

**ELECTRONIC  
FUNDS  
TRANSFER  
SYSTEMS**

**FEDERAL RESERVE BANK OF CLEVELAND  
ANNUAL REPORT 1977**

**To Member Banks in the Fourth Federal Reserve District:**

*We are pleased to present the 1977 Annual Report of the Federal Reserve Bank of Cleveland. This year's report reviews the growth of electronic funds transfer systems and the contributions of the Fourth District to the advancement of EFT.*

*In the last several years the financial markets have undergone considerable structural change. Automation and electronic payments systems have often been at the forefront of these changes. In some parts of the payments mechanism, these changes have been adopted at a rapid pace. In others, the process of adoption and implementation is still at an early stage. The introduction of these new ways to transfer funds has altered more than the technological methods of payments. It has blurred the traditional distinctions among financial institutions, and it has changed their competitive roles. This report considers the effects of EFT on the evolving payments mechanism and financial sector, and it describes the types of systems that have been adopted to facilitate business, retail, and government transactions.*

*It is particularly appropriate that our Annual Report feature the story of EFT. The Federal Reserve has a vital interest in the maintenance of a strong and efficient payments mechanism, and the Fourth District has been in the vanguard of payment system automation. Its banks have introduced automated payments systems. The District's automated clearinghouses, among the first established in the country, have participated in a pilot program to clear automated transactions nationally. Last year the 4 automated clearinghouses in this District processed nearly 6 million commercial and Federal transactions.*

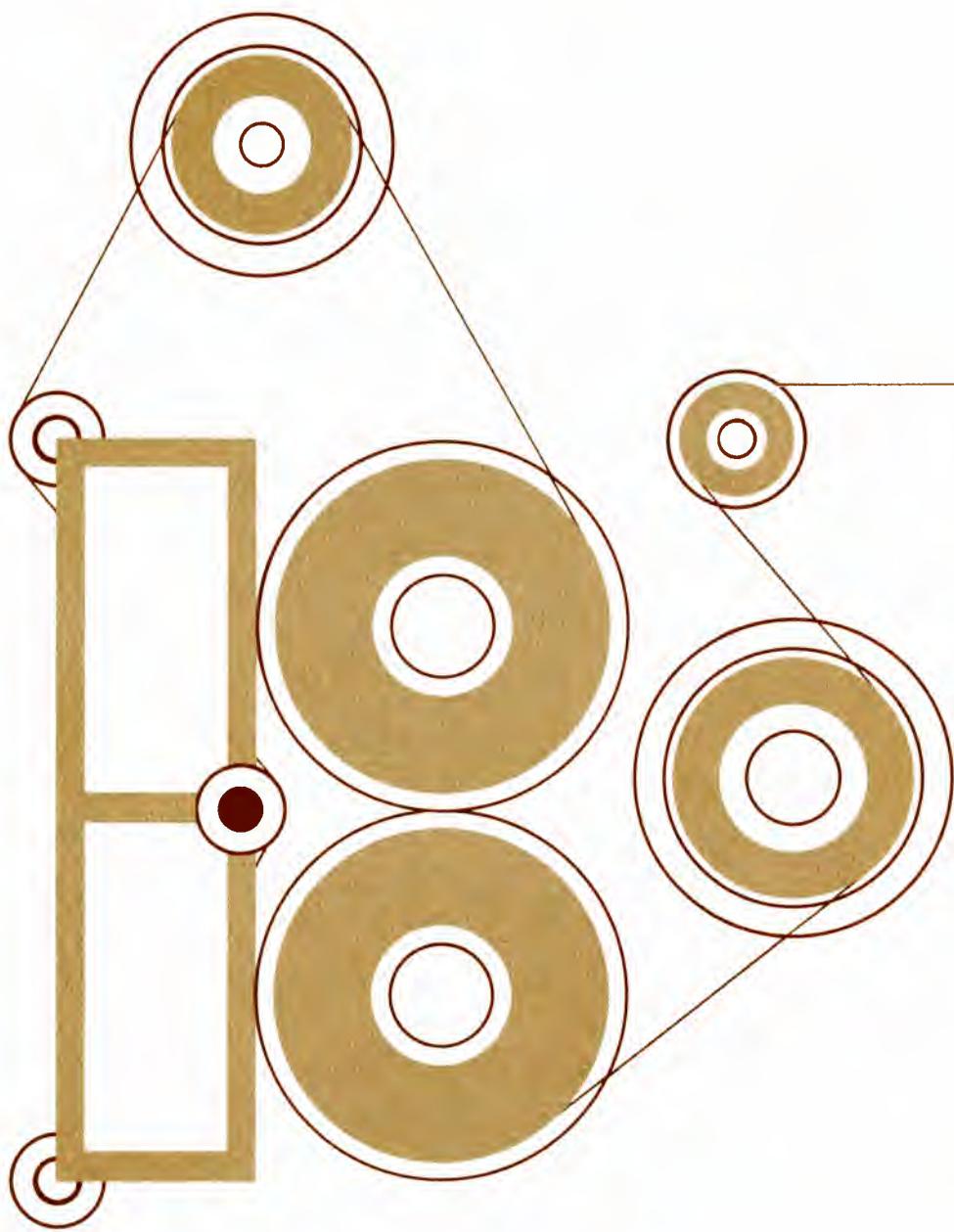
*We would like to take this opportunity to thank the member banks, the directors, and the officers and staff of this Bank whose support enabled us to carry out our commitments last year. We ask for your continued assistance in accomplishing the responsibilities of this Bank.*



**Robert E. Kirby**  
Chairman of the Board



**Willis J. Winn**  
President



# ELECTRONIC FUNDS TRANSFER SYSTEMS

E. J. Stevens

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## Origins

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EFT—Electronic Funds Transfer—includes a wide variety of new developments in the payments industry. To some it means a system to replace checks, cash, and credit card vouchers with a nationwide network of computer-linked terminals that instantaneously keep track of each penny spent everywhere. To others it simply means getting cash out of a machine. EFT is a worldwide phenomenon, further advanced in some other industrialized nations than it is in this country.<sup>1</sup> In one way or another EFT refers to the application of computer and telecommunication technology in making or processing payments.

Electronic communication has been used in making payments since the introduction of the telegraph in the 1840s. The addition of computers has made EFT possible. Financial institutions began to turn to computerized information storage and retrieval techniques after World War II to manage their massive accounting and recordkeeping needs. Blending communication and computer technologies into remote access computer networks now allows financial institutions to form true electronic payment systems that link payers with payees and their respective accounts.

Rising costs in paper-based payment systems stimulated interest in EFT. The noted authority on the payment system, George Mitchell, foretold much of current EFT activity in his 1965 description of the cost-saving and marketing opportunities that computer technology made available to the banking industry.<sup>2</sup> Two major research efforts, by the Stanford Research Institute in 1966 and the Bank Administration Institute in 1969, estimated the savings that could be realized by replacing checks with a nationwide commercial bank electronic payments system.<sup>3</sup> In the early 1970s the Atlanta Payments

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<sup>1</sup>See *Proceedings of International Payments Symposium*, National Commission on Electronic Fund Transfers, June 1977.

<sup>2</sup>George W. Mitchell, "Effects of Automation on the Structure and Functioning of Banking," *American Economic Review* 56 (May 1966): 159–66.

<sup>3</sup>See *A Techno-Economic Study of Methods of Improving the Payments Mechanism* (Menlo Park, California: Stanford Research Institute, 1966) and *An Electronic Network for Interbank Payment Communications: A Design Study* (Park Ridge, Illinois: Bank Administration Institute, 1969).

