

FEDERAL RESERVE BANK OF RICHMOND

MONTHLY REVIEW

*The Evolving Payments System
The Federal Reserve's
Communications Center
and the Payments System
The Washington-Baltimore Regional
Check Clearing Center*



MAY 1970

EDITOR'S NOTE: *This issue of the MONTHLY REVIEW is devoted to the nation's internal payments mechanism. The feature article examines some aspects of the present system, noting recent improvements that have managed to keep it from being engulfed by the rising flood of checks. It also describes recent progress toward a more efficient payments system of the future—one in which paper checks will likely give way to an electronic transfer system possibly employing some variation of the giro principle. Two major developments in the Fifth District this year could represent important milestones on the road to a new payments system and are discussed in separate articles. These are the completion of the Federal Reserve's new Communications and Records Center at Culpeper, Virginia, and the establishment of a Regional Check Clearing Center for the Washington-Baltimore area.*

THE EVOLVING PAYMENTS SYSTEM

Businesses and banks in the United States are in danger of being drowned in a flood of paper generated by the operation of the country's payments system. The accompanying chart, which shows the number and dollar amounts of checks handled in recent years by the Federal Reserve Banks, gives some indication of the rate at which this flood has grown. The number of checks handled in 1969, for example, was almost six times the number processed in 1941, and almost twice the number handled only ten years ago. And these figures tell only part of the story. A great many checks are collected through clearing houses or correspondent banks without passing through a Federal Reserve Bank. In addition, checks passing through a Reserve Bank may be handled, on the average, by five or six individuals, businesses, or commercial banks before reaching a Reserve Bank. Thus, the approximately seven billion checks processed by Federal Reserve Banks in 1969 may have involved 40 to 50 billion processings before finally returning to their drawers to be stored away in their files.

The costs of operating this payments mechanism are enormous. The most obvious real cost is measured by the number of man-hours involved in the sorting, proofing, and shipping of this huge flow

of paper, and by the large investment in expensive machinery and equipment that is needed to keep the system operating. Not so obvious are the costs arising from inefficiencies and delays in processing the daily flood of checks. Moreover, unforeseen delays in collecting checks, by altering the reserve position of the banking system, may complicate the monetary policymaking process.

Criticisms of the Present System Although the Federal Reserve System and the commercial banks have made a number of changes to improve the check payments system in recent years, the efficiencies realized have hardly more than offset the increase in volume. (The number of checks handled by Federal Reserve Banks increased 9.6 per cent last year, and the average annual growth over the past five years was in excess of 8 per cent.) Those who advocate a fundamental change in our payments system claim that we have gone about as far as we can go in improving the present system. They say that the real need is for a new payments system, one that would make full use of the fantastic technology of the computer age.

What is under attack is the basic nature of the check payments system itself. In this system, payment is made by transferring ownership of a deposit

claim against a commercial bank. But the payment is not made by means of an order presented directly to the bank on which it is drawn. Instead, the order (a check) is presented to the person to whom payment is being made. He examines and endorses it, perhaps sorts it and puts it together with other checks, and passes it along to another individual, business, or bank. There the whole process is repeated. And so it goes, until finally the check is presented to the bank upon which it is drawn and final payment is made by reducing the account of the maker of the check and increasing the account of (or paying cash to) the party presenting the check. Each transfer of the check in this chain represents a conditional payment. That is, each holder in due course has a claim against the party from whom he received the check (or any previous endorser) in the event that it is not honored by the bank upon which it is drawn.

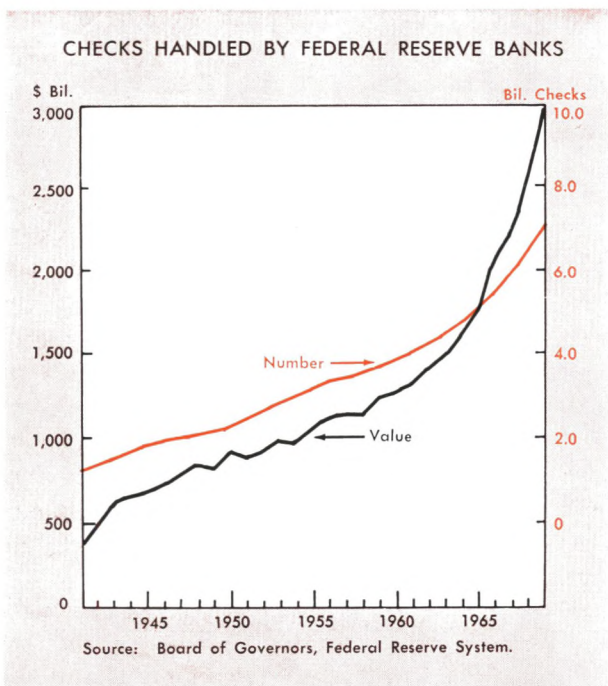
A typical check may pass through numerous hands, and through two or more banks and/or a clearing house, before being presented to the drawee bank. Thus, payment by check is a round-about, time-consuming process that, by its very nature, generates a great deal of costly paper handling. Critics of the system compare its problems with those of the securities business, where an excess of paper handling has at times threatened to bring the machinery for transferring securities to a grinding halt.

A Future Payments System? The payments system of the future is usually seen as one that combines modern electronic technology with what is known as the giro transfer system.¹ The giro system is one that has been widely used in continental European countries for years but which has been largely untried in the United States. Its characteristics make it especially suitable for the use of computers, although it does not require their use.

Like the check payments system, the giro system involves deposit balances held by individuals and businesses at a financial or governmental institution, and some systematic arrangement for the transfer of ownership of these balances from payer to payee. The major difference between the giro and the check system is in the method for effecting the transfer of ownership. Unlike the check system, in the typical giro transaction the payer delivers to the drawee institution an order directing it to transfer a specified sum from the payer's account to that of the payee. The institution is also required to advise the payee and to supply the payer with a record of the transaction. Thus, giro transfers are more direct and involve less time and less paper handling than ordinary check transfers.

