to 124 basis points (annual rate) per dollar of credit extended.

As the payments system grows, two areas for further research become increasingly important. The first, determining the value of intraday credit, was explored in this paper. The second area is no less important, namely, quantification of actual risk exposures connected with intraday credit. While the potential losses are huge, they have not in fact occurred and therefore it has been difficult to determine their expected value. If generally acceptable estimates of expected losses can be developed, they would be helpful in determining the necessity of developing and adopting other, and potentially more stringent, methods the Federal Reserve and private sector payment participants can use to further reduce intraday credit risk.

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REPURCHASE AND REVERSE REPURCHASE AGREEMENTS

Stephen A. Lumpkin

Recent years have witnessed a considerable growth in the market for repurchase agreements (RPs), both in terms of daily activity and in the numbers and types of participants in the market. Many years ago RPs, or "repos" as they are frequently called, were used primarily by large commercial banks and government securities dealers as an alternative means of financing their inventories of government securities, but their use has expanded substantially in recent years. RPs are now used regularly by a variety of institutional investors in addition to banks and dealers, and the Federal Reserve Bank of New York (FRBNY) uses repo transactions to implement monetary policy directives and to make investments for foreign official and monetary authorities. This article describes RPs and their principal uses and discusses the factors influencing the growth and development of the RP market over the past few years.

What is a Repo?

A standard repurchase agreement involves the acquisition of immediately available funds through the sale of securities with a simultaneous commitment to repurchase the same securities on a date certain within one year at a specified price, which includes interest or its equivalent at an agreed upon rate.[1] Repo transactions have many characteristics of secured lending arrangements in which the underlying securities serve as collateral. Under this characterization, the sale of securities under an agreement to repurchase is a type of collateralized borrowing and represents a liability to the "seller," reflecting the contractual obligation to transfer funds to the "buyer" on the final maturity date of the agreement.

A reverse RP (technically a matched sale-purchase agreement) is the mirror image of an RP. In a reverse repo, securities are acquired with a simultaneous commitment to resell. Because each party to the transaction has the opposite perspective, the terms repo and reverse repo can be applied to the same transaction. A given transaction is a repo when viewed from the point of view of the supplier of the securities (the party acquiring funds) and a reverse repo when described from the point of view of the supplier of funds.[2] In general, whether an agreement is termed a repo or a reverse repo depends largely on which party initiated the transaction, but an RP transaction between a dealer and a retail customer usually is described from the dealer's point of view. Thus, a retail investor's purchase of securities and commitment to resell to a dealer is termed a repo, because the dealer has sold the securities under an agreement to repurchase.

There is no central physical marketplace in which RPs are negotiated. Rather, transactions are arranged over-the-counter by telephone, either by direct contact or through a group of market specialists (dealers or repo brokers). The securities most frequently involved in repo transactions are U.S. Treasury and federal agency securities, but repos are also arranged using mortgage-backed securities and various money market instruments, including negotiable bank certificates of deposit, prime bankers acceptances and commercial paper. If executed properly, an RP agreement is a low-risk, flexible, short-term investment vehicle adaptable to a wide range of uses. For instance, dealers use repo and reverse repo transactions not only to finance the securities held in their investment and trading accounts, but also to establish short positions, implement arbitrage activities, and acquire securities for their own purposes or to meet specific customer needs.[3] Investors in the repo market, such as nonfinancial corporations, thrift institutions, state and local government authorities, and pension funds, in turn, are provided with a low cost investment alternative which

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[1] Immediately available funds include deposits in Federal Reserve Banks and certain collected liabilities of commercial banks that may be transferred or withdrawn on a same-day basis.

[2] For some participants, notably thrift institutions and the Federal Reserve, the terminology is reversed. That is, the Federal Reserve arranges RPs when it wants to inject reserves (supply funds) temporarily.

[3] A dealer establishes a short position by selling a security he does not have in his inventory. To make delivery of the securities the dealer either borrows them or acquires them by making reverse repurchase agreements.

offers combinations of yields, liquidity, and collateral flexibility not available through outright purchases of the underlying securities.

The key features of RP agreements are described in the following section. Subsequent sections explain the pricing of RP contracts and discuss the various procedures for transferring the different types of collateral between the repo counterparties.

Characteristics of RP Agreements

In most RP agreements, the purchaser of the repo securities acquires title to the securities for the term of the agreement and thus may use them to arrange another RP agreement, may sell them outright, or may deliver them to another party to fulfill a delivery commitment on a forward or futures contract, a short sale, or a maturing reverse RP. This feature makes RPs particularly useful for securities dealers, who use repos and reverses to implement a wide variety of trading and arbitrage strategies. As suggested previously, a wide range of other institutional participants also derive benefits from the RP market. The principal use of repos by these investors is the short-term investment of surplus cash either for their own accounts or on behalf of others in their fiduciary capacities or as agent. The various yields and maturities offered in RP transactions make them well-suited for this purpose.

Maturities RP agreements usually are arranged with short terms to maturity. Most RPs in Treasury securities, for example, are overnight transactions. In addition to overnight contracts, longer-term repos are arranged for standard maturities of one, two, and three weeks, and one, two, three, and six months. Other fixed-term multi-day contracts ("term repos") are negotiated occasionally and repos also may be arranged on an "open" or continuing basis. Continuing contracts in essence are a series of overnight repos in that they are renewed each day with the repo rate adjusted to reflect prevailing market conditions. These agreements usually may be terminated on demand by either party.

Yields In some RP agreements, the agreed upon repurchase price is set above the initial sale price with the difference reflecting the interest expense incurred by the borrower. It is more typical, however, for the repurchase price to be set equal to the initial sale price plus a negotiated rate of interest to be paid on the settlement date by the borrower. Repo interest rates are straight add-on rates calculated using a 360-day "basis" year. The dollar amount of interest earned on funds invested in RPs is determined as follows:

$$\text{Interest earned} = \text{Dollar amount invested} \times \text{Repo rate} \times \frac{\text{Number of days to maturity}}{360}$$

For example, a $25 million overnight RP investment at a 6 3/4 percent rate would yield an interest return of **$4,687.50:**

($25,000,000 × .0675)/360 × 1 = $4,687.50

Suppose instead, that the funds were invested in a 10-day term agreement at the same rate of 6 3/4 percent. In this case, the investor's earnings would be $46,875.00:

($25,000,000 × .0675)/360 × 10 = $46,875.00

As a final example, suppose that the investor chose to enter into a continuing contract with the borrower at an initial rate of 6 3/4 percent, but withdrew from the arrangement after a period of five days. Suppose also that the daily RP rates over the five days were 6 3/4 percent, 7 percent, 6 1/2 percent, 6 3/8 percent, and 6 1/4 percent. Then the total interest earned on the continuing contract would be:

First day:
($25,000,000 x .0675)/360 x 1 = $ 4,687.50
Second day:
($25,000,000 x .07)/360 x 1 = $ 4,861.11
Third day:
($25,000,000 x .065)/360 x 1 = $ 4513.89
Fourth day:
($25,000,000 x .06375)/360 x 1 = $ 4,427.08
Fifth day:
($25,000,000 x .0625)/360 x 1 = $ 4,340.28
Total interest earned: $22,829.86

If the investor had entered into a term agreement for the same period at the rate of 6 3/4 percent prevailing on the first day, he would have earned $23,437.50 in interest. Thus, in this hypothetical example the movement in rates worked to the advantage of the borrower.

The purchaser of securities in a repo transaction earns only the agreed upon rate of return. If a coupon payment is made on the underlying securities during the term of the agreement, the purchaser in most cases must account to the seller for the amount of the payment. Securities in registered definitive form generally are left registered in the seller's name so that any coupon payments made during the repo term may be received directly.