Project made more refined cost estimates for new electronic systems and existing paper-based systems by investigation of specific electronic systems designed for different kinds of payment needs.<sup>4</sup> By this time, automated teller machines were operating at several banks, payment terminals had been used in a small number of stores, and, in 1972, the first automated clearinghouse for paperless payments began operating in California.

EFT has provided a new means of competition not contemplated when the existing regulatory structure of financial markets was developed. Banks have used electronic networks to provide nationwide payment services to their corporate customers even though regulation restricts bank offices to local or state market areas. Thrift institutions have offered retail payment services to savings account customers using telephone transfers and electronic terminals in stores, although most state regulation prohibits thrifts from check payment services. Banks, thrifts, and retail establishments are using terminal systems to compete for customers through more convenient access to deposit and credit accounts.

The Federal government's role in the financial system has also fostered development of EFT systems. The Federal Reserve has relied on new computer and telecommunication technology to reduce costs and to improve its traditional cash, check processing, and wire-transfer services, and to operate automated clearinghouses. The Treasury has initiated its own checkless recurring payments program.

In 1974, Congress created the National Commission on Electronic Fund Transfers to undertake a comprehensive review of EFT. Four major considerations emerged from the review. Recognizing that EFT is an evolutionary concept in its early stages, the Commission held that no comprehensive policies could be adopted now that would satisfy the needs of future EFT development. Second, the Commission concluded that EFT should be developed in a competitive environment free of unnecessary regulation. Third, the Commission found that, even though EFT provides alternative payment systems, those systems will not immediately replace existing ones. Finally, the Commission concluded that EFT could not realize its potential unless it was permitted to

develop to meet consumer needs.<sup>5</sup>

EFT has emerged from a technological possibility to a growing, if ill-defined, force creating institutional change. Initially conceived as a nationwide replacement for paper documents in the banking system, EFT has evolved into a wide variety of innovations introduced by banks, thrifts and retail institutions that are changing the way payments are made and the traditional structure of the market for financial services.

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<sup>4</sup>See *Research on Improvements of the Payments Mechanism: The Final Report on Phase I—An Analysis of Payments Transactions and Phase II—Payments Flow Data*, 3 vols. (Atlanta: Prepared for the Federal Reserve Bank of Atlanta by Georgia Tech Research Institute, Georgia Institute of Technology, 1971); *Research on Improvements of the Payments Mechanism: Phase III—General Systems Design and Analysis of an Electronic Funds Transfer System*, 6 vols. (Atlanta: Prepared for the Federal Reserve Bank of Atlanta by Atlanta Payments Project, Georgia Institute of Technology, 1972); and *Phase IV—A Technical, Marketing, Organizational and Cost Evaluation of a Point-of-Sale Terminal System*, 5 vols. (Atlanta: Prepared for The Committee on Paperless Entries by the Atlanta Payments Project, 1973).

<sup>5</sup>See *EFT in the United States: Policy Recommendations and the Public Interest* (Washington, D. C.: National Commission on EFT, 1977).

## How ACH and POS Transactions Are Made

In an ACH transaction, a payer—for example, a business preparing a payroll or an individual paying a bill—can send a payment instruction directly to his bank rather than to the payee. The paying bank then makes a single magnetic tape file containing the payment orders of all its customers and forwards the file to the ACH. The ACH computer sorts incoming files from all paying banks and creates outgoing tape files for receiving banks. Then the ACH delivers the files containing payees' account numbers and payment amounts. The process follows a precise time pattern so that payments are credited to payees' accounts and debited to payers' accounts on a prearranged schedule.

Another ACH service handles recurring bill payments on a preauthorized basis. The billing company—for example, a public utility collecting monthly budget payments—initiates the collection through its own bank rather than the payer's. Its bank makes a magnetic tape file of payers' banks, account numbers, and payment amounts and sends the tape to the ACH. Again, the ACH computer sorts incoming tapes and creates outgoing tape files which the ACH delivers to the paying banks.

A typical POS system transfers funds between accounts at a single deposit institution on the basis of information keyed into computer files from a POS terminal. A clerk accepts a payment or deposit or completes a cash withdrawal for customers with accounts at the institution operating the service. Thus, a typical POS system functions as a network of retail tellers who use the retailer's account and cash as the vehicle for customer transactions.

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## The Variety of EFT Services

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EFT services are used for retail, business, and government payments in the United States. Each group uses two kinds of service. True EFT systems substitute electronic payment instructions for cash, checks, credit card vouchers, or manual wire transfers. Quasi-EFT systems provide some form of computer/telecommunication service to facilitate payments that still retain a paper document as the actual payment instrument.

### RETAIL SYSTEMS

Individuals make and receive payments through two kinds of true EFT systems: Automated Clearing Houses (ACHs) and Point-of-Sale (POS) networks. An ACH processes batched payments, while POS systems are designed for single payments.

Thirty-two commercial ACHs now blanket most of the nation with facilities to accommodate individual and business initiated local payments. Federal Reserve Banks provide computer processing facilities for all but one ACH and distribute ACH files using existing Federal Reserve check courier and bulk data communication facilities.

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Thirty-one retail POS systems operated in local areas in the United States in 1976. An additional 19 projects provided some combination of POS and check authorization/guarantee services.

Computer and telecommunications technology is also being used in various quasi-EFT systems. Electronic networks provide check and credit card authorization and guarantee services. One type uses a toll-free telephone call to verify that a credit card account is not on a centralized bad-card list. Another provides a check-guarantee card to participating customers and access to computerized verification files for retailers. A third, in conjunction with POS services, verifies that an account has sufficient funds to cover a check and, in some cases, places a "hold" on funds to cover that check. And a number of regional and nationwide retail chains use terminal systems to authorize credit extensions and to update both customers' accounts and inventory records directly from POS terminals.

Two types of telephone transfer service can initiate payments. In less sophisticated form, an employee of the deposit institution records payment instructions. The institution debits accounts and prepares a single check for each payee, consolidating the amounts paid by individual payers. Through a more sophisticated system, customers use touch-tone phones to enter account numbers and amounts to be paid directly to computer terminals from which deposit accounts are updated and checks prepared.

Automated teller machines at financial institutions and retail locations facilitate the use of cash and checks. Customers can withdraw cash from their accounts by inserting a plastic identification card and keying in a personal identification number. More frequently, extended service machines complete cash withdrawals, deposits, account balance inquiries, bill payments, and transfers among a customer's accounts. Transactions entered directly into computerized account systems give customers access to cash and other financial transactions 24 hours a day rather than only during business hours.

The list of quasi-EFT systems extends further. Many deposit institutions use on-line terminals for customer account information and updating at teller stations.<sup>6</sup> Credit-card purchase information is trans-

ferred electronically for long-distance clearing to eliminate transportation of vouchers.

## FEDERAL GOVERNMENT PAYMENTS

The Federal government increasingly has replaced checks with payments through ACH facilities. Payments are credited to recipients' accounts on a predetermined day, eliminating mail delivery or deposit of checks. The Treasury records transaction information on magnetic tape files. Federal Reserve Banks then sort the files by geographic area and receiving institution, distribute files to local areas, and deliver payments to receiving institutions using the Federal Reserve's transportation and communication networks. The service currently is offered to recipients of several kinds of Social Security payments; railroad, civil service, and Veterans Administration retirement payments; Air Force payroll and retirement payments; and revenue-sharing payments. Eventually, all recipients of Treasury payments will be able to use the service.

Treasury checks themselves are processed by a unique quasi-EFT system. Many are truncated at the Federal Reserve Bank to which they are presented for collection. Information on the checks is recorded on magnetic tape and routed to the Treasury for account reconciliation. Microfilm copies of the checks also are returned to the Treasury, while the checks are stored at regional storage centers.