Giro transfers are extremely simple when both the payer and the payee have accounts with the same institution, but they can function with equal efficiency where the payer and the payee use different institutions. Some European systems, for example, provide for a central institution for making transfers between member institutions as well as for transfers between customers of those institutions. In fact, it is possible for depositors in some European systems to make payment to individuals or businesses in other European countries.

Most descriptions of a future electronic payments system incorporate some sort of giro arrangement because the giro system possesses characteristics which make it particularly suitable for the use of electronic data processing equipment. Transactions in the giro system take place entirely within the individual institution, or if more than one institution is involved, entirely within the giro system. Thus, when a depositor instructs the institution holding his account to make payment to another account holder,



¹For a more detailed description of the giro system, see "The Giro, the Computer, and Checkless Banking," in the April 1966 issue of this *Monthly Review*, reprinted in Lawrence F. Ritter (ed.), *Money and Economic Activity*, 3rd. ed. (Boston: Houghton Mifflin), pp. 34-38.

he provides the institution with all the information it needs to complete the transaction—the identification of both the payer and the payee, the amount to be paid, and the time at which payment is to be made.

Computers could handle the entire transfer process almost instantaneously. The payer's instructions could be fed into his bank's computer, for example, and if both payer and payee are depositors of that bank the computer could perform all of the operations necessary to make the transfer, including the printing out of confirmation to the payer and advice of payment to the payee. If the two have accounts at different banks, the computer at the payer's bank could perform the operations necessary for its records and transmit the information to the second bank's computer, perhaps through a central institution. Settlement between the two institutions could be made through entries in the records of the central institution.

Numerous articles have been written in recent years describing various features of an electronic payments system, and it is not difficult to think of many ways in which such a system could function. The housewife of the future, for example, could pay the family bills by simply inserting a card into a special telephone device and giving the necessary instructions to her bank's computer. She could pay all of her bills at one time by giving the computer a list of her creditors, the amount to be transferred to each, and the date at which transfer is to be made. The housewife might pay for her groceries at the supermarket by handing the cashier the same little plastic card. The cashier would insert the card into a telephone-like terminal and instruct the bank's computer to transfer the amount owed from the housewife's account to that of the supermarket.

In addition to the use of the electronic payments system for retailing purposes, business firms of the future may also use it for processing payrolls. Rather than issuing a check to each employee, for those desiring it the employer could have the employee's pay credited to his deposit account at regular intervals, monthly, weekly, or even daily. The employer would furnish the bank the necessary information in machine-usable form, or he might instruct his computer to instruct the bank's computer to reduce his account and to credit his employees' accounts in the proper amounts. If his employees banked at several banks, his computer might transmit the payroll data to a central bank switching center, whence it would be transmitted to the various banks concerned.

Banks of the future undoubtedly will provide their customers with some sort of automatic loan plan, somewhat along the lines of the credit extended today through the use of bank credit cards. If the housewife described above were shopping for new furniture or a television set and the amount of the purchase exceeded her current balance, the bank's computer might make an instantaneous loan, up to some pre-arranged amount. She might arrange to pay off the loan by authorizing her bank to have the computer transfer money from her deposit account, either the entire amount at the end of the month or in installments over a period of time.

Making the Old System Work Better Most of the changes in the payments mechanism in recent years have served to improve the functioning of the present system. The more important of these changes have made it possible for people to write more and more checks, year after year, without causing the entire system to collapse. Others have made modest contributions toward reducing the need for checks. Finally, there have been some tentative steps toward the development of a new and different payments mechanism.

The development of the Magnetic Ink Character Recognition System (MICR) in the 1950's was undoubtedly one of the most important improvements in the present system. By putting certain essential information on checks in a form that can be read by electronic data processing equipment, the process of reading, sorting, and tabulating checks is greatly speeded up at certain points of congestion along the circuitous route followed by the typical check. A large percentage of the checks that are written every day are now being processed on electronic equipment.

One of the most spectacular changes in recent years has been the growth in the use of credit cards. And, although this was not the reason for their introduction, credit cards have served to reduce the number of checks used. The individual cardholder, by writing one check at the end of the month, may settle for a number of transactions that occurred over the course of the month.

Arrangements designed to reduce the handling and use of checks include the use of a "lock box" and the preauthorization of payments. The lock box technique may be employed by a company whose customers are distributed over a wide area. Rather than have the customers pay their bills by sending a check to the head office, the company may rent post

office boxes at strategic locations in the area and customers mail their payments to this box. The company maintains an account with a bank near each of these locations, and authorizes the bank to collect the checks from the box at frequent intervals. The bank credits the company's account in the amount of the checks received, advises the company of the payments, and sends the checks through regular channels for collection. The use of lock boxes does not reduce the number of checks, but it does reduce the round-about collection process and the number of times each check is handled.

Preauthorized payments involve the periodic transfer of money from one account to another with the expressed agreement of the parties concerned. Many preauthorized payments arrangements are internal to the bank, involving such things as the transfer of funds from a checking account to a savings account, a Christmas or vacation club, or in payment for U. S. Savings Bonds. Preauthorized payments external to the bank have included such things as payments of insurance premiums, utility bills, taxes, and rental or mortgage payments. Both types of preauthorized payments have reduced the number of checks in circulation, but more important, perhaps, preauthorized payments would be a significant element in any future electronic payments system.

Some form of payroll servicing is another way of reducing the number of checks used and one that also would be an important element in an electronic payments system. Corporations and governments issue a large number of checks for salaries and wages, and anything to short-circuit this process could reduce significantly the number of checks in circulation. Some companies and governmental agencies have entered into agreements with banks to have employees' wages deposited automatically to each employee's checking account. In some instances, firms relate this kind of program to the automated payroll service provided by their banks. The Federal Reserve Bank of Richmond permits each employee to designate the bank in which his check will be deposited. The Payroll Department then makes a list for each bank designated, showing for each employee the amount to be deposited. A single check is issued to each bank covering the total amount of deposits for that bank. At the head office of the Federal Reserve Bank of Richmond, all 35 officers and more than 200 other employees have salary checks deposited under this plan.

