

Research Department  
Federal Reserve  
Bank of  
San Francisco

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## In the CHIPS

The global market for dollars has created the need for an efficient mechanism to transfer dollar funds among banks throughout the world. The banking system now transfers about \$130 billion every day, with New York City banks handling nearly 90 percent of all such transactions. These interbank payments employ a little-known electronic funds-transfer (EFT) system called CHIPS: the Clearing House Interbank Payments System. The history and operation of CHIPS illustrate the prospects and challenges that lie ahead for financial institutions and their regulators as EFT systems evolve further.

### Clearing house functions

The evolution of funds-transfer mechanisms like CHIPS can be traced to the changing nature and volume of payments activity. Simple transactions—such as the transfer of funds between two local parties who use the same bank—do not require elaborate mechanisms for effecting payment. Party A simply writes a check on its account at the bank, and when party B presents the check for payment at the same bank, the account of A is debited and the account of B is credited.

If the parties have different banks, however, the transaction involves an interbank exchange of funds. This requires communication between the parties' banks to provide the accounting information needed to record the transaction (part of the process called "clearing") and to provide some means of finalizing (or "settling") the obligations of one bank to the other. As an economy grows and the number of banks increases, this type of transaction increases in frequency.

In the early days of banking, clearing and settling involved direct exchanges of objects between banks. Messengers carried checks back and forth between individual banks, and those banks settled the obligations created by such drafts by the physical movement of gold or bank-note assets. As the

number of banks grew, the amount of interbank communication rose sharply, and "clearing houses" came into being to simplify the process. By providing all banks with central meeting places, clearing houses streamlined the check clearing and settlement processes considerably.

As the volume of transactions grew further, the clearing-house functions of check clearing and settlement frequently became lagged processes: banks would post each day's transactions to their own books at an agreed-upon time, but would delay settlement by a day because of the difficulty of immediately satisfying the net settlement obligations to all other banks. (Until each transaction is settled, the proceeds cannot be used in any domestic transactions outside the clearing house, although they can be used internally.) Moreover, over time, the settlement of transactions through the exchange of gold and bank notes gave way to the exchange of other forms of "good funds," mainly Federal Reserve and correspondent balances.

### Evolution of CHIPS

CHIPS is owned and operated by one such clearing house—the New York Clearing House Association (NYCHA). NYCHA has been in existence since 1853 to service interbank transactions for New York banks. As a focal point for many domestic and international transactions, the New York banks have always generated a substantial volume of interbank transactions. Prior to 1971, the clearing house handled these transactions in the traditional manner—exchanging paper checks at the clearing house and effecting settlement the next day by a transfer of reserve balances.

But in view of New York's prominence as an international-banking center, and in view of the growing activity in Eurodollar and foreign-exchange markets in the late sixties, the New York banks eventually found themselves with

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an expanded volume of international dollar transfers. The old paper process of clearing and settling dollar payments presented an increasing number of problems. First, the old system created severe "back room" problems for banks, because of the sheer volume of paper that had to be handled to initiate a transfer of funds for their customers. Payment instructions had to be typed, official checks had to be written, and messengers had to be dispatched to the clearing house. The process was cumbersome and costly.

Second, the manual payments system apparently created problems of risk management. For example, a customer often asks a bank to initiate a payment on his behalf before the customer has "covered" the transfer with good funds in his account. As long as cover is received before the check is dispatched to the clearing house, the bank's exposure is minimized; however, the bank may decide to take the risk that the cover will be received by the settlement time (the next day), which means initiating the transfer without cover and carrying the customer overnight. Permitting an overnight overdraft of a customer's account is a potentially important credit decision which becomes difficult to make amid the paperwork and time pressures involved in manual clearing-house procedures.

In response to these problems, NYCHA initiated CHIPS in 1971, utilizing a small computer and 42 terminals located in the clearing-house banks. Through a system of account-identification numbers, CHIPS permitted complete payment instructions to be exchanged electronically between the two banks involved in any transfer, and in the process eliminated the former paper media. The system grew rapidly, especially after 1974, when CHIPS installed more computer capacity and extended associate membership to the agencies and branches of foreign banks and New York Edge Act corporations. Today CHIPS has over 90 members, and has experienced peak volumes of nearly \$200 billion, compared to about \$4 billion daily in its first year of operation.

### **Operation of CHIPS**

Modern technology has made possible the rapid growth of CHIPS' payments activity. The CHIPS computer operates on a "store and release" basis. A bank making a payment on behalf of one of its customers simply provides the CHIPS computer with payment instructions, including assigned account-identification numbers. The computer stores this information until an authorized person at the bank approves the release of the message to the receiving bank. This relieves the account officer of some of the decision-making pressures involved in payment authorizations for transactions that have not yet been covered.

The CHIPS computer also performs the basic accounting functions required for clearing and settlement. At the end of each day, CHIPS nets out the debits and credits to members' accounts that occurred during the day, and composes the settlement obligations for each bank. Actual settlement occurs the next day at 10:00 a.m. If the bank is an associate member of CHIPS, it typically settles through a correspondent account at one of 14 "settling" member banks which acts as its sponsor. (These 14 banks are the 12 large members of NYCHA plus two Edge corporations of non-New York banks.) The "settling" members exchange reserve balances at the Federal Reserve Bank of New York to achieve settlement. (Recent rule changes open the door for all CHIPS members to settle directly at the Fed if they have an account there.)