Principal Amounts RP transactions are usually arranged in large dollar amounts. Overnight contracts and term repos with maturities of a week or less are often arranged in amounts of $25 million or more, and blocks of $10 million are common for longer maturity term agreements. Although a few repos are negotiated for amounts under $100,000, the smallest customary amount is $1 million.

Valuation of Collateral Typically, the securities used as collateral in repo transactions are valued at current market price plus accrued interest (on coupon-bearing securities) calculated to the maturity date of the agreement less a margin or "haircut" for term RPs.[4] Technically, the haircut may protect either the lender or the borrower depending upon how the transaction is priced. In the usual case, the initial RP purchase price is set lower than the current market value of the collateral (principal plus accrued interest), which reduces the lender's exposure to market risk. A dealer arranging a reverse RP with a nondealer customer frequently takes margin, which covers his exposure on the funds transferred.

To illustrate the computation of market risk haircuts, consider the case of a lender who in December 1984 was holding $10 million par value of 52-week Treasury bills as collateral for a 7-day term RP agreement. In 1984, the average week-to-week fluctuation in the yield of recently offered 52-week bills was 0.21 percent, measured as the standard deviation of the change in yield from Tuesday to Tuesday. The corresponding price volatility measure was 0.20 percent. To reflect a 95 percent confidence level the lender would compute a market risk haircut factor of 0.50 percent (2.5 times the standard deviation of week-to-week price changes). On December 27, for instance, year bills were trading at a discount rate of 8.38 percent or at a price of $91.504 per $100 par value. Thus, the current market value of the collateral was $9,150,361.11. The lender would calculate its per week risk of loss at $45,751.81 (the market risk haircut factor times the market value), and would value the collateral accordingly at $9,104,609.31 (the current market value less the haircut in dollars).

In principle, the dollar amount of the haircut should be sufficient to guard against the potential loss from an adverse price movement during the repo term. The sizes of haircuts taken in practice usually vary depending on the term of the RP contract, type of securities involved, and the coupon rate of the underlying securities. For example, discount bonds are more price volatile than premium bonds and thus are given larger haircuts. Similarly, haircuts taken on private money market instruments generally exceed those of comparable-maturity Treasury securities, due to an additional credit risk-induced component of price volatility. In general, haircuts are larger the longer the term to maturity of the repo securities, and larger haircuts are common for less liquid securities as well. Currently, market risk haircuts range from about one to five percent, but may be as low as one-eighth of a point for very short-term securities.

Because both parties in a term repo arrangement are exposed to the risk of adverse fluctuations in the market value of the underlying securities due to changes in interest rates, it is common practice to have the collateral value of the underlying securities adjusted daily ("marked to market") to reflect changes in market prices and to maintain the agreed upon margin. Accordingly, if the market value of the repo securities declines appreciably, the borrower may be asked to provide additional collateral to cover the loan. However, if the market value of the collateral rises substantially, the lender may be required to return the excess collateral to the borrower.

Special Repo Arrangements The bulk of the activity in the RP market involves standard overnight transactions in Treasury and agency securities, usually negotiated between a dealer and its regular customers. Although standard overnight and term RP arrangements are most prevalent, dealers sometimes alter various provisions of these contracts in order to accommodate specific needs of their customers. Other arrangements are intended to give the dealer flexibility in the designation of collateral, particularly in longer-term agreements. For example, some contracts are negotiated to permit substitution of the securities subject to the repurchase commitment. In a "dollar repo," for instance, the initial seller's commitment is to repurchase securities that are similar to, but not necessarily the same as, the securities originally sold. There are a number of common variants. In a "fixed-coupon repo," the seller agrees to repurchase securities that have the same coupon rate as those sold in the first half of the repo transaction. A "yield maintenance agreement" is a slightly different variant in which the seller agrees to repurchase securities that provide roughly the same overall return as the securities originally sold. In each case, the maturity of the repurchased securities must be within an agreed upon range, but may be only approximately the same as that of the original securities. These agreements are frequently arranged so that the purchaser of the securities receives the final principal payment from the issuer of the securities.

In other repo arrangements, the repo counterparties negotiate flexible terms to maturity. A common example of this type of contract is the repo to maturity (or reverse to maturity for the lender of funds). In a repo to maturity, the initial seller's repurchase commitment in effect is eliminated altogether, because the purchaser agrees to hold the repo securities until they mature. The seller's repurchase commitment depends on the manner in which the final principal payment on the underlying

[4] The failure of Drysdale Government Securities in May 1982 and Lombard-Wall in August 1982 uncovered weaknesses in the pricing of RPs. RPs are now priced with accrued interest included in full in the purchase price, but prior to adoption of full accrual pricing in October 1982, it was common for RPs to be priced without accrued interest.

securities is handled. When the purchaser of the repo securities receives the final principal payment directly from the issuer of the securities, he usually retains it and nets it against the seller's repurchase obligation. However, if the seller of the repo securities receives the principal payment, he must pay the purchaser the full amount of the agreed upon repurchase price when the repo is unwound.

Reverses to maturity often involve coupon securities trading at a discount from the price at which the "seller" initially purchased them. Typically, reverses to maturity are initiated by an investor who is reluctant to sell the securities outright, because an outright sale would require taking a capital loss on the securities. A reverse to maturity enables the investor to acquire funds to invest in higher yielding securities without having to sell outright and realize a capital loss. The dealer participating in the transaction usually takes margin on the securities "purchased".

Participants in the RP Market

The favorable financing rates and variety of terms and collateral arrangements available have led government securities dealers to expand their use of repos in recent years. Many years ago, dealers relied primarily on collateralized loans from their clearing banks ("box loans") to meet their financing needs, but RPs and reverse RPs are now their principal sources of financing. Major dealers and large money center banks in particular finance the bulk of their holdings of Treasury and agency securities by RP transactions. Most of these transactions are arranged on a short-term basis (i.e., overnight or continuing contracts) via direct contact with major customers, typically banks, public entities, pension funds, money market mutual funds, and other institutional investors. The Federal Reserve Bank of New York also arranges repos and reverse repos with dealers to implement monetary policy directives and to make investments for foreign central banks and other official accounts.

Early each morning a dealer's financing desk arranges repo financing for expected changes in the firm's securities inventory ("long position") and for replacement of maturing RPs, and also arranges reverse RPs to cover known or planned short sales or to meet specific customer needs.[5] The bulk of these arrangements are finalized by 10:00 a.m. Eastern Time.

Dealers use reverse RPs to establish or cover short positions and to obtain specific issues for redelivery to customers. Major suppliers of securities to the market include large commercial banks, thrifts, and other financial institutions. Nonfinancial corporations and municipalities also supply collateral to this market. A dealer "reverses in" securities, in effect, by buying them from the holder under an agreement to resell; the term of the agreement usually ranges from a week to a month, but may also run for the remaining term to maturity of the securities (reverse to maturity). The use of reverse repos to cover short positions is similar to securities borrowing arrangements in which the dealer obtains securities in exchange for funds, other securities, or a letter of credit. However, reversing in securities typically is cheaper than borrowing the securities outright and also gives the dealer greater flexibility in his use of the securities. For instance, reverse RPs are arranged for fixed time commitments, but borrowing arrangements usually may be terminated on a day's notice at the option of the lender.