Finally, the development of regional clearing centers has been encouraged as a means of reducing the length of the journey of the typical check and cutting down on the number of times it is handled. The interest of the Federal Reserve System in this type of arrangement is evidenced by the establishment at the Baltimore Branch of the Federal Reserve Bank of Richmond of a Regional Clearing Center to serve banks in a 40-mile radius of Washington, D. C. In its present stage of development the Baltimore Clearing Center represents an attempt to improve the functioning of the existing payments system, but it should be remembered that the electronic payments system of tomorrow will require the establishment of a number of highly automated regional clearing centers. The Baltimore center is discussed in an article elsewhere in this issue of the *Monthly Review*.

Steps Along the Way A press release by the Board of Governors of the Federal Reserve System, dated September 20, 1968, began with these words:

In a major preparatory step toward an electronic transfer system for bank deposits and financial data in the 1970's, the Federal Reserve System announced today it has entered into a contract for a key segment of a computerized network to speed up the movement of money, securities, and economic statistics.

In these words the Federal Reserve System officially called attention to a project which may represent the beginning of a giant leap toward an entirely new payments mechanism. And yet, it should be noted that the new Culpeper facility referred to in the release is nothing more than a broadening and an extension of a wire transfer facility the System has operated since 1922. This facility, which is used mainly for the transfer of funds and securities between member banks, has many of the features of the European giro systems. Transfers are effected by one bank authorizing the Federal Reserve to credit the account of another bank or some account in that bank. Payees are advised by their banks when and from whom payments have been received.

The scope and significance of the new facility, and of the specialized equipment employed in it, are discussed in an accompanying article in this *Monthly Review*. It is sufficient to our purposes to note that the development and testing of a facility of this type is an essential first step in the transformation of the payments system. In the words of George W. Mitchell, Member, Board of Governors of the Federal Reserve System, "By its planning and action in

putting into place a sizable electronic transfer plant and related staff the Federal Reserve System is demonstrating its preparedness to accommodate an automated payment system as rapidly as it earns public acceptance.”

The establishment of the Culpeper switching center is the most important single step toward an electronic payments system, but there have been many others. Some of these have been mentioned in the section dealing with improvements in the old system. One interesting recent development was the action of the Home Loan Bank Board in publishing a proposed change in its regulations which would permit savings and loan associations to pay, at a shareholder’s request, amounts from the shareholder’s account to third parties. While this action in itself is a far cry from the payments system of the future, it does constitute a limited recognition of the giro principle.

The New York Clearing House Association is engaged in setting up a network to transfer funds electronically between major clearing house banks. The first phase of the project, which will be used only for large-denomination international transactions, is expected to become operational in the near future. The system, which will make use of a central computer located at the Clearing House, is expected to eliminate as many as 40 thousand checks a week. The second phase will bring other New York institutions into the system, and it is expected that eventually it will be expanded to include banks in other major U. S. cities.²

SCOPE (Special Committee on Paperless Entries) is made up of representatives of banks in the Los Angeles and San Francisco Clearing House Associations. Its purpose is to study and recommend arrangements to enable California banks to transfer debits and credits electronically between banks. A recent news story indicates that commercial banks in Seattle are considering a similar project³. As was

noted earlier, the establishment of clearing centers to permit electronic transfers of funds among member institutions is an essential element in the creation of the payments system of the future.

Public acceptance is a major prerequisite to any far-reaching change in the payments mechanism, and developments over the last decade have gone a long way toward creating the proper climate for such changes. Evidence that bankers are convinced that major changes are inevitable is found in the example cited above, and in the announcement by the American Bankers Association that a top-level committee of leading bank executives has been created to study various aspects—economic, legal, technological, and marketing—of any modification of the payments mechanism. While the general public is probably less aware than bankers are of the necessity for changing the present system, most people are probably more receptive to change today than they would have been ten years ago. The proliferation of credit cards, among other things, has conditioned the public to checkless and cashless purchases. No doubt a great deal remains to be done in the way of educating the public to the idea of a checkless society, but the task seems much less formidable than it did just a few years ago.

The technological know-how required for an electronic payments system already exists. Banks make extensive use of electronic data-processing equipment in their operations, and a push-button type of telephone has been developed which would permit a depositor to communicate directly with his bank’s computer. The Federal Reserve facility at Culpeper represents the kind of switching center that would be an integral part of any such system. While there would be problems, both legal and technological, in the establishment of an electronic system, the limitations of the check-payments system make it imperative that these problems be solved.

Aubrey N. Snellings

²*American Banker*, March 13, 1970, p. 1.

³*American Banker*, April 6, 1970, p. 1.