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<sup>6</sup>"On-line" is used to refer to interactive computer systems in which a message initiated at a terminal is followed promptly by a response from a host computer and, in some cases, messages to other terminals.

## BUSINESS PAYMENTS

EFT systems have emerged as indispensable means of payment among businesses, especially for international and national money market transactions that have for many years relied on manually operated telephone and telegraph facilities for rapid transfers of funds.

CHIPS (Clearing House Interbank Payments System) began on-line operation in 1970 and now handles interbank money transfers among 75 U. S. and foreign banks in New York City. Telephone lines link terminal computers of participating banks to a central computer system at the New York Clearing House. The System eliminates paper check preparation, messenger delivery, and manual input into bank accounting systems for payments that must be completed in a critically short time span. Computer name and address files for frequently used accounts facilitate input of information about transactions by identity codes. Terminal computers or magnetic tapes from the clearinghouse are the links to banks' computerized accounting systems. Next-day settlement for transfers is performed through the reserve deposit accounts of New York banks that are Federal Reserve members. Daily transfers total over \$75 billion for 45,000 to 50,000 payment messages.

The Federal Reserve communication system, Fed Wire, transfers funds among reserve deposit accounts of member banks, for banks' own accounts or indirectly for third parties. The current service links 379 on-line member banks through 37 Federal Reserve Bank offices via a central computer switch in Culpeper, Virginia. Member banks that are not on-line use the service by telephone or wire instruction to a Federal Reserve office. On-line banks accounted for an estimated 90 percent of the 58,000 daily transfers totaling over \$80 billion daily in 1976.

Quasi-EFT systems are also important for business payments. This category includes Bank Wire and SWIFT (Society for Worldwide Interbank Funds Transfer) and Fed Wire when used in the off-line mode. Bank Wire originated in 1952 as a wire transfer service for some New York and Chicago banks. Currently, 194 banks throughout the country use the cooperative message-switching service operated by

Western Union. Prescribed message formats and codes for Bank Wire participants simplify message transmission and provide more security than ordinary telex transmission. Bank Wire enables an originating bank to transfer funds on deposit at another bank to the account of a third party.<sup>7</sup> SWIFT, linking over 500 banks around the world, offers a similar service through an on-line message-switching network.

Computerized cash management and lock-box reporting networks represent an important quasi-EFT service for large regional, national, and international corporations. Businesses receiving numerous recurring payments from customers over a wide geographical area use lock-box systems to accelerate and to control receipts. Rather than mailing payments to a central location, customers send payments directly to local post office boxes where local banks pick up the checks, enter them in the local check-collection system, and gather accounts-receivable information. Lock-box banks use a telecommunication network to provide information about collected balances to a centralized office that consolidates funds into a disbursement account by wire transfers or paper drafts drawn on the local banks.

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<sup>7</sup>Bank Wire II is the planned successor to the existing Bank Wire and will be operated by Collins Radio. It is expected to be an on-line system offering single message and bulk data transfer, value-dating, and net settlement for member banks on the books of the Federal Reserve.

## EFT IN THE FOURTH DISTRICT

Fourth District financial institutions and the Federal Reserve Bank have earned a reputation for being alert to the advantages of automation and EFT in the payments system. One of the very first experimental POS systems, providing valuable market testing of the concept of paperless retail payment, was operated by a member bank in the Columbus area in 1971. Since then most retail EFT development in the District has emphasized automated teller machines (ATMs). A recent survey shows that 70 ATM systems are now operated by 63 commercial banks and 7 thrift institutions.\* Commercial banks also operate 12 authorization/guarantee and 7 telephone transfer systems. Thrift institutions are involved in an additional 2 POS and 8 telephone transfer systems. All of these systems combined operate almost 800 terminals and processed over 1,600,000 transactions last year.

Automated clearing houses in the District were among the first 10 ACHs operating in the country. Even before the recent national pilot project for inter-ACH exchanges of payments, District ACHs were exchanging payments to provide customers with the advantages of larger geographical coverage. The District's ACHs were among the 7 participants in the national pilot program for inter-ACH payments.

During 1977 the District's 4 ACHs processed 1.5 million commercial transactions and 4.4 million Federal payments. These amounted to 5.8 percent of all ACH payments made nationally. While commercial payments represented 12 percent of all ACH transactions for the nation, such payments in the District represented 25 percent of all ACH transactions. This relative success of Fourth District ACHs in commercial transactions may be attributed in part to the early linkage of the 4 ACHs. Last year 200,000 transactions were made among these facilities.

Both Fed Wire and Bank Wire are actively used by District commercial banks. Eighteen banks use Bank Wire, and 27 of the 460 District member banks are on-line users of Fed Wire. The number of on-line and off-line Fed Wire payments was almost 1,300,000 at the main office and branches last year.

The Federal Reserve Bank of Cleveland has itself been a pioneer in payment system automation. Prototype high speed check-sorting equipment was tested in the Cleveland office in the early 1970s. The communication links for District inter-ACH payments were put in place in 1975. And the Data Systems Support staff of this Bank had a major role in developing the computer software to generate the ACH national pilot program.

\*Also, 4 out-of-District credit unions use a computer center in Dayton to operate their ATMs.

Corporations can use office terminals to gain access to their banks' corporate cash management networks. Services include balance and account activity information, a terminal-based means of making intracorporate funds transfers, and additional information features such as interest- and exchange-rate quotations. On-line and telephone inquiry customers rely on these bank or third-party-operated networks to collect information from all of a corporation's banks, including lock-box banks handling receipts.

## How Widespread is EFT?

Payments are made with cash, checks, credit cards, and a variety of EFT services in the United States. A comparison of the number and value of the major kinds of non-cash payments made in the country suggests the extent to which payments are made or facilitated by EFT systems.<sup>8</sup> True EFT systems have made significant inroads on the number and value of business and Treasury payments, but not retail payments. Discussion of EFT tends to focus on retail systems, especially POS, and creates an inaccurate impression that EFT is a fledgling innovation with an uncertain future. A broader view—one that includes business and Treasury payments and quasi-EFT systems—corrects this impression.

Private retail payments account for over 96 percent of the number of non-cash payments made in the United States, but only about 4 percent of the dollar value. These relatively small payments primarily involve consumer purchases, bill payments, and income receipts. Checks and credit cards dominate in this category, dwarfing ACH and POS payments (Table 1).

Commercial ACHs handled about 12 million retail payments last year and the 31 standard POS systems about 3 million payments in 1976. These EFT systems together currently comprise about 1/20 of one percent of the number and 2/10 of one percent of the value of all retail payments.

The number of payments made on true EFT systems is a conservative measure of the use of EFT for retail payments. The number of authorization/guarantee inquiries and automated telephone and teller machine transactions is easily 10 times greater than the number of retail ACH and POS transactions (Table 2). In addition, proprietary POS credit systems of major retailers and electronic clearing of vouchers in some bank credit card systems suggest even more widespread EFT use. Nevertheless, it is clear that true EFT payment systems process only a tiny portion of the enormous number of retail payments.

**Table 1**

**PAYMENTS IN THE UNITED STATES**  
Approximate Number and Value  
in 1976–1977\*

	Number (millions) <u>per year</u>	Value (billions) <u>per year</u>
<b>Retail Payments:</b>		
Check	27,720	\$ 2,106
Credit card	5,000	71
Bank card	1,103	33
Other	3,897	38
ACH	12	3
POS	3	0.1
<b>U. S. Treasury:</b>		
Check	768	400
ACH	89	23
<b>Business:</b>		
Check	280	8,424
Wire: off-line		
Bank Wire	2	5,100
Fed Wire	1	2,040
Wire: On-line		
CHIPS	12	19,200
Fed Wire	11	18,530

\*For sources, see Appendix.