If a dealer has exhausted its regular customer sources but is still in need of funds or specific collateral, it may contact a repo broker. Dealers use repo brokers most often for term RP agreements and in arranging reverse RPs. The repo brokers market is particularly important for obtaining popular issues in short supply ("on special"). Although the use of bank loans as a source of financing has declined considerably, a dealer still may obtain financing from its clearing bank in the form of an overnight box loan if it has a negative balance in its cash account at the end of the day.[6] The rate the clearing bank charges is generally 1/8 to 1/4 of a point or more above the Federal funds rate, with slightly higher rates charged for loans arranged late in the day, so dealers acquire box loans only as a last resort. A dealer who is unable to obtain adequate financing using his own customer base, or has an unexpected receipt of securities late in the day, may choose to obtain a "position" loan from another bank rather than a box loan from his own clearing bank. Position loans are often available at more favorable rates than available on box loans. In these circumstances, the lender frequently wires the dealer's clearing bank the amount of the loan. The clearing bank, in turn, segregates the required amount of the dealer's securities as collateral for the loan and acts as custodian for the lender.

In addition to using repos and reverse repos to finance their long and short positions, dealers also use RP agreements in transactions in which they act as inter-

[5] A short sale is the sale of securities not currently owned, usually under the expectation that the market price of the securities will fall before the termination date of the transaction. The seller later purchases the securities at a lower price to cover his short position and earns an arbitrage profit.

[6] Securities received by a clearing bank on behalf of a dealer customer generally are delivered first into a central clearing account known as the "box." Any securities that have not been allocated to other uses by the dealer, and have not been financed through other means, may be used to collateralize an overnight loan (box loan) from the clearing bank.

mediaries between suppliers and demanders of funds in the repo market. A dealer acts as principal on each side of the arrangement, borrowing funds from one party (against the sale of securities) and relending the funds to another party (against the receipt of securities). The combination of repo and reverse repo transactions in this fashion is termed a "repo book." A repo book in which an RP and a reverse RP in the same security have equal terms to maturity is referred to as a "matched book." Larger, better capitalized dealers are able to borrow in the RP market at more favorable rates than smaller dealers and non-dealer customers, and thus can profit through arbitrage in matched transactions. Dealers also may profit from a differential in the margin taken on the underlying collateral in the two transactions.

At times, a dealer may choose not to match the maturities of the repo and reverse repo agreements in an effort to increase profits. For example, if interest rates are expected to rise during the term of the agreement, the dealer may arrange an RP with a longer term than the reverse RP in order to "lock in" the more favorable borrowing rates. Conversely, in a declining rate environment, a longer-term reverse RP may be financed through a number of shorter-term RPs arranged at successively lower rates.

Many types of institutional investors derive benefits from RP and reverse RP transactions with dealers, including nonfinancial corporations, state and local government authorities and other public bodies, banks, and thrift institutions. Repos are adaptable to many uses and RP maturities can be tailored precisely to meet the needs of lenders. This enables corporations and municipalities with temporary surplus cash balances to earn market rates of return on a timely basis but have their funds available when needed. Thus, in effect, RP agreements convert cash balances into interest-bearing liquid assets. In this fashion, RPs are more attractive investments than alternative money market instruments which do not offer the same combination of liquidity, flexibility, and ease of negotiation. Newly issued negotiable CDs, for example, must have a minimum maturity of at least 14 days and commercial paper is seldom written with maturities as short as a day.

Repos are also attractive investments for investors subject to restrictions on the types of assets in which they may invest. Many public bodies, for example, are required by law to invest their tax receipts and proceeds from note and bond sales in Treasury or federal agency issues until the funds are to be spent. As opposed to buying the securities outright, these entities often invest in repos collateralized by government securities and record the ownership of the securities rather than the repos on their books.

The Federal Reserve also is a major participant in the repo market. When the Manager of the System Open Market Account needs to inject reserves in the banking system overnight or for a few days, the Domestic Trading Desk of the FRBNY arranges RPs with primary dealers in government securities.[7] These agreements are arranged for specified periods of up to 15 days and are collateralized by Treasury and agency securities. Investments on behalf of foreign official and international accounts also involve RPs, either arranged in the market or internally with the System's Account. When the Manager wants to absorb reserves for a few days, the Desk arranges matched sale-purchase transactions with primary dealers, in which specific securities are sold from the System's portfolio for immediate delivery and simultaneously repurchased for settlement on the desired date.

Growth and Development of the RP Market

It is difficult to ascertain when the repurchase agreement originated. Some suggest that RPs date back to the 1920s, about the time that the Federal funds market evolved. Other sources state that the use of RPs was initiated by government securities dealers after World War II as a means of financing their positions. There is general agreement, however, that for many years RPs were used almost exclusively by government securities dealers and large money center banks. Since the late 1960s however, the number and types of participants in the RP market has grown considerably.

A number of factors have influenced the growth and development of the RP market over this period, including changes in the regulatory environment, inflation, growth in federal debt outstanding, and increased interest rate volatility. The higher levels and greater volatility of interest rates since the 1960s have been particularly important. They have raised the opportunity cost of holding idle cash balances in demand deposit accounts, on which the explicit payment of interest is prohibited, and have led to an expanded use of active cash management techniques. Accompanying these developments have been key innovations in telecommunications and

[7] Primary dealers are a group of dealers who have met eligibility criteria established by the Federal Reserve Bank of New York (FRBNY). To be on the FRBNY's primary dealer list, a firm is expected to make markets in the full range of Treasury and agency issues under "good' and "bad" market conditions for a diverse group of nondealer customers, and to maintain certain minimum capital levels. The FRBNY selects appropriate counterparties from this list when it conducts open market operations.

computer technology, which have contributed to the development of sophisticated cash management systems for managing and transferring large volumes of funds. As a consequence, a variety of financial institutions, nonfinancial corporations, pension funds, mutual funds, public bodies, and other institutional investors have joined securities dealers and money center banks as active participants in the RP market.

As a result of this growth, the RP market is now considered to be one of the largest and most liquid markets in the world. Although total daily activity in the RP market is not known, as most agreements are negotiated directly between counterparties over the telephone, an indication of the growth in the market over recent years can be seen in the use of RPs and reverse RPs by primary dealers. As shown in Table I, on an annual average basis, repo financing by major dealers has nearly tripled since 1981. The same is true for the use of matched book transactions (Table II), which account for about half of all repo transactions. In fact, for some nonbank dealers matched book transactions account for as much as 90 percent of overall repo activity. Bank dealers are subject to capital requirements imposed by bank regulators, which raise the cost of using these transactions relative to alternative investments; thus, they have not participated as much in the use of matched RP agreements.

The rapid growth and development of the RP market over recent years has not occurred without incident. In particular, the failures of a few unregistered non-primary government securities dealers has had a significant effect on the operation of the market. These failures generally had some common characteristics, including the use of pricing techniques which ignored accrued interest in computing the value of repoed securities, and the. fraudulent use of customers' collateral. The failures resulted in considerable uncertainty regarding the legal status of repos and the contractual rights of the counterparties when one of them files for protection under federal bankruptcy laws.

Repurchase agreements have never been defined in a strict legal sense either as collateralized loans or as outright purchases and sales of securities. Under recent court rulings involving the bankruptcy proceedings of Bevill, Bresler, and Schulman, Inc., the court has determined that the appropriate characterization of a repo for legal purposes depends upon the manner in which the transaction was arranged. For instance, if the repo counterparties arranged the transaction as a consummated sale and contract to repurchase, then the court would adopt the same characterization in the event of a default and subsequent bankruptcy of one party.