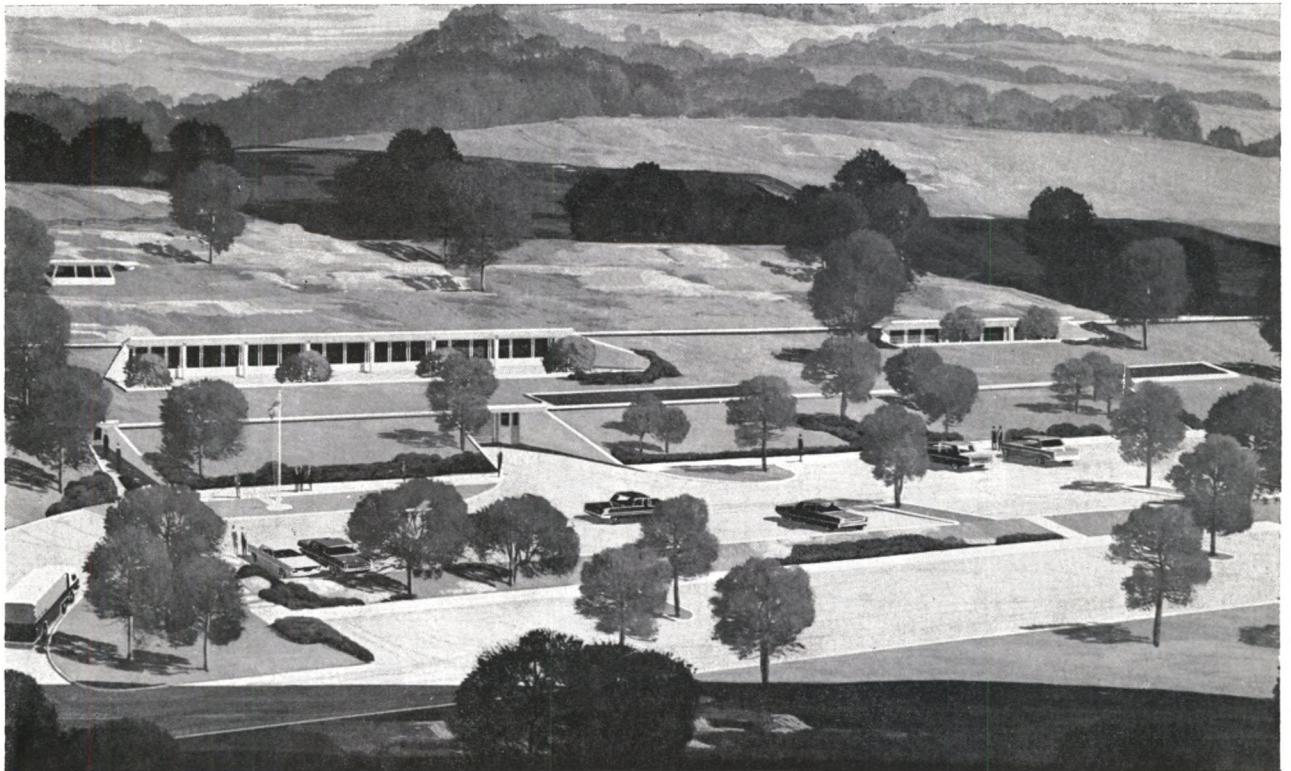
The Federal Reserve's Communications Center and the Payments System

Fortunately for the American payments system, the growth of knowledge in the field of information technology has kept pace with the growth of paper generated by the ever expanding volume of economic and financial transactions. While the paper jam has on numerous occasions impaired the orderly flow of economic activity, and probably will again, it is encouraging that steps are being taken which should practically rid the payments system of the future of this costly burden. One such step is that taken recently by the Federal Reserve System in opening its new Communications and Records Center at Culpeper, Virginia. The communications aspect of the center is now in the testing stage and is expected to be fully operational by July 1970. In view of the Federal Reserve's central role in the handling of economic and financial data—particularly banking statistics—the communications facility is expected to

have a significant bearing upon the speed and accuracy with which the payments system operates as well as upon the capacity of the system to handle the increased volume of information.

Officially dedicated in December 1969, the Communications and Records Center, built largely underground, serves several roles. It provides vault space for storage of money and duplicate records for use in the event of a national emergency. Also, it will house a computer to serve the data processing needs of the Federal Reserve Board, and to supplement the Board's existing computer located in Washington.

Of most significance to the payments mechanism, however, is the fact that the Culpeper facility contains the Federal Reserve System's new communications center, consisting of four large, high-speed, special-purpose, communications switching computers. The Culpeper facility, including the com-



The Federal Reserve Bank of Richmond's Culpeper facility. The facility houses the Federal Reserve System's new communications center, and provides vault space for the storage of money and duplicate records.

munications center, is operated by the staff of the Federal Reserve Bank of Richmond for the entire Federal Reserve System. When it goes into full operation in about July of this year, the new communications system will replace the existing Telegraph and Switching Center, which has been in operation at the Richmond Bank's head office since 1953. The Federal Reserve System has operated a wire transfer system since 1922, but the Board of Governors decided to move the center which handled this operation from Washington to Richmond in 1953, to make it less vulnerable to nuclear attack. The decision to move to Culpeper was predicated partially on the same motive, but of equal importance was the desire to establish a modern facility with a capability for growth commensurate with that expected in the Federal Reserve System's communications needs.

Technical Features of the Communications Center Under a \$2¾ million contract, Marshall Communications, Inc., now a division of Control Data Corporation, has installed a M-1000 Quad Communications Switching System at Culpeper. This system is actually four M-1000 computers which are designed to handle in very rapid fashion the receiving and relaying of messages among the 12 Federal Reserve Banks, their 24 branches, the Federal Reserve Board, and the U. S. Treasury. The system operates as a message exchange or switch, and it communicates with the 38 locations, each of which has one or more terminal units, by means of telephone lines capable of high speed data transmission. Any type of message, whether quantitative or narrative, can be transmitted by the system.

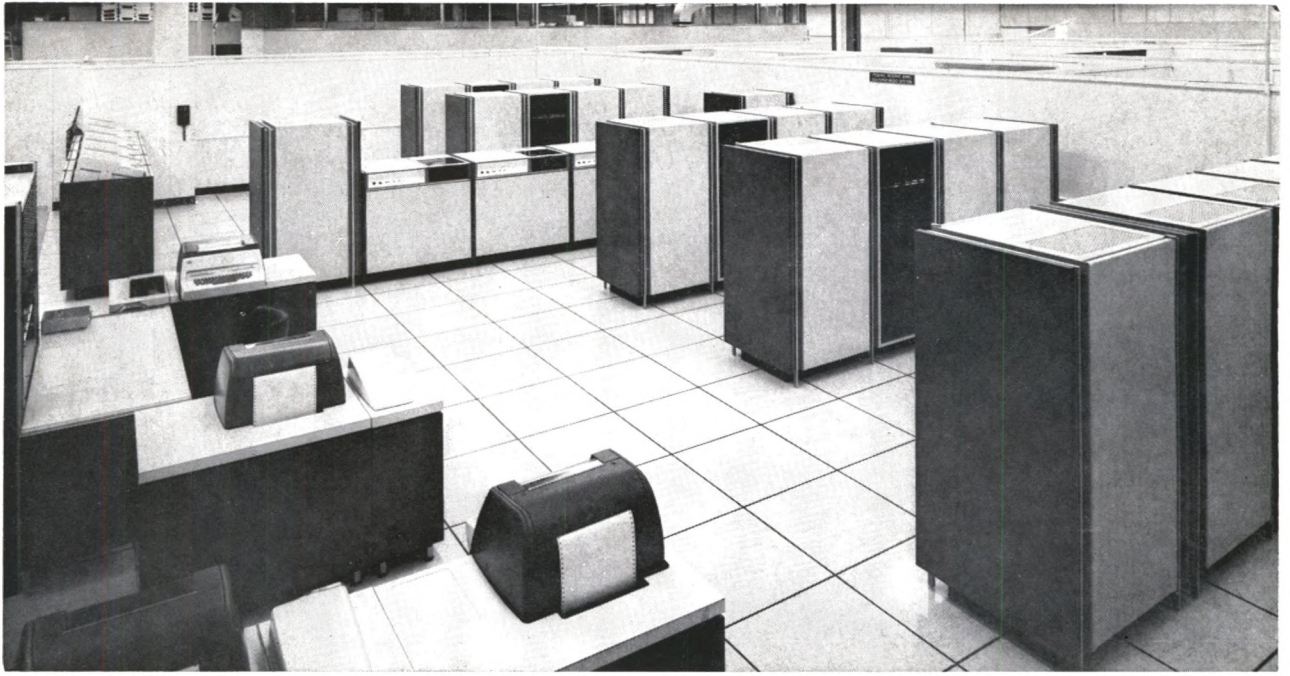
An important feature of the system is that the kinds of terminal units located at each of the Federal Reserve offices can vary considerably. Standardization is achieved through the use of a universally adopted code in which all messages are phrased and transmitted. This code, which can be handled by several types of terminal gear, is ASCII, American Standard Code for Information Interchange, known as "asky." The code is a communications language which, in addition to actually transmitting information, executes its own internal check on the accuracy of the information transmitted.