<sup>8</sup>Cash payments are not included in the comparison because little is known about them. According to an Arthur D. Little study "The number of cash transactions conducted annually is difficult to measure, but we estimate over 200 billion (well over 80 percent of all payment transactions) of which the majority are for less than \$1." See *The Consequences of EFT* (Cambridge, Mass: Arthur D. Little, Inc., 1975), p. 7.

The U. S. Treasury makes almost 3 percent of the annual number of non-cash payments in the country. Over 10 percent of these Federal payments are channeled through ACH facilities and account for 5 percent of the value of Federal payments. In addition, it is expected that all Treasury checks will be truncated at Federal Reserve Banks by the end of 1978.

Automated on-line systems among banks now play a key role in business payments, although large checks and drafts represent over 90 percent of the number of business payments. CHIPS and on-line Fed Wire carry 7 percent of business payments. However, the two systems account for over 70 percent of the value of business payments.

Quasi-EFT systems are also an important component of business payment systems. Bank Wire and off-line Fed Wire carry about the same number of messages as retail POS systems, but account for about 14 percent of the value of business payments. In addition, many large nonfinancial corporations are adopting on-line links to their banks for cash management purposes.

True EFT payments represent less than 1 percent of the number of all non-cash payments made annually in the United States, but they include 68 percent of the value of all these payments because of the enormous sums transferred on business EFT systems. Quasi-EFT systems, some of which may be precursors of true EFT systems, play an even more pervasive role in processing payments.

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## Adopting EFT

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Payments are a means of buying things, not a direct source of enjoyment in themselves. Therefore, users—payers and payees—are only likely to adopt new ways of making payments that are cheaper or more convenient. Similarly, producers would only invest in new payment services that are expected to be profitable through cost control or market development.

Table 2

### QUASI-EFT: RETAIL

	Number of Systems <u>1976</u>	Number of Transfers of Inquiries (millions per year) <u></u>
Automated Telephone Transfer*	20	3
Check/Credit Card Authorization-Guarantee	40**	103
Automated Teller Machines	195	58

\*Excludes teller-assisted telephone transfer.

\*\*This includes 19 systems offering a combination of POS transfer and CA/G service, but excludes proprietary POS credit authorization systems.

Source: Peat, Marwick, Mitchell & Co., "Summary of Data on Major Terminal Based Electronic Funds Transfer Projects in the U. S.," March 1977, NCEFT IWD 37.

Differences in the rate of adoption of EFT systems have been significant. As previously indicated, about 10 percent of business and U. S. Treasury payments but less than 1 percent of retail payments are made on true EFT systems. The lag in adoption of EFT for retail payments is largely the effect of two differences between retail and business or Treasury EFT systems. One difference is in the time, effort, and cost involved in organizing a sufficient number of payers and payees to create a usable payments system. New organizations have had to be created for retail payments, whereas existing organizations have been the basis for business and Treasury payments. The other difference is in the gain that users and producers can expect to realize by shifting payments to new systems. Business payments are for relatively large amounts and therefore provide more incentive for a relatively small number of users to incur the operating costs of an additional payment system. In addition, traditional cash, check, and credit card payments are frequently priced in such a way as to obscure the benefit of retail EFT to some users.

## ORGANIZATION

Organization of payers and payees is a way of dealing with interdependence in payments. Payers and payees are interdependent because both must agree on a means of payment and because the advantage of adopting a new means of payment may depend on the number of other users.

Organization of payment systems takes a variety of forms. For example, governments enforce acceptability of cash to settle debts by defining legal tender. Private clearinghouses are organizations of banks that make check payments more acceptable by standardization of clearing and settlement procedures.

The early success of on-line Fed Wire was due in part to the action of the Federal Reserve, as an organization of member bank users, that eliminated interdependence as an impediment to on-line use of Fed Wire. Even when a bank becomes an on-line user it can still make and receive payments from all other Federal Reserve member banks, on-line or off-line, because Federal Reserve Banks transfer messages

between the two modes of transmission. Once an on-line communication system was available for Fed Wire, therefore, a single bank could convert to on-line use unilaterally whenever its volume and cost made the investment worthwhile. Within this framework no new organization or new collective action was required.

Initial CHIPS participants previously were organized as members of the New York Clearing House Association. The CHIPS network accommodated international payments messages among a readily identifiable small group of domestic and foreign banks that had a large daily recurring volume of payments flowing among them. The initial decision to create the CHIPS system required collective action, but the Clearing House organization already existed to provide a vehicle for that action.

Retail POS systems have proved more difficult to organize. In addition, at least for the foreseeable future, POS systems will not eliminate cash, checks, and credit cards. Adoption of a POS system will not supplant present systems and their operating costs. Payers and payees therefore must decide whether investment in an additional means of payment can be justified, and that decision will depend on the number of other users who adopt the system.

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Retail POS systems have not been developed by preexisting organizations of banks, and in fact, the antitrust interpretation of such organizations is uncertain. Development of POS systems must bring together a large number of participants with recurring needs to pay one another. This involves identification of locations where both a retailer and substantial number of consumers have a deposit relationship with the deposit institution that installs the terminal system. A single deposit institution in a competitive market is unlikely to have a substantial base of both retailer and consumer depositors. But without a substantial base, low daily volume of transactions makes it difficult for producers and retailers to justify investment in an additional means of payment.

*Developing a Customer Base*—POS developers are exploring various strategies to build the necessary customer base. One means is to identify retailers who serve a sizable number of depositors of a financial institution. Another is to develop a deposit relationship with the customers of particular retailers. The expectation has been that by installing a POS facility in heavily trafficked retail locations—frequently a chain of supermarkets—customers would open a deposit account to take advantage of the POS facility serving that retailer. EFT thus becomes an innovative service marketed to enlarge the customer base for EFT and other financial services.

A variant of this strategy is reflected in widespread nervousness among financial institutions that one of the large general merchandise retailers might develop a deposit-like account, either directly or by affiliation with a deposit institution. These retailers already use POS terminals to manage their proprietary credit relationships with a very large customer base. A deposit-like relation that could be used to make payments to others could provide a serious challenge to the market shares of traditional deposit institutions.

The customer base for POS systems also could be increased without changing consumer deposit relationships through retailer affiliation with several systems. Credit cards provide an example. An independent retailer can affiliate with several credit card companies to assure that all cardholders can charge purchases. Similarly, retailers could hold accounts at

a number of institutions with independent POS networks. This has raised the specter of merchants being forced to install a different terminal for each network and has spurred development of a common terminal that could serve all networks and standardization of customer identification devices.

An alternative strategy would organize consumers and retailers in a common POS network shared by a number of deposit institutions. The network could be developed by a special organization like a credit card association or by a deposit institution that markets participation to other institutions. But an organization for sharing presents problems. If a shared system becomes successful, must it admit latecomers who have avoided some of the initial costs? A shared system might welcome latecomers as a means of expanding the customer base. But if not, or if the terms for entrance were prohibitive, what alternative would latecomers have? Some states have enacted legislation that requires statewide sharing. But the Justice Department has objected to mandatory sharing because it might preclude competition among systems before sufficient experience with POS has been gained to determine the feasibility of competitive systems.<sup>9</sup>

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<sup>9</sup>For a useful discussion of sharing see *EFT in U. S.*, pp. 91–101.

In the case of ACHs, the Treasury has surmounted the problem of interdependence more readily than have private users. The Treasury is the only payer whose bank has a nationwide network of branches, the 12 Federal Reserve Banks and their 36 branches and other offices. The Treasury is the common focal point for convincing agency administrators to make required changes in payment procedures and to obtain authorizations from employees, retirees, and beneficiaries for ACH payments. While ACH payments have not eliminated the Treasury's need to prepare and to reconcile paper checks, they have replaced enough checks to make them efficient additional means of payment for the Treasury.