Market participants have long operated under the assumption that the purchaser of repo securities is entitled to liquidate them if the seller is unable to fulfill the terms of the agreement at settlement, but the validity of this assumption relies importantly on the court's interpretation. For instance, in September 1982, in the bankruptcy proceedings involving Lombard-Wall, Inc., Federal Bankruptcy Judge Edward J. Ryan ruled that certain repos involved in that case were to be considered secured loan transactions for purposes of the proceedings.[8] As a consequence, under the existing law, RPs became

Table I

ANNUAL AVERAGES OF OUTSTANDING REPURCHASE AND REVERSE REPURCHASE AGREEMENTS BY CATEGORY OF PRIMARY DEALER[1]

(Millions of Dollars)

Year	Bank Dealers	Nonbank Dealers	Total
1981	19,173	92,565	111,738
1982	22,337	147,890	170,227
1983	24,812	159,319	184,131
1984	26,706	218,282	244,988
1985	34,453	286,365	320,818

[1] Figures are obtained from reports submitted weekly to the Federal Reserve Bank of New York by the U.S. government securities dealers on its published list of primary dealers. Figures include matched agreements.

Table II

ANNUAL AVERAGES OF OUTSTANDING MATCHED REPURCHASE AND REVERSE REPURCHASE AGREEMENTS OF PRIMARY DEALERS[1]

(Millions of Dollars)

Year	Bank Dealers	Nonbank Dealers	Total
1981	6,167	51,177	57,344
1982	7,534	88,315	95,849
1983	6,839	84,523	91,362
1984	7,207	121,938	129,145
1985	9,118	152,914	162,032

[1] Figures are obtained from reports submitted weekly to the Federal Reserve Bank of New York by the U.S. government securities dealers on its published list of primary dealers. Figures include repurchase agreements, duebills, and collateralized loans used to finance reverse repurchase agreements, as well as the reverse side of these transactions.

[8] Lombard-Wall failed in August 1982 when it was unable to return funds it had obtained in overvalued long-term RPs. The failure of Lombard-Wall occurred shortly after the collapse of Drysdale Government Securities, Inc. Drysdale failed in May 1982 when it was unable to make payments on accrued interest on securities it had acquired under RP agreements and could not return the securities it had obtained through over-collateralized reverse RPs.

subject to the "automatic stay" provisions of the Bankruptcy Code. The automatic stay provisions block any efforts of a creditor to make collections or to enforce a lien against the property of a bankrupt estate. Consequently, Lombard-Wall's repo counterparties could neither use the funds obtained nor sell the underlying repo securities without the court's permission, because to do so would constitute the enforcement of a lien and thus would violate the automatic stay provision.

As a result of the developments in the Lombard-Wall case, the perceived risks of lending in the RP market were raised, resulting in a contraction in the volume of repo transactions entered into by non-dealer entities, including mutual funds and state and local government authorities. With the reduction in a major source of repo funds, the financing costs for some non-primary dealers rose, as other participants regarded them as higher credit risks. At the same time RP rates paid by some well-capitalized firms declined somewhat. Similar movements in repo financing rates have occurred in the wake of failures of other government securities dealers, including the recent failures of E.S.M. Government Securities, Inc. and Bevill, Bresler, and Schulman Asset Management Corp. in 1985.

In response to the repurchase agreement issue, Congress, in June 1984, enacted the Bankruptcy Amendments Act of 1984, which amended Title 11 of the U. S. Code covering bankruptcy. The legislation exempts repurchase agreements in Treasury and agency securities, certain CDs, and bankers acceptances from the automatic stay provision of the Bankruptcy Code. Although the legislation does not resolve the question of whether an RP agreement is a secured lending arrangement or a purchase and sale transaction, it enables lenders to liquidate the underlying securities under either interpretation and resolves a major question about the status of RP collateral in bankruptcy proceedings.[9]

With the encouragement of the Federal Reserve Bank of New York (FRBNY), primary dealers began to include the value of accrued interest in the pricing of RPs and related transactions in October 1982. At that time, the FRBNY also recommended that dealers follow uniform procedures in establishing repo contract value for purposes of maintaining margin. These actions helped to correct certain inadequacies in standard repo pricing practices.

However, recent dealer failures have demonstrated that proper pricing of repo transactions alone is insufficient to ensure the safety of a repo investment. Investors must also concern themselves with the creditworthiness of their repo counterparties. For instance, many of the investors dealing with E.S.M. and Bevill, Bresler, and Schulman lost their money because they did not protect their ownership interest in the repo securities pledged to them as collateral. Investors can best establish their ownership claim to repo securities by taking delivery of the securities, either directly or through a clearing bank-custodian.

[9] Note that the automatic stay provision is irrelevant if an RP is considered to be an outright purchase and sale of securities.

Repo Collateral Arrangements

As mentioned previously, most RPs involve Treasury and federal agency securities, the bulk of which are maintained in book-entry form. Usually, when an RP is arranged, the underlying securities are transferred against payment over the Federal Reserve's securities wire ("Fedwire") to the lender/purchaser, resulting in a simultaneous transfer of funds to the borrower. At maturity, the RP collateral is returned over the wire against payment and the transfers are reversed. Direct access to the Federal Reserve's securities and payments transfer systems is restricted, so transfers of the repo securities usually are processed by means of Reserve Bank credits and debits to the securities and clearing accounts of depository institutions acting as clearing agents for their customers. Transfers of physical securities also frequently involve clearing agents.

The transaction costs associated with the payment and delivery of repo securities include some combination of securities clearance fees, wire transfer charges for securities in book-entry form, custodial fees, and account maintenance fees. The exact charges can vary considerably from case to case depending on the type of securities involved and the actual method of delivery. For example, Fedwire charges for securities transfers are higher for off-line originations than for transfers initiated on-line, and the fees for transfers of agency securities are slightly higher than those for Treasury securities. In any event, the total transaction costs to process transfers of securities from the seller/borrower to the buyer/lender are higher the greater the number of intermediate transactions. Although these costs are often inconsequential for longer-maturity transactions in large dollar amounts, they may add significantly to the overall costs of others. As a result, a number of repo collateral arrangements have been developed that do not involve the actual delivery of collateral to the lender. Not surprisingly, the rates available to investors in such nondelivery repos are higher than rates offered on standard two-party RPs with collateral delivery. Of course, the risks may be greater as well.

At one end of the spectrum of nondelivery repos is the "duebill" or letter repo. A duebill in essence is an unsecured loan similar in form to commercial paper; the borrower merely sends a transaction confirmation to the lender. Although specific securities might be named as collateral, the lender does not have control of the

securities. Thus, the lender relies for the most part on the integrity and creditworthiness of the borrower. Duebills are used primarily in overnight arrangements that involve small par amounts of non-wireable securities.

A similar arrangement is the "hold-in-custody" repo in which the borrower retains possession of the repo securities but either transfers them internally to a customer account or delivers them to a bulk segregation account at its clearing bank; the securities are left in the dealer's name and not that of the individual customers. The extent to which the investor's ownership interest in the pledged securities is protected depends on the type of custody arrangement. If the borrower acts as both custodian and principal in the transaction, the investor relies on the borrower's integrity and creditworthiness.[10]

A lender can protect his ownership claim to repo securities by using "safekeeping" arrangements involving a clearing bank-custodian acting solely in its behalf or jointly as agent for both repo counterparties. The most popular of these arrangements is the "triparty repo" in which a custodian, typically the borrower's clearing bank, becomes a direct participant in the repo transaction with the borrower and lender. The clearer-custodian ensures that exchanges of collateral and funds occur simultaneously and that appropriate operational controls are in place to safeguard the investor's ownership interest in the underlying collateral during the term of the agreement. When the repo is unwound at maturity, the clearer makes an entry in its internal records transferring the securities from the segregation account to the borrower's clearing account and wires the loan repayment to the lender.