Most Federal Reserve offices have been equipped with Model 37 terminal units—slightly modernized versions of conventional teletype equipment. Each

office has the capability to send and receive messages, although specialized equipment to receive or send only is provided additionally at some locations. These units handle the frequent and important low-content messages involving transfers of funds and administrative transmissions, but usually not those messages transmitting large quantities of data.

At present, the system is equipped to handle messages to or from the Model 37 terminals at the speed of 150 words per minute. The transmission speed is constrained by the lines rather than by the message exchange at Culpeper. The lines presently available for use with the Model 37 terminals are 150 "baud," where "baud" is defined as a unit of signalling speed. The term is, for practical purposes, almost synonymous with "bits per second." With the ASCII code, there are eight bits per character, and six characters per word. Allowing for additional characters that are transmitted in order to check the internal accuracy of the message, the term "baud" becomes approximately synonymous with words per minute. To compare present with potential speed in this respect, it should be noted that the message exchange computers at Culpeper are capable of transmitting messages to distant points at speeds of 9,600 bits per second. At present, therefore, constraints are imposed by the lines as well as by the types of terminals in use at the various end locations. Present needs, however, do not require the maximum utilization of the capacity available at the Culpeper message exchange.

The lines used with the Model 37 terminals are "full-duplex," which means that messages can be received and sent simultaneously between any given points, each at the designated speed. The fact that a terminal is in the process of sending a message does not preclude its receiving another message at the same time. Whether this is done is determined by the message exchange computers at Culpeper. The Culpeper computers continuously poll all terminals to determine whether a message is waiting to be transmitted. The complete polling cycle takes about 45 seconds. If a positive signal is indicated by a waiting terminal, the Culpeper exchange receives the message and notifies the terminal of the message's arrival. In a similar fashion, if a message has been received by the Culpeper exchange for delivery elsewhere, the Culpeper exchange notifies the terminal at the destination (or destinations) that a message is to be delivered. Upon receipt of the proper signal, the message is sent to its destination, and the



M-1000 communications switching computers and related equipment at the Federal Reserve's Communications and Records Center in Culpeper, Virginia. Equipment in this room links all offices of the Federal Reserve, and will play a central role in facilitating the nation's payments system.

Culpeper computer awaits a signal from the terminal that the message was received. All messages are then stored at the Culpeper center on disks or tapes for a predetermined period of time.

In addition to the Model 37 terminals, the 12 Federal Reserve head offices and the Federal Reserve Board are being equipped with I.B.M. Model 2968 tape units for transmitting and receiving large quantities of data through the Culpeper exchange. These units utilize magnetic tape which is readable by the data processing computers at each of the locations. Thus, tapes of economic information generated by the Banks' computers can be immediately transmitted to other Reserve Banks or to the Board through the Culpeper exchange, or conversely, can be received by a given Reserve Bank for immediate processing on its own computer. Lines available for transmission by this method are 2400 "baud," i.e., approximately 2400 words per minute. These lines are "half-duplex," however, which means that a terminal can either receive or send at a given time, but not both.

Since the Culpeper message exchange is capable of communicating with a wide variety of terminal equipment, the use of the Model 37 terminals, and to a lesser extent even the use of the Model 2968 tape

terminals, is regarded as temporary at several of the Federal Reserve offices. A number of Reserve Banks and branches are in the process of upgrading their data processing and research computer equipment. In doing this, they have taken into consideration the coming potential of the Culpeper center. Thus, some of them intend to use large third-generation computers as terminals to communicate with the Culpeper exchange in addition to performing other data processing or research functions for the Reserve Banks. The Federal Reserve Bank of New York has planned from the outset to do this, and will therefore begin its communication with the Culpeper exchange via a computer. The Federal Reserve Banks of Chicago and San Francisco have plans to follow a similar approach in the near future, and will probably replace or at least supplement their existing terminal gear with computer-to-computer communications. Other Reserve Banks, including the Federal Reserve Bank of Richmond, have similar plans under consideration. The advantages of this approach are considerable in that all messages flowing to or from the Culpeper exchange at a given Reserve Bank can be examined by that Bank's computer for informational content relevant to other computer related functions—accounting, reserve account-

ing, research and statistics, fiscal agency operations, discount and credit, etc. The terminal computer can thus automatically update files or perform necessary processing of the data it receives from the message flows.