Commercial ACH programs rely on voluntary associations of deposit institutions to direct the organization of payment recipients and thousands of individual payers. The relatively small initial scale of ACH payments within each payer's organization discourages many payers from using an ACH. Firms that already provide a direct deposit arrangement are most likely to be able to justify the cost. For others, the cost of an additional payment system operating in tandem with their cash or check systems may be difficult to justify until a relatively large portion of payments can be routed through an ACH. An additional constraint on ACH payments will soon be eliminated. In the past, commercial ACH use has been confined largely to payments within the geographical area defined by each of the 32 ACHs. Nationwide ACH payments are becoming possible as the Federal Reserve implements inter-ACH clearing and settlement of commercial payments.

Organizing interdependent participants into new payment systems has been easier in some EFT applications than in others. Business systems evolved from preexisting organizations of a limited number of potential users. Treasury ACH benefited from ease of administration and unlimited geographical coverage. But retail POS and ACH systems have had to define and organize potential users in local areas in order to develop systems.

## GAINS FOR USERS

Gains from increased efficiency of EFT systems are scattered among all the participants in the

payment process. Because of the way payments traditionally have been priced, some key participants may not be able to identify a gain from adopting EFT. In particular, prohibition of interest on demand deposits has supported the banking practice of providing payment services which are priced implicitly and indirectly. Businesses and consumers have less incentive to adopt ACH or POS payments because cash, check, and credit card payments carry no explicit price.

*Business Systems*—Users have adopted business EFT systems because on-line systems reduce their costs of monitoring and controlling the progress of large value payments during a banking day.<sup>10</sup> On-line business payments have a very high dollar value per payment and per user (Table 3). To control float and assure timely delivery, such payments traditionally have been made by wire and messenger-delivered check.<sup>11</sup> Banks that send and receive hundreds of these transfers daily found that the possibility of lost transfers was significant when the messages were received by telephone or telegraph, noted by a clerk,

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<sup>10</sup>One frequently cited reason for the spread of on-line Fed Wire is that the service is free. This is not precisely true. Access to Fed Wire is available only to banks that become members of the Federal Reserve System, and membership is not free. There is a charge of \$1.50 per message for small-value payments; there is no charge for large-value payments regardless of whether the member bank is an on-line or off-line user. Thus, there is no pricing incentive to become an on-line user; users must bear all development and operating costs of on-line use at their end of the telecommunication line. Further, CHIPS, accounting for half of business terminal-based EFT payments, is not provided free. Users bear the entire resource cost of the system, allocated on a per-message basis.

<sup>11</sup>The value of one day's interest on the average \$1,700,000 Fed Wire transfer is \$232.88 at an interest rate of 5 percent.

**Table 3**  
**ACTIVITY IN PAYMENT SYSTEMS IN THE UNITED STATES**  
**(1976–1977)**

	<u>Number of End Points or Accounts</u>	<u>Number of Transactions per Account or End Point per Day</u>	<u>Value of Average Transaction per Account or End Point per Day</u>	<u>Value per Transaction</u>
<b>1. Bank Credit Cards</b>				
Merchant Outlets	3,284,444	1.3	\$ 39	\$29.92
Active Card Holders	33,956,308	0.1	1	\$9.75
<b>2. ACH</b>				
Private Payers	4,402	10.8	2,800	\$260
U. S. Treasury Paying	1	353,288	92,000,000	\$260
Receiving	7,418,833	0.05	13	\$260
<b>3. Retail Terminal</b>				
POS	718	16.6	497	\$29.92
Authorization/Guarantee	7,412	55.4	n.a.*	
Automated Teller Machine	2,197	104.8	n.a.	
Automated Telephone Transfer	65,975	0.2	n.a.	
<b>4. Business</b>				
Fed Wire				
On-line	379	138	235,000,000	\$1,700,000
Off-line	5,321	1.04	1,800,000	\$1,700,000
CHIPS	75	635	1,000,000,000	\$1,600,000
Bank Wire	194	61	104,000,000	\$1,700,000

\*n.a. — Not available.  
For sources, see Appendix.

and manually processed. Corporate financial officers and bankers alike have been frustrated by the difficulty and expense of finding lost payments in this manual system. Therefore, banks spend more than a million dollars a year for CHIPS and plan to pay an estimated 60 cents per message for the proposed Bank Wire II system.

*Retail Systems: POS*— Retail POS systems currently process only about \$500 per merchant terminal daily as compared to almost \$200 million daily for the average on-line Fed Wire user and \$1 billion daily for the average CHIPS user. Assurance of timely payment through a POS system is of little value when a day's interest, at 5 percent, totals only four-tenths of 1 cent for the average transaction and 7 cents for an average day's payments on a terminal. A POS user would have to benefit from some other feature of the system.

Another benefit might be lower resource costs of producing POS payments, reflected in lower prices to users. Of course, POS systems may not currently operate at lower resource costs. Because most POS systems are new and in large part experimental, it is difficult to evaluate their costs. Still, the cost per transaction on some of these systems has been notoriously high, ranging from \$1.07 to \$3.90 in those surveyed by the NCEFT. On the other hand, analysis of cost data submitted to the NCEFT for 20 retail terminal systems suggested that a POS project would provide a competitive return on investment if revenues or cost savings of 15 cents per transaction could be realized. That is, 15 cents per transaction was an estimate of full operating costs for a POS system.<sup>12</sup> This finding differs from the actual cost experience of POS systems in that actual volume has averaged only about 17 payments per terminal per day (Table 3), while the analysis assumed daily volume of 100 payments per terminal. However, even if producers expected high-volume POS systems to operate at lower resource costs than other payment systems, some users still might not have an incentive to adopt POS.

Retailers might see attractive payment alternatives in POS systems. Automated systems could reduce the costs of processing payments and losses

from bad checks and credit cards. Retailers could receive funds faster through same-day or next-day credit for POS transactions. Reduced bank costs for processing POS payments rather than checks and credit card vouchers should be reflected in reduced compensating balance requirements and merchant discounts that would provide an incentive to adopt the lower cost system.

Many consumers would not see the same incentives to adopt POS systems because of the way cash, checks, and credit cards are priced. Free or low-priced checking services are used to attract customers because banks cannot pay interest on checking account balances. In addition, check payments are only deducted from an account when the check has cleared, providing float to the payer. This float is valuable to a consumer who can take advantage of any interest-bearing or interest-saving alternative for the duration of the float.

The value of consumer check processing and float is substantial, costing the banking system about \$7 billion a year for 27.7 billion retail checks.<sup>13</sup> The average individual with "free checking" would receive a value of about \$50 yearly for 15 checks each month that had an average amount of \$76. This value is realized if an account user avoids all account charges and values float at 5 percent.

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<sup>12</sup>See Russell D. Morris, "Cost and Revenue Requirements of POS Systems," NCEFT Internal Working Document No. 43 (May 1977).

<sup>13</sup>Cost is based on 25-cents processing cost per check plus two-day float on payments of \$2 trillion.

The value of consumer credit card processing and float is also significant. A few card issuers levy an annual fee, but in general no per-item charges are involved. Neither is float priced. Interest begins to accrue on unpaid balances many days after transactions take place. Credit card processing and float have a value of about \$700 million in the two major bank card systems.<sup>14</sup> An average bank credit cardholder receives a value of about \$21 per card each year.