The rates available to investors in tri-party repos are lower than those available on nonsegregated RPs without collateral delivery, but higher than the rates offered on standard two-party RPs with delivery. Thus, safekeeping arrangements of this type are attractive both to investors, who earn a higher risk-adjusted return than available on standard RPs, and to borrowers, whose total financing costs are lowered through the avoidance of clearance costs and wire transfer fees.

Determinants of RP Rates

The interest rate paid on RP funds, the repo rate of return, is negotiated by the repo counterparties and is set independently of the coupon rate or rates on the underlying securities. In addition to factors related to the terms and conditions of individual repo arrangements, repo interest rates are influenced by overall money market conditions, the competitive rates paid for comparable funds, and the availability of eligible collateral. As mentioned previously, changes in the perceived risks associated with RP investments also affect the level of RP rates and the spreads between RP rates and comparable money market rates.

Because repurchase agreements are close substitutes for Federal funds borrowings, overnight RP rates to a large extent are determined by conditions in the market for reserve balances and thus are closely tied to the Federal funds rate. For example, when the demand for reserves is high relative to the existing supply, depository institutions bid more aggressively for Federal funds, thereby putting upward pressure on the Federal funds rate. As the funds rate rises, some institutions will enter into repurchase agreements, which also puts upward pressure on the RP rate. Both rates will continue to rise until the demand and supply for reserves in the banking system is again in balance.[11] Federal Reserve policy actions have a major influence on overnight financing rates through their effect on the supply of reserves via open market operations and discount window policy.

Repo rates for overnight RPs in Treasury securities, usually lie about 25 to 30 basis points below the Federal funds rate. Properly executed RP agreements are less risky than sales of Federal funds because they are fully backed by high-quality collateral. Thus, the rate spread generally reflects a risk premium paid to compensate investors for lending unsecured in the Federal funds market rather than investing in a collateralized RP agreement. The spread between the Federal funds rate and RP rate has narrowed when the perceived risks associated with RP investments have increased, e.g., when the legal status of the repo securities backing an RP agreement has come under question.

The spread between the funds rate and the RP rate can also depend on the supply of collateral held by government securities dealers. Dealers reduce their demand for RP financing when the dollar volume of securities they hold in their investment and trading accounts is low.[12] Other things the same, this also puts downward pressure on the RP rate relative to the Federal funds rate. Conversely, the RF rate rises, and the rate spread narrows, when the volume of securities to be financed is high relative to the availability of overnight financing. This

[10] Under the Uniform Commercial Code, an investor can establish an ownership interest in securities it has left with a dealer for a period of up to 21 days if it obtains a proper written agreement and "gives value" for the securities.

[11] See Kenneth D. Garbade [1982, Chapter 5].

[12] This sometimes occurs after major tax payments when incoming tax receipts exceed the capacity of Treasury Tax and Loan (TT&L) accounts at commercial banks and are transferred to the Treasury's account at Federal Reserve Banks. Because the transfer of funds from the public to the Federal Reserve (Fed) drains reserves from the banking system, the Fed often arranges RPs to inject reserves to offset the effect of the movement. These RPs must be collateralized, of course, and funds held in TT&L accounts also must be collateralized. Both actions tend to remove a large quantity of eligible collateral from the market.

sometimes occurs after Treasury mid-quarter refundings, particularly when the new issues are not well distributed to investors.

Conclusion

The use of RPs as a major financing vehicle is likely to continue to expand during the forseeable future, with a sizable increase in the volume of RPs outstanding and a broadening of the types of assets used as collateral. In coming years, the move toward a more complete globalization of securities markets and the associated growth in trading activity will further enhance the demand for flexible financing arrangements. This is likely to be associated with further efforts to clarify the rights of repo counterparties in written agreements and the expanded use of triparty agreements and other segregation arrangements.

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THE AGRICULTURAL OUTLOOK FOR 1987 . . . Financial Turnaround Unlikely

Raymond E. Owens

After a mediocre 1986, the outlook for agriculture this year promises only a slight improvement in income and further declines in asset values for the nation's farmers. For crop producers, large harvests worldwide continue to depress market prices and limit export opportunities; and although lower energy and interest expenses will likely lessen production costs, the incomes of crop farmers will remain heavily dependent on federal crop support payments. Livestock producers, however, should enjoy wider margins due to low grain prices and relatively strong demand. Lower energy and interest expenses will likely lessen production costs, although overall financial conditions in agriculture will probably continue to weaken.

The United States Department of Agriculture (USDA) held its annual Outlook Conference in December. Aware of continuing problems in agriculture, analysts at the conference discussed current conditions in this sector and outlined their expectations for this year. A consensus of their assessments of agriculture's performance in 1986 and their forecasts for 1987 are summarized below, following a brief review of the behavior of agricultural exports and the features of current federal farm programs.

I. FOREIGN TRADE AND DOMESTIC AGRICULTURAL POLICY

The present condition of the agricultural sector has been greatly affected by trade developments and domestic agricultural policy. In many ways these two influences are difficult to separate, so intertwined are their effects on one another, but an effort at such a separation is made here.

Exports

As agricultural exports from the United States increased in the 1970s through early 1980s, domestic crop producers became more dependent on world developments. A combination of factors caused domestic exports to increase, including higher earnings and greater access to credit by foreign nations and more emphasis on improving their diets. As a result, the rest of the world came to rely on the United States-the holder of a major portion of the world's available grain reserves-for its purchases. Increased exports reduced domestic carryover stocks and boosted grain prices and the incomes of American farmers.

Farmers increased their investments in land and equipment on the premise that the strong world demand would continue. In recent years, however, world demand has grown less rapidly than anticipated while world production has exceeded expectations. Both developments lowered foreign demand for U.S. agricultural goods. Underlying these general developments are three primary factors pressuring agricultural exports.

First, increased foreign supplies have partly displaced U.S. exports. The annual growth rate of agricultural production abroad increased from 2.2 percent in the 1970s to 2.6 percent in the 1980s.

A second factor has been slow economic growth worldwide. Growth slowdowns have effectively reduced real incomes in many nations, lowering the growth rates of food consumption in these nations. Worldwide growth in demand dropped sharply, falling from an average yearly increase of 34 million tons of grain in the 1970s to 19 million tons in the 1980s. A third factor is the decreased availability of foreign exchange to foreign nations that purchase U.S. goods. With the higher interest rates that prevailed in the early 1980s, many nations in debt found more of their foreign exchange committed to debt service, leaving less available for imports.

Domestic agricultural policy may have hampered exports as well. Federal price supports in the early 1980s priced domestic grain well above prevailing world prices. Also, increased availability of grain from other nations allowed importing countries to buy on a least cost basis in the world market. That relatively expensive domestic grain supplies faced cheaper foreign substitutes undoubtedly contributed to decreased exports.

Agricultural Policy

The U.S. Food Security Act of 1985, usually referred to as the Farm Bill, has two primary objectives-to support the income levels of American farmers and to reduce the surpluses of many agricultural commodities. These objectives conflict, as the efforts to support farm incomes tend to encourage more production and accumulation of surplus commodities. Policymakers at USDA have at-

tempted to reduce the conflict by offering farmers price subsidies only in exchange for limiting commodity production.

In the crop sector, attempts to limit production have generally taken the form of acreage reduction programs (ARPs). Under these programs, farmers who agree to limit planted acreage of eligible crops and place the removed acreage in an approved conservation use for one year become eligible to receive nonrecourse loans and deficiency payments from the Commodity Credit Corporation (CCC).[1] Participation in ARPs was strong in 1986. Preliminary estimates by USDA indicate that 45 million acres were removed from crop production under the program.