Several Reserve Banks have further plans to establish computer-to-computer communications with member commercial banks in their districts. Such arrangements will make possible direct electronic communication via the Culpeper exchange of commercial banks throughout the nation. Messages involving funds transfers, for example, will be completed almost instantaneously. Human intervention in the transaction will be minimized thus reducing the possibility of error, and automatic updating of all relevant reserve accounts will be achieved as a by-product of the communication.

The technical capability exists for still other communications linkages, of a bank or non-bank nature, either directly to the Culpeper exchange or to it via a computer-type terminal at a Reserve Bank or branch. The existence of the Culpeper facility makes feasible, for example, the sharing among Federal Reserve offices of a large centralized data bank of national economic information.

Implications for the Payments System To obtain *maximum* efficiency in the operation of any payments system would require the instantaneous communication of transactions data. Realistically, however, constraints are imposed by the complexity of the economy and its institutions, as well as by the distances which separate individuals and organizations—not to mention many other natural barriers. There is presumably some maximum speed at which it is physically possible to sort checks, to move pieces of paper from one location to another, or to ship currency and coin. While numerous advances have been made in all these areas, progress to date is still considered far short of adequate. Modern technology does not seem to promise an ultimate solution whereby maximum efficiency of the payments system can be achieved. Since all economic units are not electronically interfaced with one another, it is not feasible to consider this kind of efficiency—nor would such a system necessarily be desirable. Nevertheless, the limits of feasibility have been greatly expanded. The establishment of the Culpeper exchange is a reminder of the technological possibility of alternative payments systems, which might feasibly include an economy without checks.

Banks play an obviously critical role in the American payments system as it presently exists. They provide the mechanism through which the overwhelming preponderance of payments are made. Thus, the efficiency of communications among banks largely determines the efficiency with which the payments system operates. The Federal Reserve, as the central bank, in turn plays a critical role in the settling of payments among banks, both member and nonmember. Therefore, the Federal Reserve's communications center at Culpeper, the nerve center of the central banking system, will unquestionably become a core element in the nation's payments mechanism.

The significance of the Culpeper center is yet to be seen, since its contribution to the Federal Reserve and to the payments system does not begin until mid-year. Its potential impact, however, is more clearly revealed by its technical characteristics than by the nature of the jobs that it will be required to perform in its initial stages. Most of the work that will be put through the Culpeper exchange at the outset are conventional tasks that will be transferred from the existing Telegraph and Switching Center—e.g., funds transfers among banks, administrative messages, transmissions of economic information among Reserve Banks, etc. However, as the Federal Reserve Banks and branches begin to install more sophisticated terminal equipment, as communications via computers are established with commercial banks, and as rapid data transmission among Reserve Banks gets underway, the impact of the center upon the operations of these institutions should be striking. Significant departures from existing customs of communication will be quick to follow. Technological progress in the communications field has exceeded present levels of ability and readiness to take maximum advantage of its potential. However, there is little doubt that the Culpeper center represents one of the early steps leading invariably to an electronic payments system.

The Culpeper facility was a necessary development because improvement in the timeliness of economic information is necessary. But, even so, the development is impressive. Its impressiveness lies not in any immediate revamping of existing methods of communication, but in the opportunity which it offers for significant future accomplishments in the communications field.

William H. Wallace

The Washington-Baltimore Regional Check Clearing Center

Since its inception the Federal Reserve System has worked with bankers to improve the check collection process on which the nation's payments system is based. The opening of the Washington-Baltimore Regional Clearing Center on January 2, 1970, represents a major step in that direction. Regional clearing centers are perhaps the best immediate answer to the check collection problem. Moreover, a series of such centers, connected by wire with each other and with their participating banks, could well bridge the gap between the present payments system and the "checkless society" of the future.

Background In virtually all large cities, clearing houses have existed for many years for the exchange of checks among large city banks, but rarely have these arrangements included smaller banks in the surrounding areas. The Nassau County Clearing Bureau, organized by about 80 banks on Long Island in 1952, is a notable exception. Checks are picked up each evening from the participating banks, sorted, and delivered to the drawee banks early the next morning. The Federal Reserve Bank of New York, however, was not and still is not a direct participant; that is, it does not send checks to, nor receive them from, the Clearing Bureau.

The success of this effort resulted in a similar clearing system established later in Bergen County, New Jersey. This Bureau began operations on October 20, 1959, serving 31 banks with 70 offices. By the end of 1969, the area served by the Bergen County Clearing Bureau had been expanded to include nearby counties, with participation by 39 banks with 185 offices. As in the case of the Nassau Bureau, the Federal Reserve Bank of New York does not participate directly.

Meanwhile, the American Bankers Association, the Association of Reserve City Bankers, and the Conference of Reserve Bank Presidents appointed a joint committee to make a comprehensive study of the nation's system of collecting checks. The committee in its report dated June 15, 1954, found that

more than 90 per cent of the dollar value of payments in the United States was being made by check. An efficient collection system is thus of key importance in facilitating the flow of such payments. The committee noted that check collection problems arise primarily out of the volume of checks and estimated that the average check passes through $2\frac{1}{3}$ banks in the process of collection. The volume problem, furthermore, could be alleviated by reducing the number of check handlings.

The committee recommended that, where volume warrants, checks drawn on nearby out-of-town banks "should be presented to drawees through a central clearing arrangement serving all banks in the area, with settlements being made on the books of a correspondent bank or on the books of the Federal Reserve Bank." Some of the proposals made by the committee, however, met with strong opposition, and there was little support for establishing regional clearing arrangements until the middle 1960's.

The Washington-Baltimore Situation The Washington-Baltimore area provided a striking example of the inefficiencies possible under existing check clearing arrangements. Delays resulted partly from the fact that the Federal Reserve Bank of Richmond served Washington and Northern Virginia while its Baltimore Branch served Baltimore and surrounding Maryland counties. A check drawn on a suburban Maryland bank and deposited with a bank in Northern Virginia might take as long as four days to clear even though the banks were only a few miles apart. If this check were deposited on Monday, and sent to Richmond that night, the Richmond Fed would send it on to Baltimore on Tuesday. The Baltimore Branch, in turn, would forward the check to the drawee bank on Wednesday and receive payment on Thursday. A return item would have to follow this route back to the bank with which it was deposited. The entire process could take up to eight or nine business days from the date of original deposit. As a result, area banks were understandably

reluctant to collect checks through the Federal Reserve.