Pricing POS services so that consumers would have some incentive to substitute them for check and credit card payments has been handled in several ways in initial POS projects. The convenience of POS has been emphasized, and terminals have been installed in supermarkets where float is a minimal advantage. POS services have been offered on interest-bearing accounts, distinguishing them from checks drawn on noninterest-bearing accounts. And a few deposit institutions have offered a 1- or 2-percent discount on the monthly value of purchases paid for by POS direct debit to customers' accounts. In general, however, it has been difficult to price POS services to make them visibly cheaper than free checks and credit card payments.

*Retail Systems: ACH*—Gains from ACH payments have been harder to realize for retail users than for the Treasury. The Treasury can realize the net sum of gains and losses accruing to the government as payer, as the paying bank, as check-clearing agency, and as ACH operator. Private ACH users find these gains and losses distributed among the corporation arranging payments, its bank, the Federal Reserve Banks, and other banks involved in the check collection process. ACH computer processing and transportation have been provided without charge by the Federal Reserve. But this component of ACH costs is too small to assure the economic feasibility of ACH payments for corporations and banks, in part because the Federal Reserve also provides check-collection services without charge.<sup>15</sup> In addition, the distribution of check payment costs among corporations, their customers, and various banks may be quite different from the distribution of ACH costs. Some redistribution of gains and losses through ACH pricing may be necessary to promote adoption.<sup>16</sup>

Adoption of true EFT payment systems reflects the gains available to users. Business on-line systems create efficiencies from improved control of the flow of large-value payments. The Treasury has been able to realize reduced processing costs by using ACH payments rather than checks. Adoption has been slower in retail payments. Gains from ACH and POS systems can be identified and may be realized by some users and by producers when high volume is achieved. But other users may not have adequate incentive to adopt EFT systems until pricing practices in the payment industry change and payments that are cheaper to produce can show a lower price to users.

## GAINS FOR PRODUCERS

Adoption of retail ACH and POS payments has lagged, and costs have been high. Still, banks, thrift institutions, and independent producers are investing in retail EFT services.

Retail EFT services may yield immediate gains to producers. ACH service or a retail terminal system may attract users who have no deposit accounts or

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<sup>14</sup>Cost is based on 50-cents processing costs per item plus 30-day float valued at 5 percent. Processing cost estimates are reported in "The Economics of the Payments System—1976," Division of Federal Reserve Bank Operations, Board of Governors of the Federal Reserve System, 1977.

<sup>15</sup>Federal Reserve costs represent about 10 percent of the total cost of processing a check and of processing a Treasury ACH payment.

<sup>16</sup>ACH pricing is currently being discussed by the National Automated Clearing House Association. See NACHA *Quarterly Update* (January 1977), pp. 7–8.

who might shift account relationships. The possibility of capturing recipients' accounts for new Treasury and commercial direct-deposit programs has probably been an important factor spurring ACH participation. Some POS system developers expected to reap a larger market share from shoppers attracted by the new payment alternative, although experience frequently has proved disappointing. Also, electronic networks may reduce costs even when they provide only quasi-EFT services that do not actually connect retail payers and payees. Automated teller machines (ATMs), for example, can reduce the volume of "on-us" checks cashed over-the-counter and written to cover loan payments, thereby eliminating costly processing.

Nevertheless, high costs and low volume in present EFT retail systems suggest that investment decisions are being based on expectations of profitability over a longer period. Entrepreneurs may expect much more intensive reliance on EFT systems in 10 to 20 years. This expectation can be supported by the fact that business and Treasury systems already are secure within the payment mechanism. Furthermore, the declining cost of technology is likely to promote additional EFT development. An institution may decide to develop EFT services now rather than wait and react to the innovations of competitors. Technical and marketing systems can be "debugged;" personnel and organizational development for an electronic future can be initiated; market positions can be molded by developing customer habits and account relationships. This long-run developmental view in part explains the variety of POS strategies for organizing payers and payees and the growing number of true and quasi-EFT systems being introduced for retail payments.

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## The Future Environment for EFT

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Market forces have promoted EFT. Experimental introduction and competitive reaction will continue to guide investments in EFT systems, but subject to two important environmental influences: changes in regulation and in technology.

## REGULATION

Deposit and asset specialties of banks and thrift institutions defined by national chartering and regulatory agencies in the 1930s limited the institutional "territory" within which deposit institutions would compete. Banks would issue payment accounts and thrifts would not. But thrifts have acquired NOW account powers in New England and offer similar non-interest-bearing accounts in a few other states. They can offer interest-bearing electronic payment accounts everywhere. Commercial banks can offer interest-bearing telephone payment accounts, but their ability to offer electronic payment accounts is otherwise restricted by branching regulations that do not apply to thrifts and by the prohibition of interest on demand deposits.

*Branching*—Electronic payment instructions replace customers' trips to the bank. An ACH can be a substitute for maintaining a banking office convenient to people receiving paychecks or government income payments. Because POS terminals or ATMs can substitute for banking offices, terminals might be subject to the same regulations as branches.

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In 1974 the Comptroller of the Currency ruled that branch applications were *not* required for national banks that establish terminals. But, two years later, the Supreme Court let stand a lower court ruling that, in effect, a terminal *is* a branch. Many states have legislated that terminals are *not* branches. But the Supreme Court in 1969 held that Congress intended national and state banks to compete on equal terms with respect to branching, thereby requiring national banks to follow state bank branching regulation.

Unlike commercial banks, federal savings and loans and credit unions are not subject to such uncertain branching regulations. Therefore, the branch-terminal distinction has not been a crucial constraint on thrifts. If terminals are branches, then thrift institutions will be in a better position than banks to market certain retail EFT services. But if terminals become clearly distinguished from branches by regulation or legislation, then both banks and thrifts might be subject to new regulatory guidelines on establishment of terminals. No matter how this regulatory issue is resolved, it will clearly influence future organization of the EFT market.

One other thing is clear. Consumer telephone bill-paying services and corporate cash management on-line networks effectively provide national, if not international, payment service to account holders who have telephone or computer terminal connections to their deposit institutions. EFT systems can operate in a national and international market, making regulatory restrictions on branching increasingly irrelevant.

*Interest on Checking Accounts*—Commercial banks offer checking accounts, but can't pay interest on them. They pay interest on savings accounts, but can only offer telephone payment services on them. Thrifts pay interest on accounts and offer both telephone and POS transfer service, but can only offer check-like payment services in New England and a few other states.

EFT is one source of pressure to alter these regulatory distinctions. Banks could compete more effectively with thrifts' POS service if banks could offer interest-bearing payment accounts with both

check and POS payment features. Thrifts could compete more effectively with banks' check service if they could do the same. Payment of interest on demand deposits and nationwide NOW account authority would promote a common framework within which to offer interest-bearing payment accounts that might be extended to POS facilities. But if regulation of interest payments changes, the future environment for EFT will change. Not only the competitive standing of bank and thrift deposit accounts, but also the competitive cost situation of banks and thrifts would be affected indirectly for both electronic and paper payment services.

Paying interest on all payment accounts would promote "unbundling," or explicit pricing of payment services that banks have offered in lieu of interest. Explicit pricing of payment services would concentrate pressures for change on regulations that affect the cost of producing those services. This pressure is likely to be extended to the regulatory framework governing the present operation of the payments-clearing mechanism which makes costs of production for some kinds of payment or for some kinds of institutions lower than for others.