In an effort to reduce dairy production, the Dairy Termination Program (DTP) was enacted in 1986. Under the terms of this program, dairy farmers agreed to sell their dairy cows and remove their dairy facilities from production for 5 years in exchange for a lump sum payment from USDA. USDA accepted a substantial number of these offers. About 14,000 dairy farmers participated in the program, receiving $1.8 billion and sending 1.5 million head of dairy cows to market in 1986. Of the total payment, about one-third is being paid from an assessment against all dairy producers and two-thirds by USDA.

In addition to limiting production, USDA is trying to expand the export of commodities by using federal loan guarantees. Under this plan, credit extended to foreign purchasers is guaranteed by the federal government. A second export program is that embodied in U.S. Public Law 480. This program, which has been in effect a number of years, authorizes government-held food stocks to be transferred to "deserving" nations. The transfers can occur by direct donation, or by United States-backed credit purchases.

Federal farm programs also provide credit to some farmers and rural areas. Under the Farmers Home Administration, for example, qualified farmers may receive farm ownership and operating loans, emergency disaster loans, and loan buydowns. In addition, rural communities are eligible for rural housing and community development grants. Loans must be repaid, of course, but the terms of these loans are usually favorable compared to the private financial market alternatives.

[1] Eligible producers are allowed to borrow from the Commodity Credit Corporation using their crops as collateral. Should producers choose not to repay these loans, ownership of the crop is passed to the CCC. Eligible producers may also receive direct government payments called deficiency payments which are based on crop production allowed under the program.

II. A REVIEW OF THE AGRICULTURAL SECTOR IN 1986

Entering 1986, analysts were guardedly optimistic that the policy changes embodied in the 1985 Farm Bill, together with a declining dollar exchange rate, would encourage stronger exports. However, real export volume was apparently little changed in 1986, and with prices lower than in 1985, the nominal balance of agricultural trade continued to deteriorate. In the absence of improved export earnings, farm income continued to be dominated by government support payments and by continued efforts to reduce production costs. The value of farm land fell further in 1986, though generally not quite as rapidly as in 1985. Agricultural lenders continued to experience stress, but as the year progressed there were some signs that conditions were steadying.

Agricultural Trade Remains Sluggish

Despite a lower foreign exchange value of the dollar and export incentive programs, the agricultural trade balance deteriorated sharply in 1986. The value of exports was sharply lower, falling to $26.3 billion, almost $5 billion less than in 1985. Import value increased about $1 billion, largely due to higher coffee prices. In light of these changes, the agricultural trade balance registered a surplus of only $5.5 billion, less than half the level of a year earlier. Since peaking at $26.5 billion in 1981, the agricultural trade surplus has trended downward, due primarily to lower exports.

Farm Income Measures Mixed

Agricultural policy and sluggish exports were important determinants of farm income in 1986. Table I shows cash receipts from farm marketings were sharply lower in 1986, falling 7 percent to $138 billion, Responsible for the decline was the fall in crop cash receipts which, including the net change in CCC loans, decreased over $10.7 billion dollars. Lower crop cash receipts resulted in part from farm policy initiatives which acted to lower production, and from lower market prices.

Livestock cash receipts were higher in 1986 as strong demand helped boost prices and the DTP encouraged cattle marketings. Increased direct government payments helped soften the impact of lower crop cash receipts to farmers. Direct payments totaled $12 billion in 1986, up sharply from the $7.7 billion of 1984. Higher crop deficiency payments accounted for most of the increase.

Reduced plantings, lower livestock inventories, and lower input prices contributed to a 5 percent drop in expenses over 1985. Total expenses including some noncash categories fell to $129 billion, the lowest level since 1979.

Table I

FARM INCOME STATISTICS

(Billion dollars)

	Item	1980	1981	1982	1983	1984	1985	1986F	1987F
1.	Farm receipts	142.0	144.1	147.1	140.9	146.4	148.5	138	130
	Crops (incl. net CCC loans)	71.7	72.5	72.4	67.0	69.2	72.7	62	58
	Livestock	68.0	69.2	70.2	69.5	72.9	69.4	71	71
	Farm related[1]	2.3	2.5	4.5	4.4	4.3	6.4	5	5
2.	Direct Government payments	1.3	1.9	3.5	9.3	8.4	7.7	12	16
	Cash payments	1.3	1.9	3.5	4.1	4.0	7.6	8	9
	Value of PIK commodities	0.0	0.0	0.0	5.2	4.5	0.1	4	7
3.	Total gross farm income (4+5+6)	149.3	166.3	163.4	152.4	174.4	166.6	158	156
4.	Gross cash income[2] (1+2)	143.3	146.0	150.6	150.2	154.9	156.2	150	150
5.	Nonmoney income[3]	12.3	13.8	14.1	13.2	13.3	11.5	10	9
6.	Value of inventory change	−6.3	6.5	−1.3	−10.9	6.3	−1.1	−3	−3
7.	Cash expenses[4]	109.1	113.2	113.8	113.0	115.6	112.1	106	103
8.	Total expenses	133.1	139.4	140.7	139.5	141.7	136.1	129	124
9.	Net cash income (4−7)	34.2	32.8	36.8	37.1	39.3	44.0	44	47
10.	Net farm income (3−8)	16.1	26.9	22.7	13.0	32.7	30.5	29	32
	Deflated (1982$)	18.8	28.6	22.7	12.5	30.3	27.3	26	27
11.	Off-farm income	34.7	35.8	36.4	37.0	37.9	40.8	43	44
	Loan changes[5]:								
12.	Real estate	9.3	9.4	4.0	2.5	−0.8	−5.6	−5	−3
13.	Non-real estate	5.9	6.2	3.4	1.0	−0.8	−9.2	−6	−3
14.	Rental income plus monetary change	6.1	6.4	6.4	5.7	7.8	8.0	7	7
15.	Capital expenditures[5]	18.0	16.8	13.7	13.0	12.5	10.1	8	7
16.	Net cash flow (9+12+13+14−15)	37.5	37.9	37.0	33.3	33.0	27.1	32	41

F = midpoint of forecast range.
[1] Income from machine hire, custom work, sales of forest products, and other misc. cash sources.
[2] Numbers in parentheses indicate the combination of items required to calculate a given item.
[3] Value of home consumption of self-produced food and imputed gross rental value of farm dwellings.
[4] Excludes capital consumption, prerequisites to hired labor, and farm household expenses.
[5] Excludes farm households.

Note: Totals may not add due to rounding.

Source: U.S. Department of Agriculture, Economic Research Service.

The net cash income received by farmers totaled $44 billion in 1986, unchanged over the previous year as lower cash receipts were almost exactly offset by higher government payments and decreased expenses. The 1986 cash income level, though not the highest on record, is above the average levels of the early 1980s.

The Balance Sheet Deteriorates

As shown in Table II, farm assets totaled an estimated $702 billion in 1986, a 9 percent drop from the previous year. As in most years, the change in asset values was primarily due to the change in the value of farmland. Farmland asset values fell 9.8 percent, accounting for $55.6 billion of the total asset value decrease of $69.4 billion. Weak market conditions and uncertainties about the long-run prospects for government support continues. As economist Emanuel Melichar at the Federal Reserve Board has pointed out, however, lower farm debt has partially resulted from the transfer of farmland from heavily-indebted operators to financial institutions and less-indebted farmers through foreclosure and other actions.

The value of non-real estate farm assets also fell sharply in 1986, to $198 billion, a decrease of 6.5 percent. Machinery and motor vehicles accounted for $3.2 billion of the decrease, as sluggish replacement rates pushed farm equipment numbers down and the average age up. Crops in storage fell $7.1 billion in value, due primarily to lower values of corn and wheat.