Instead they resorted to one of several arrangements for local clearing. These included clearing houses in Washington, Baltimore, and Frederick, Maryland. There were also two informal exchanges, one made up of two banks in the Maryland suburbs of Washington and the other with limited participation of five Northern Virginia banks. No provisions had been made, however, for exchanging checks among these five groups.

Banking Characteristics of the Area The accompanying table summarizes some of the banking characteristics of the area that was under consideration for a new regional collection system. It confirms that the area within a 40-mile radius of Washington had a very heavy concentration of the Fifth District's total banking activity. In 1967, there were 94 banks with 666 banking offices, representing 11.7 per cent and 22.2 per cent respectively of the totals for the entire Fifth District. The deposits of these banks totaled about \$6 billion, or 32 per cent of the District total. The population of the area represented about a quarter of the total District population.

Development of the Plan Bankers in the area have long been aware of the need for a better clearing procedure. During the 1960's many of these bankers approached representatives of the Federal Reserve Bank of Richmond about the possibility of establishing some type of clearing center. They did suggest, however, that the Federal Reserve should take the initiative in setting up such a facility.

The Richmond Reserve Bank decided to initiate efforts to establish a better collection system early in 1967. Accordingly, in March it invited the banks belonging to the Washington and Baltimore clearing houses, the Northern Virginia Bankers Association, and the various banking associations in nearby Maryland counties to participate in a check clearing survey of the Washington-Baltimore area. This led to the appointment of a team of area bankers and representatives of the Richmond Reserve Bank to conduct a survey and develop plans for a regional check clearing center if one seemed desirable.

The survey team studied check movements in the area during June 1967 and concluded that a clearing center definitely was needed. Its report to the Richmond Reserve Bank contained the following recommendations:

1. The establishment of a regional check clearing center to be owned and operated by the Richmond Bank without cost to participating banks.

2. The formation of a six-man committee of area bankers to advise the Reserve Bank on the operation of the center.

3. The location of the center at a point convenient to participating banks, airports, and beltways.

4. The extension of participation privileges to all banks within a 40-mile radius of Washington and to any others near enough to make participation feasible. Federal Reserve offices would also be allowed to send items directly to the center.

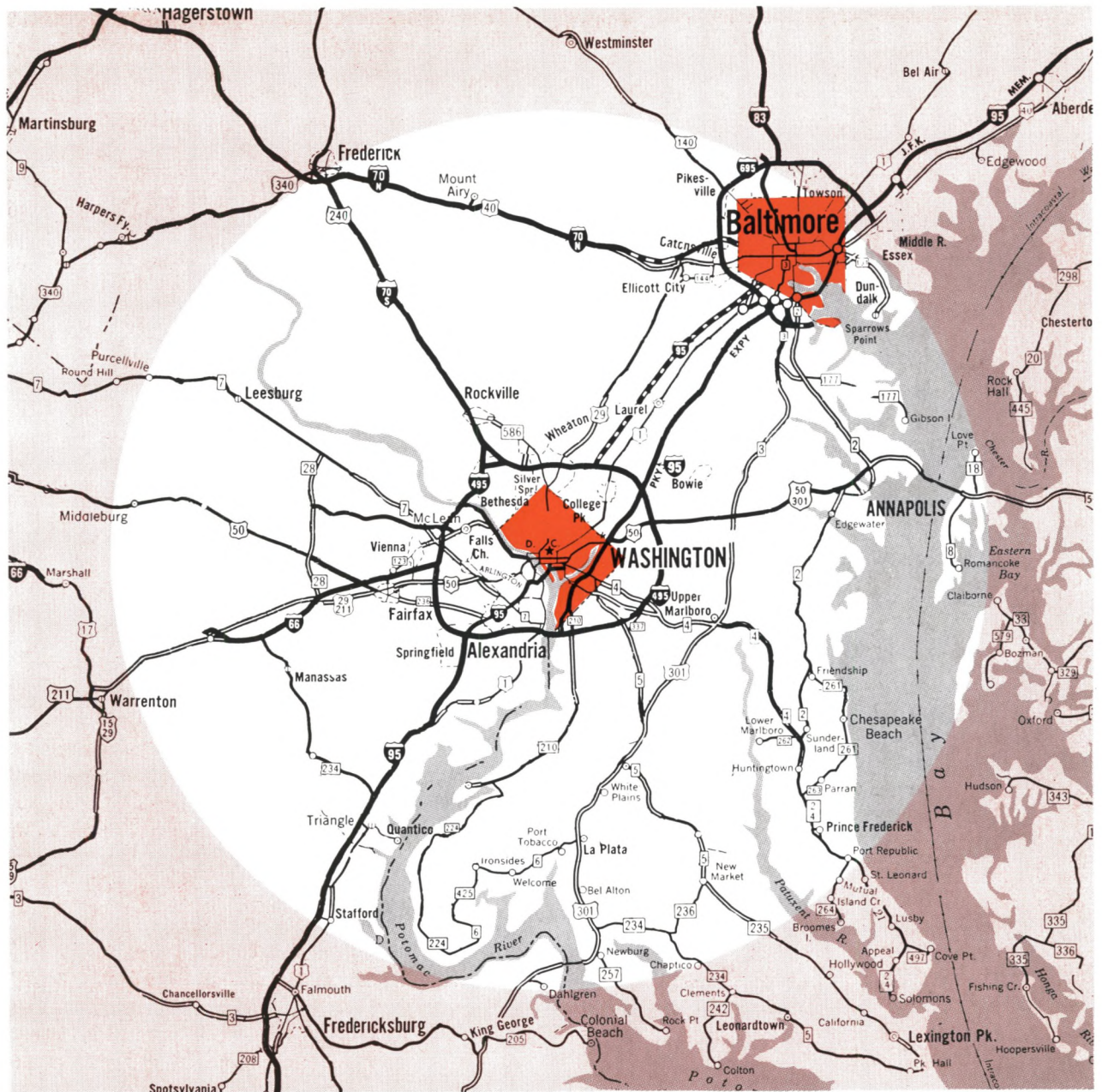
5. The settlement of clearing balances through the reserve accounts of member banks.