Federal Reserve Banks clear an estimated 57 percent of all interbank checks collected annually. The collecting bank pays no direct charge for this service, whether it is a member bank with complete access to nationwide Federal Reserve check-clearing service or a non-member bank with access only to local clearing service. Federal Reserve Banks do not charge for ACH processing and delivery, and access is available to any bank or thrift institution. Fed Wire service is provided only to member banks and at no charge (except for small transfers).<sup>17</sup> Thus, the Federal Reserve provides payment services without charge to various groups of deposit institutions, ranging from all deposit institutions in some cases to member banks only in other cases. Institutions that complete payments in other ways, such as POS systems, private ACHs, CHIPS, and Bank Wire, must share costs. These differences among types of payment and institution would prevent potential users of alternative payment methods from recognizing true cost differences even if unbundling led to competitive per-item pricing of payments to users. Both the Justice Department and the NCEFT have supported the view that the Federal Reserve should charge for clearing services and make them available to non-members.

Charging for Federal Reserve clearing services would focus pressures for change on reserve requirements. Banks that are members of the Federal Reserve System face reserve requirements that are more costly than analogous requirements imposed by other regulators on non-member banks and thrifts. Member bank access to free clearing services is an important, though only partial, offset to the reserve requirement cost differential. Charging for clearing services would increase the cost burden of membership and focus pressures for change on reserve requirements. Interest might be paid on reserves, comparable reserve requirements might be developed for non-member deposit institutions, or member bank reserve requirements might be lowered after reduction of statutory minimum levels.

Regulatory change promoting interest on payment accounts, unbundling, and equalized access and cost of Federal Reserve services would have several effects on EFT. Pricing of checks and EFT services

would allow producers to promote EFT use by price incentives. Producers themselves would have a basis for promotion of EFT service if costs of clearing and settlement were lower for electronic payments than for checks and credit cards. Banks and thrifts would move toward comparable positions in providing EFT services.

Future development of EFT and the organization of markets for deposit and payment services are inextricably bound up with complex financial regulations. Regulatory changes are likely to affect opportunities for individual deposit institutions to introduce EFT services and position themselves in financial markets.

## TECHNOLOGY

The most recent ABA automation survey (1975) found that 90 percent of banks were computerized to some degree, including 85 percent of banks smaller than \$100 million in deposits.<sup>18</sup> Automated customer services were being offered or

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<sup>17</sup>Technically, access is granted to member banks and Edge Act subsidiaries and to the Treasury, foreign central banks, and international institutions for which the Federal Reserve is fiscal agent.

<sup>18</sup>"Changing Face of Automation," *Banking* 67 (September 1975): 32.

planned by 98 percent of large banks (over \$500 million in deposits), 83 percent of medium-sized banks (\$100–\$500 million in deposits), and 34 percent of small banks. However, most of these automated services were *not* EFT systems, but primarily payroll processing and correspondent services.

Most commercial banks have not yet built EFT services on their existing automation foundation, although electronic payment systems have gained acceptance since 1975.<sup>19</sup> Growth of EFT banking services, therefore, will result from the investments of many individual banks in computer and telecommunication technology. Decisions to invest will be influenced by the cost of that technology, access to it, and the technological strategies employed.

Computer costs in general are expected to decline into the 1980s. In a world of inflation, computers stand out because their undeflated prices, averaged over a wide array of services, have been declining for years. Some estimates suggest that this decline in costs has been proceeding at a rate close to 30 percent a year.<sup>20</sup> This trend is expected to continue into the next decade even without any fundamental breakthroughs that would solve presently foreseen limitations on computer technology. EFT costs may not parallel these declining prices because they emphasize telecommunications, where tariffs will play an important role in operating costs. However, the real cost of acquiring EFT capability directly and from system vendors will surely continue to decline in coming years.

Access to EFT technology is within reach of all banks. ACH receiving banks need not have any technological sophistication because items can be received in paper form. ACH originating banks must be able to prepare magnetic tapes, but service bureaus and correspondent banks will provide this service. In addition, direct wire communication may soon eliminate any requirement for magnetic tape receiving or originating capability. The technology for corporate cash management is available from vendors who now provide packages that banks may use to enter the market. Hardware, software, and marketing programs for operating retail terminal systems are available, and some existing networks market participa-

tion in their computer systems.

In its current state EFT differs substantially from the single nationwide network of computers and terminals envisioned a decade ago. Existing EFT and quasi-EFT systems provide a menu of different services that banks might produce. Banks may make investment decisions that treat each service as an independent addition to their product lines. This piecemeal approach to EFT investment may be best, especially for short-lived investments and for banks that must rely on outside vendors to acquire expertise. But it may create problems. Customer activities on separate systems may be costly to consolidate. Hardware, software, and marketing efforts may overlap. A bank may become technologically locked in to service designs made obsolete by regulatory or competitive changes.

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<sup>19</sup>For example, two-thirds of the retail terminal projects covered in the 1976 NCEFT survey began operating in either 1975 or 1976, including 90 of the 172 ATM projects and 88 of the 95 non-ATM projects.

<sup>20</sup>See Rein Turn, *Computers in the 80's* (New York: Columbia University Press, 1974).

An alternative approach would require looking at EFT as an integrated technological foundation of computer, communication, and other capabilities, plus specific enhancements to provide a flexible line of services. These services would not be restricted to EFT because application of computer and telecommunication technology is a process common to all aspects of banking organizations. The major difference between this and a piecemeal approach to EFT is that it requires integrated long-range planning involving the whole bank. But this may be the best way for any institution to pursue long-run profitability in the midst of technological and institutional turmoil.

The costs of EFT are declining and access to the technology is open. The approach banks take to investment in that technology will play a significant role in determining future EFT services. Banks may invest in computer and telecommunication systems embodied in currently available EFT designs, replicating present services over a growing number of local markets. Or banks may invest in systems that have flexibility for experimentation with new EFT designs, expanding the range of future services.

Investments in EFT systems will continue as these parameters are redefined and producers find profitable innovations that provide cheaper and more convenient payment services to payers and payees.

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## Concluding Observations

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EFT has become more than an experimental application of computer and telecommunication technology in the payment system. In some sectors of the economy it is an essential way of conducting business, while in other sectors it is one among many ongoing changes in the financial structure that does not yet have a predictable outcome.

EFT also involves much broader questions than those of organization and pricing of viable payment systems. Replacement of paper documents with electronic impulses is prompting redefinition of such parameters of economic life as documentation of transactions, security of funds from fraud and theft, and privacy of records. These are not just issues of EFT, but issues of a modern computerized society.

## APPENDIX

### Number and Value of Payments

1. **Checks:** The NCEFT estimated that about 28 billion private checks were written in 1976, based on a recent FDIC study. These are allocated between retail and business payments using the A. D. Little finding (based on a 1966 Bank Administration Institute small survey) that 1 percent of checks written are for amounts in excess of \$10,000. These large-value checks are reported as business payments and the other 99 percent are reported as retail payments. U. S. Treasury checks collected by the Federal Reserve Banks numbered 768 million in 1976.

Value of check payments is imputed by valuing total non-Treasury checks at the \$376.05 per-check amount of checks cleared through the Federal Reserve in 1976. Large-value checks account for 80 percent of the value of check payments, according to the same Little report. U. S. Treasury check value is the value of Treasury checks collected by the Federal Reserve in 1976.

2. **Credit Cards:** The NCEFT estimated 5 billion credit card payments in 1976. Visa and Master Charge volume, reported in the ABA *Bank Card Letter*, was deducted from the total to derive non-bank card value.

Value of credit card payments was reported to be \$71 billion by the NCEFT. Bank card value, reported in the same ABA source, was deducted to determine non-bank card volume.

3. **ACH:** Volume of U. S. Treasury and commercial ACH payments is reported in the NACHA *Update*.

Value of ACH payments is based on a survey of average per-item value of Treasury ACH payments, excluding revenue sharing, at the Federal Reserve Banks of Boston, Cleveland and Atlanta. Commercial items are valued at the same per-item amount.