Farm liabilities also decreased in 1986, although much less than the drop in asset values. Real estate debt showed the largest fall, decreasing $8.3 billion to $89 billion (Table II). The declines were due to the repayment of loans and the write-off of loans by lenders. Non-real estate loans totaled $87 billion at the end of 1986, 8.2 percent below the level of 1985. The volume of Commodity Credit Corporation (CCC) loans rose over 12 percent to $19 billion due to low grain prices.

Farm equity decreased 9.2 percent in 1986, falling to $526 billion. That was the sixth consecutive decline, with the 1986 level the lowest on record in nominal terms since 1976, and as low as the levels of the late 1960s when adjusted for inflation.

Table II

BALANCE SHEET OF THE U. S. FARMING SECTOR

(Billion dollars)

Item	1980	1981	1982	1983	1984	1985	1986F	1987F
Assets								
Real estate[1]	779.2	780.2	745.6	736.1	639.6	559.6	504	468
Non-real estate	224.0	225.0	232.2	220.4	216.5	211.9	198	195
Livestock and poultry	60.6	53.5	53.0	49.7	49.6	45.9	45	48
Machinery and motor vehicles	96.8	103.0	103.7	100.9	95.0	92.2	89	86
Crops stored	36.5	36.1	40.6	33.2	33.7	37.1	30	27
Financial assets	30.1	32.4	34.9	36.5	38.1	36.7	34	34
Total farm assets	1,003.2	1,005.2	977.8	956.5	856.1	771.4	702	663
Liabilities								
Real estate	87.9	97.2	101.2	103.7	102.9	97.3	89	86
Non-real estate	82.5	91.6	102.4	98.7	95.8	94.8	87	79
CCC loans	5.0	8.0	15.4	10.8	8.7	16.9	19	13
Other non-real estate	77.5	83.6	87.0	87.9	87.1	77.9	68	65
Total farm liabilities	170.4	188.8	203.6	202.4	198.7	192.1	176	165
Total farm equity	832.9	816.4	774.2	754.0	657.3	579.3	526	498
				Percent				
Selected ratios								
Debt-to-assets	17.0	18.8	20.8	21.2	23.2	24.9	25.1	24.9
Debt-to-equity	19.7	22.3	25.1	25.6	28.6	31.0	NA	NA
Debt-to-net cash income	497.7	576.1	553.0	545.5	505.8	436.2	NA	NA

[1] Excludes farm household.

F = midpoint of forecast range.

NA = Not available.

Source: U. S. Department of Agriculture, Economic Research Service.

Farm Credit Stabilizes

Farm credit conditions were steadier in 1986. Total debt shrank, both in the real estate and non-real estate categories. Several factors depressed debt levels including debt write-offs at financial institutions, debt paydowns by farmers with strong cash positions, and lower operating debt requirements of farmers participating in federal ARP programs.

Interest rates on farm loans fell sharply. According to the Federal Reserve's quarterly survey of the terms of bank lending, the rate of interest on non-real estate loans at commercial banks averaged 10.8 percent in November 1986, 4 percentage points below that reported in August of 1984, the most recent peak.

Farm loan delinquencies and chargeoffs at agricultural banks showed signs of stabilization in 1986. Although chargeoffs as a percentage of the total loans outstanding increased slightly in 1986 compared to 1985, delinquency rates appear to have peaked early in the year and then declined by year-end to a level below that of late 1985. In the fourth quarter, loan chargeoffs at agricultural banks also were down from a year earlier.

III. PROSPECTS IN 1987

Lower production expenses and large federal outlays will influence farm income again in 1987. Low market prices projected for crops in 1987 should increase USDA program participation, with a total of 65 to 70 million acres expected to be removed from production. This level of acreage reduction would be second only to that achieved in 1983 under the payment-in-kind program.

More emphasis will be placed on the longer-term retirement of land in 1987. This will be accomplished through the Conservation Resource Program (CRP). The CRP is similar to the ARP, but applies to highly erodible land and is effective for a lo-year term. Farmland enrolled under this program is expected to total 15 million acres but should impact little on crop supplies in 1987 as much of this land is of low productivity. A larger impact can be expected if enrollment grows to 40 million acres as expected by 1990.

If planted acreage is reduced by the amount currently projected in 1987, less farm production inputs will be required, further reducing production costs. Large participation would also increase government payments.

Cash Receipts May Fall Slightly

Total cash receipts for 1987 are expected to fall slightly to $130 billion, as crop prices and production continue to decline. Crop cash receipts, including net CCC loans, are projected to total $58 billion in 1987, $4 billion below 1986. Total livestock cash receipts will likely remain unchanged, at $71 billion, as higher production offsets generally lower prices.

Forecasters anticipate that increased farmer participation in federal programs and the carryover of payments owed from 1986 programs will increase government. payments in 1987.[2] Direct government payments may add $16 billion to farm income in 1987, up from the $12 billion paid in 1986.

Total production expenses are projected to fall about 4 percent this year. Production expenses for the crop sector will fall due to lower planted acreage, as well as to lower prices of seed, fuel, fertilizer and other inputs. Large reductions in planted acreage are anticipated as low market prices will encourage farmers to participate in government ARPs.[3]

Net farm income is forecast to rise in 1987 in nominal and real terms. The projected $32 billion of net income will represent an increase of $3 billion over the 1986 figure. Measured in 1982 dollars, net farm income in 1987 will increase by $1 billion, **but** will still fall short of incomes received in 1984 and 1985.

Farm Balance Sheet May Deteriorate Further

Despite a slight improvement in income, farmers' net worth will likely decrease by the close of 1987. Farm asset values will be generally weaker as the future income prospects remain uncertain. While higher farm income is expected in 1987, this income remains dependent on government payments. Uncertainty surrounding the continued receipt of high levels of direct government payments combined with weakness in the outlook for agricultural exports have made many potential farmland buyers wary of future farm income prospects. Weaker farm asset values have resulted.

The value of farm assets may fall another 5.5 percent in 1987, totaling $663 billion. As in 1986, a large part of the decrease is expected to be a result of lower farm real estate values. Non-real estate asset values may also fall slightly.

Liabilities will likely come down in 1987 with lower non-real estate debt accounting for most of the decrease. Total liabilities shown in Table II should decline by $11 billion, to $165 billion.

Farm equity will likely fall by $28 billion to a level of $498 billion in 1987, making it more difficult for farmers

[2] Many USDA programs operate on a fiscal year or some other basis that does not correspond to a calendar year. Because of this, a calendar year could reflect overlapping payments from government programs.

[3] Government programs provide price supports to farmers in exchange for reduced plantings by farmers. When crop prices fall, participation in government programs usually rises as more farmers opt to receive higher government payments and agree to reduce production.

to borrow as their collateral shrinks. Thus, although lower interest rates have made debt service more affordable, shrinking equity has made credit expansion more difficult.

As shown in Table II, the debt-to-asset ratio, which had been rising for eight years, topped 25 percent in 1986 but is expected to fall to 24.9 percent in 1987-a level equal to that of 1985. A projected decrease in this key ratio is a welcome sign to the agricultural sector as it may reflect emerging stability in the equity position of farmers.

Trade Outlook Should Be Slightly Brighter

The dollar value of agricultural exports is not likely to rise in 1987. Lower domestic prices and a weaker dollar may push the quantity of exports up slightly from 1986 but the adverse revenue consequences of price weakness will likely outweigh any quantity increases, possibly lowering the value of exports from 1986's $26.3 billion to the $26 billion range.

Imports are expected to fall to $20 billion in 1987, a decrease of $900 million from 1986. The decline, due chiefly to lower coffee prices, would be the first in four years.