6. The establishment of pickup and delivery service so as to effect presentation of items to drawee banks by 10 a.m.

Establishment of the Center After a lengthy discussion within the Federal Reserve System, the Federal Reserve Bank of Richmond agreed to establish a regional check collection center, the first operation of its kind to be established by a Federal Reserve Bank. The Washington-Baltimore Regional Check Clearing Center officially began operations on January 2, 1970.

The Clearing Center initially serves 90 banks within a 40-mile radius of Washington (see map). Included in the service area are the city of Washington; the city of Baltimore and the counties of Anne Arundel, Baltimore, Calvert, Charles, Howard, Montgomery, and Prince Georges in Maryland; and the cities of Alexandria, Falls Church, and Fairfax and the counties of Arlington, Fairfax, Loudoun, and Prince William in Virginia.

For operational reasons the Center is located at the Baltimore Branch of the Richmond Reserve Bank, with a relay station in downtown Washington for use by participating banks that may find it more convenient. Banks depositing their items at the relay station are subject to the same cut-off hours as those sending directly to the Center in Baltimore. The Federal Reserve Bank bears the expense of transporting checks from the station to the Baltimore Branch. Participating banks, both member and non-member, and Federal Reserve Banks may send checks, unsorted, drawn on other banks in the region to the Center by 1 a.m. If a participating bank desires, it may fine sort its checks by drawee bank and deliver them to the Center by 5 a.m. for inclusion in the daily shipment. Nonparticipating member banks from outside the area may also send to the Center, but for them the cut-off hour is 4 p.m. of the previous day.



Area served by the Washington-Baltimore Clearing Center. The circle has a radius of 40 miles around Washington.

Regional Clearing Center personnel using high speed computer equipment sort the checks by drawee bank, make up the shipments and dispatch them by motor carrier in time to reach each bank by 10 a.m.

Member banks settle through their reserve accounts and nonmembers through the reserve account of member correspondents. Thus, participating banks each morning receive credit for all deposits made prior to the cut-off hours and likewise are debited for all items presented to them.

Among other features of the Regional Clearing Center are:

1. A requirement that participating banks that are members of the Washington or Baltimore Clearing House sort and package clearing house items separately.
2. A requirement that all items sent to the Center must be amount encoded if a sending bank averages more than 100 items per day in its deposit.

3. The establishment of an Advisory Group made up of two commercial bankers from Northern Virginia, two from Washington, and two from Maryland.

Advantages of the Center The Regional Clearing Center has now been in operation more than four months and has already produced a significant improvement in the check collection system for the Washington-Baltimore area. Among the advantages are:

1. *Earlier Collection of Items* A regional center of this type enables both participating banks and banks outside the area to present and collect many checks more promptly. Checks now clear in one day, rather than up to four days as was previously the case.

2. *Earlier Credit on Checks* Because of the faster process, participating banks collecting through the Center receive earlier credit on their checks in most instances.

3. *Earlier Return of Unpaid Items* The faster check collection process generally enables participating banks to receive their return items two or three business days sooner.

4. *Reduction in Check Kiting* The general public had become increasingly aware of the length of time required to collect checks in the Washington-Baltimore area, and this had given rise to a number of check kiting schemes. By reducing collection time significantly, the Center greatly reduces the opportunities for such kiting operations.

5. *Reduction in Commercial Bank Float* By reducing collection time on checks the Center

reduces commercial bank float on both intra-area items and those presented from outside the area by direct-sending banks and Federal Reserve Banks.

6. *Fewer Check Handlings* In terms of the payments system, the most significant advantage is the reduction in the number of times each check is processed.

The Clearing Center is now functioning smoothly, although some start-up problems were experienced by the Federal Reserve Bank and participating banks. Probably the most difficult situation resulted from significantly higher volume than expected. Forecasts of check volume, based on the 1968 survey, had indicated that the Center would be processing about 600,000 items per day. Actual volume for the first quarter of 1970, however, averaged 874,000 items per day and necessitated diverting some of the checks to Richmond for processing. With the installation of additional computer equipment scheduled for this month, the Center should be able to handle present volume and its projected growth.

It is now evident that a regional clearing center can provide a significant improvement in the check collection process. If the idea spreads throughout the country, both the banking system and the general public should benefit. The Federal Reserve's new communications network could conceivably provide an electronic link between such centers. In any case, both these innovations represent considerable progress toward an improved payments system of the future.

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BANKING CHARACTERISTICS OF THE WASHINGTON-BALTIMORE AREA

	POPULATION (July 1, 1967)	NUMBER OF BANKS (July 1, 1967)	NUMBER OF BANKING OFFICES (July 1, 1967)	BANK DEPOSITS (June 30, 1966)
Northern Virginia ¹	846,500	35	170	\$ 842,429,000
Washington, D. C.	809,000	14	108	2,310,960,000
Suburban Maryland ²	2,004,600	38	276	1,391,370,000
Baltimore, Maryland	913,000	7	112	1,485,245,000
TOTAL SURVEY AREA	4,573,000	94	666	\$6,030,004,000
Survey Area as a Percentage of Fifth District	24.8	11.7	22.2	31.7

¹ Cities: Alexandria, Falls Church, and Fairfax.

Counties or parts thereof: Arlington, Fairfax, Loudoun, and Prince William.

² Counties or parts thereof: Anne Arundel, Baltimore, Calvert, Charles, Howard, Montgomery, and Prince Georges.

Source: Bureau of the Census, *Current Population Reports*, Series P. 25 No. 373, September 5, 1967; Maryland State Department of Health, Division of Statistics, *Population Estimates of Maryland*, August 30, 1967; University of Virginia, The Bureau of Population and Economic Research, *Estimates of the Population of Virginia Counties and Cities*, July 1, 1967, October 1967; Federal Deposit Insurance Corporation, *National Summary of Accounts and Deposits in All Commercial Banks*, June 30, 1966.