4. **POS:** Volume of POS payments is an annualized number of transactions per terminal times the number of terminals in use, reported in the NCEFT survey conducted by Peat, Marwick and Mitchell in 1976. Both number of terminals and per

terminal volume are for POS systems that do not include a check authorization/guarantee service because separate item counts are not provided for payment and authorization/guarantee in combined systems.

Value is imputed using the per-item value of bank card payments.

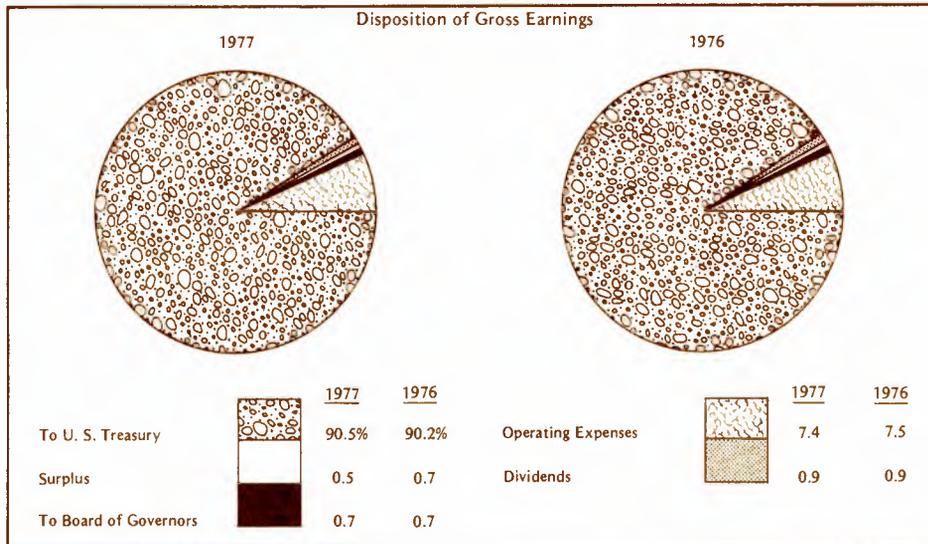
5. **Wire Systems:** Volume and value of transfers on Fed Wire, Bank Wire, and CHIPS were obtained from the respective organizations. On-line Fed Wire volume is a Federal Reserve staff estimate, valued at the average per transfer value of all Fed Wire payments.

# Comparative Statement of Condition

ASSETS	<u>Dec. 30, 1977</u>	<u>Dec. 31, 1976</u>
Gold Certificate Reserves .....	\$ 933,870,100	\$ 939,388,200
Special Drawing Rights Certificates .....	107,000,000	103,000,000
Federal Reserve Notes of Other Banks .....	- 0 -	63,793,713
Coin .....	39,702,072	46,208,019
Loans to Member Banks .....	1,550,000	- 0 -
Federal Agency Obligations - Bought Outright .....	669,970,000	560,153,000
U.S. Government Securities:		
Bills .....	3,478,894,000	3,180,233,000
Notes .....	4,227,966,000	3,955,325,000
Bonds .....	<u>740,668,000</u>	<u>554,496,000</u>
Total U.S. Government Securities .....	<u>8,447,528,000</u>	<u>7,690,054,000</u>
Total Loans and Securities .....	9,119,048,000	8,250,207,000
Cash Items in Process of Collection .....	460,882,397	604,290,443
Bank Premises .....	22,825,499	24,054,463
Other Assets .....	140,423,451	130,151,006
Interdistrict Settlement Account .....	<u>(41,750,722)</u>	<u>215,460,395</u>
Total Assets .....	<u>\$ 10,782,000,797</u>	<u>\$ 10,376,553,239</u>
<b>LIABILITIES</b>		
Federal Reserve Notes .....	\$ 7,986,742,657	\$ 7,382,250,855
Deposits:		
Member Bank - Reserve Accounts .....	1,649,739,882	1,327,438,555
Due To Other FR Banks - Collected Funds .....	- 0 -	26,468,675
U.S. Treasurer - General Account .....	450,724,792	788,564,949
Foreign .....	23,710,200	20,505,900
Other Deposits .....	<u>43,822,984</u>	<u>40,758,742</u>
Total Deposits .....	2,167,997,858	2,203,736,821
Deferred Availability Cash Items .....	361,023,439	549,153,562
Other Liabilities .....	<u>92,199,543</u>	<u>72,983,501</u>
Total Liabilities .....	\$ 10,607,963,497	\$ 10,208,124,739
<b>CAPITAL ACCOUNTS</b>		
Capital Paid In .....	87,018,650	84,214,250
Surplus .....	<u>87,018,650</u>	<u>84,214,250</u>
Total Liabilities and Capital Accounts .....	<u>\$ 10,782,000,797</u>	<u>\$ 10,376,553,239</u>

# Comparison of Earnings and Expenses

	1977	1976
Total Current Earnings .....	\$ 564,269,128	\$ 523,648,517
Net Expenses .....	<u>40,378,337</u>	<u>39,189,411</u>
Current Net Earnings .....	523,890,791	484,459,106
Additions to Current Net Earnings:		
All Other .....	<u>1,026,394</u>	<u>335,816</u>
Total Additions .....	1,026,394	335,816
Deductions from Current Net Earnings:		
Loss on Sales of U.S. Government Securities (Net) .....	4,185,456	(2,662,918)
Loss on Foreign Exchange Transactions (Net) .....	12,589,053	2,181,447
All Other .....	<u>48,584</u>	<u>44,675</u>
Total Deductions .....	<u>16,823,093</u>	<u>(436,796)</u>
NET DEDUCTIONS .....	15,796,699	- 0 -
NET ADDITIONS .....	- 0 -	772,612
Assessment for Expenses of Board of Governors .....	4,057,700	3,623,500
Net Earnings before Payments to U.S. Treasury .....	<u>\$ 504,036,392</u>	<u>\$ 481,608,218</u>
Dividends Paid .....	\$ 5,142,729	\$ 4,953,406
Payments to U.S. Treasury (Interest on F.R. Notes) .....	496,089,263	473,075,662
Transferred to Surplus .....	<u>2,804,400</u>	<u>3,579,150</u>
Total .....	<u>\$ 504,036,392</u>	<u>\$ 481,608,218</u>



# Federal Reserve Bank of Cleveland

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Lexington, Kentucky

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Chessie System  
Cleveland, Ohio

**ARNOLD R. WEBER**, Provost  
Carnegie—Mellon University  
Pittsburgh, Pennsylvania

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**M. BROCK WEIR**, President and Chief Executive Officer  
The Cleveland Trust Company  
Cleveland, Ohio  
Member, Federal Advisory Council

*As of April 1, 1978*

## Federal Reserve Bank of Cleveland

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*As of April 1, 1978*

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Cincinnati, Ohio

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and Chief Executive Officer  
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Chairman of the Board  
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Cincinnati, Ohio

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**CHARLES A. CERINO**, Vice President  
**ROSCOE E. HARRISON**, Assistant Vice President  
**DAVID F. WEISBROD**, Assistant Vice President  
**JERRY S. WILSON**, Assistant Vice President

As of April 1, 1978

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Pittsburgh, Pennsylvania

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Sharon, Pennsylvania

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**WILLIAM R. TAGGART**, Vice President  
**PAUL E. ANDERSON**, Assistant Vice President  
**JOSEPH P. DONNELLY**, Assistant Vice President  
**CHARLES A. POWELL**, Assistant Vice President

As of April 1, 1978

## Pittsburgh Branch

### DIRECTORS—1978

*Chairman*

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Consolidated Natural Gas Company, Pittsburgh, Pennsylvania

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