### **Payments systems and risk**

Credit risk arises in all payments mechanisms because banks often implicitly extend credit in order to facilitate transactions for their customers. In the context of CHIPS, for example, a bank may initiate a payment on behalf of a customer anticipating receipt of "cover" (from the customer) by the settlement hour. If the bank fails to receive the cover, however, it must incur the expense of disentangling itself from the transaction. The failure to receive cover may occur for a number of reasons, including the financial

collapse of a customer or a bank in the transactions link. A serious problem of this sort arose in 1974, with the sudden demise of the Herstatt Bank of Germany.

This type of risk is not peculiar to CHIPS. However, other potential problems may occur under CHIPS settlement procedures. That process, for example, involves a "netting" of the settlement obligations of a CHIPS participant within its account at a settlement bank. Despite obvious accounting advantages, this procedure makes the settlement accounts of the various participants highly interdependent. If one participant is unable to obtain funds for settlement by the settlement hour, this can affect the net obligations of many other participants and cause a chain of settlement problems, with the settling members probably bearing the ultimate credit risk. CHIPS employs a number of procedures to control such problems, including a set of rules for "unwinding" transactions if a participant is unable to obtain funds for settlement, but potential difficulty may remain.

The convention of next-day settlement may also contribute to credit risk within the system. Most other domestic and European payments systems use a same-day settlement convention: transfers are made in immediately available "good funds." Thus the risk associated with uncovered transfers does not extend overnight. It is debatable, however, that the resultant reduction in settlement lag would reduce overall risk. But clearly, moving to same-day settlement imposes additional operating costs on participants because banks have less time to make adjustments to errors in their CHIPS transactions and their settlement positions. NYCHA is currently studying these and other factors involved in a conversion of CHIPS to same-day settlement.

#### Other EFT issues

NYCHA's experience with CHIPS serves to illustrate other factors that arise in EFT operation. One such consideration is the competitiveness (or lack of competitiveness)

of the payments marketplace. Because EFT systems generally display considerable economies to scale, single suppliers can often serve entire markets economically. (CHIPS, for example, handles virtually all of the New York banks' interbank transfers of dollars.) Banking institutions—and their regulators—are concerned that such technological imperatives may lead to anticompetitive behavior on the part of providers of EFT services.

Another consideration involves the risks to the "safety" of the banking system posed by the existence of private settlement mechanisms. Under CHIPS, for example, NYCHA members perform settlement services for smaller CHIPS participants through debiting and crediting of correspondent balances, rather than through transactions with Federal Reserve banks.

This is an attractive feature for those users who do not have Federal Reserve bank accounts. In addition, this feature reduces the amount of Federal Reserve processing required. Some observers of the EFT industry fear, however, that such private settlement devices make the health of the payments mechanism overly dependent upon the health of the settling institutions.

Despite these challenges, CHIPS illustrates EFT's great potential for improving the efficiency of financial markets, by expanding the range of services available to financial institutions, their customers, and the general public. As a result, CHIPS-like systems are likely to evolve to perform payments functions in other markets.

**Randall Pozdena**

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**BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT**

(Dollar amounts in millions)

Selected Assets and Liabilities	Amount Outstanding	Change from	Change from	
			Dollar	Percent
<b>Large Commercial Banks</b>	<b>5/7/80</b>	<b>4/30/80</b>		
Loans (gross, adjusted) and investments*	137,699	- 695	+ 11,483	+ 9.1
Loans (gross, adjusted) — total#	116,041	- 649	+ 12,860	+ 12.5
Commercial and industrial	33,390	- 359	+ 2,510	+ 8.1
Real estate	46,132	+ 53	+ 8,979	+ 24.2
Loans to individuals	24,133	- 181	+ 2,353	+ 10.8
Securities loans	1,139	+ 16	- 522	- 31.4
U.S. Treasury securities*	6,357	- 34	- 1,463	- 18.7
Other securities*	15,301	- 12	+ 86	+ 0.6
Demand deposits — total#	42,904	-1,017	+ 2,105	+ 5.2
Demand deposits — adjusted	30,456	- 629	+ 129	+ 0.4
Savings deposits — total	26,066	+ 162	- 3,640	- 12.3
Time deposits — total#	64,943	+ 426	+ 14,892	+ 29.8
Individuals, part. & corp.	55,919	+ 309	+ 15,201	+ 37.3
(Large negotiable CD's)	23,369	+ 144	+ 6,212	+ 36.2
<b>Weekly Averages of Daily Figures</b>	<b>Week ended 5/7/80</b>	<b>Week ended 4/30/80</b>	<b>Comparable year-ago period</b>	
<b>Member Bank Reserve Position</b>				
Excess Reserves (+)/Deficiency (-)	295	331		17
Borrowings	34	88		90
Net free reserves (+)/Net borrowed(-)	261	243		- 73

\* Excludes trading account securities.

# Includes items not shown separately.

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