The agricultural trade surplus should widen slightly to $6 billion in 1987. Though improved from 1986's $5.5 billion, the trade surplus remains well below the peak level of $26.5 billion achieved in 1981. The continued low level of exports and relatively high level of imports holds little promise for reducing United States' grain stocks in the near term. It is encouraging, however, that the agricultural trade balance is now stabilizing after trending sharply downward during the early 1980s.

IV. COMMODITY OUTLOOK

Commodity analysts attending the Outlook Conference discussed market conditions surrounding individual agricultural commodities in 1986 and expectations for 1987. A summary of their comments for some of the major commodities produced in the Fifth District is presented below.

Hogs

Low feed prices and strong retail pork demand widened margins considerably for pork producers in 1986. Nevertheless, total pork production fell about 6 percent from the previous year. Analysts normally expect high margins to quickly translate into increased hog production, but many pork producers are in poor financial condition due to weak profits over the last few years and this is limiting expansion ability. Analysts do expect moderate production increases to occur late in 1987 or early in 1988, however. For 1987, total commercial pork production is expected to total 13.8 billion pounds, 1 percent less than in 1986. Slaughter should be down about 5 to 7 percent in the first two quarters of the year as breeding stocks are held back and high returns encourage producers to overfeed. Strong production gains should appear in the second half of the year.

Cattle

Large supplies of competing meats, a reduction in dairy herd liquidations, and retention of breeding animals are likely to limit cattle production in 1987. Large poultry supplies are likely to constrain consumer demand for beef in 1987. At the start of the year cattle numbers were 4 percent below year earlier levels. Although overall slaughter rates were up 1 percent in late 1986, the slaughter of cows was down 6 percent and heifer slaughter was down 8 percent from a year earlier as producers began retaining breeding stock.

Total beef production will likely fall 5 to 7 percent in 1987, with the sharpest declines in cow slaughter. A tighter supply will help boost prices, with feedlot finished cattle rising to the $60s per hundredweight by spring. Further price increases will be difficult because of the abundance of competing meat supplies.

Poultry and Eggs

Higher production of poultry and eggs is projected in 1987. Low feed costs should widen margins to producers and boost output even in light of anticipated lower prices. Broiler production was 4.7 percent higher in 1986, with bird slaughter up 3.9 percent and slaughter weights 1.2 percent above 1985 levels.

Broiler production should increase about 6 percent this year, encouraged by higher prices of meat substitutes and additional demand arising from fast food outlets. Foreign demand for broilers was up sharply in 1986, and is expected to remain at those levels in 1987.

Turkey production rose 12 percent in 1986 with favorable margins encouraging expansion by producers. Large stocks of frozen turkeys on hand in addition to anticipated increases in production will likely lead to lower prices. Prices could be down as much as 6 cents per pound, probably ranging from 59 to 65 cents per pound in the first half of the year, then rising to 70 to 75 cents per pound in the second half as the holidays boost demand.

Egg production is expected to rise 1 percent in 1987 after increasing sharply in 1986. Producers may retain older laying hens longer as low feed costs provide wider margins. Average price per dozen eggs is expected to fall about 1 to 5 cents in 1987.

Tobacco

Production was sharply lower in 1986, down about 21 percent compared to the previous year. Additionally, carryover stocks were somewhat lower, reducing total supply about 8 percent, to 5 billion pounds. Lower prices prevailed despite lower supplies partly because quality was lower and partly because exports decreased.

Production should increase in 1987 as the effective production quota for tobacco increases by 5 percent. Prices should hold at their 1986 levels as normal weather increases quality and domestic consumption offsets declines in export demand.

Corn

Domestic usage is stagnant and export prospects are weak for corn in 1986/87. Usage expanded 20 million bushels in 1986/87 compared to normal annual growth of 80 to 100 million bushels. Exports for 1986/87 fell 9 percent, totaling 1.13 billion bushels. As a result, carryover stocks are at record levels, 5.8 billion bushels in 1986/87-surpassing the previous record of 4 billion bushels.

Corn prices have fallen 35 percent since the beginning of the 1986/87 marketing year. For 1986/87, corn prices are expected to average between $1.35 and $1.65 per bushel.

V.
FOOD PRICES

As a final note, the paragraphs below review food prices for 1986 and present the outlook for 1987.

Modest increase in 1986...

Food prices rose only 3.1 percent in 1986, at about the same annual rate as over the last four years. The modest increase was the result of small increases in the components that influence food prices. Lower farm price supports limited the increases in the prices of many farm products. Lower inflation limited increases in both processing and transportation cost. Modest economic growth fostered a slightly lower unemployment rate and somewhat higher disposable income level causing strengthened consumer demand. Although the rise in the general level of food prices was modest, individual food categories exhibited a broad range of price changes.

Red meats and poultry showed stronger price increases than did food overall. Beef and veal prices fell over the first 5 months of 1986 as large supplies kept downward pressure on prices. Over the second half of 1986, beef liquidations eased and prices adjusted upward. But the yearly average price of beef rose less than 1 percent in 1986. Pork prices rose 7.5 percent in 1986 as production and stocks remained low throughout the year. Because buyers switched to cheaper substitutes, poultry benefited from increasing prices of beef and pork. Poultry also benefited from wider usage at fast food chains. Poultry supplies were reduced somewhat by extreme heat in the Southeast, which diminished weight gains and fertility rates. Retail poultry prices rose 6.4 percent in 1986. Demand for fish and seafood was strong in 1986 as domestic consumption reached a record high. This component of food prices showed the strongest gain in 1986, rising 9 percent.

The prices of dairy products were unchanged in 1986 as attempts to reduce surpluses did not affect consume] prices. The Dairy Termination Program (DTP) reduced dairy cow herds but not enough to raise prices of milk and other dairy products in 1986.

Cereal and vegetables showed only slight price increases in 1986. Grain supplies were abundant because the domestic harvest was large and export sales relatively small. The resulting lower grain prices had only a small impact on the cost of cereal and bakery products because processing and marketing costs dominate the retail price:. Cereal and bakery product prices rose about 3 percent in 1986.

Fresh fruit and vegetable supplies were higher in 1986. Citrus production was strong as trees damaged by cold weather several years ago began to recover. Vegetable price increases were dampened by a large potato harvest in late 1985, leading to large supplies carried over into 1986. Fresh fruit prices rose 2.3 percent and vegetable prices 3 percent in 1986. Processed fruit prices were down 2.9 percent in 1986 due to lower frozen orange juice prices. Processed vegetable prices were unchanged.

... And Again in 1987

For 1987, food prices are again expected to increase about 3 percent. As was the case in 1986, stronger price increases will likely occur in food consumed away from home while price increases in food consumed at home will be more modest.

The farm value of meats is again expected to exceed increases in grain and vegetable prices in 1987. Beef and pork prices are expected to rise 5 and 4 percent, respectively, as supplies are expected to be below 1986 levels. Rapid expansion of poultry production should lead to slightly lower prices at the retail level.

Strong consumer demand for fish and seafood will likely continue in 1987, driving prices up another 7 to 10 percent. The prices of imported foods, especially coffee, should rise only moderately, averaging 1 percent higher.

The prices of dairy foods are expected to be unchanged to slightly higher. Supplies are expected to be

little changed despite dairy herd reductions. Fruit prices will probably remain level, while vegetable prices are projected to rise 7 to 10 percent. A smaller supply of potatoes and vegetables is expected in 1987 as producers reportedly intend to reduce acreage planted. With low inflation and low grain prices expected, cereal product prices should rise only modestly.

Consumer demand for food should be slightly higher in 1987 if economic growth is somewhat stronger than in 1986. Such demand expansion would place some upward pressure on prices. On the other hand, a continued low rate of inflation would limit upward price movements in the labor, processing, packaging, and distribution components of retail food cost.