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A Beginner's Guide to the U.S. Payments System

by Paul W. Bauer

Today's complex, worldwide economic network is more dependent than ever on a safe and efficient payments system, yet few are aware of how it functions. This article defines the U.S. payments system, outlines its evolution, and examines some of the areas where improvements are needed.

High living standards depend critically on many types of infrastructure — both technological and institutional — that few fully comprehend. The payments system, the means by which funds are transferred between economic agents, is one such critical support.

The importance of technology in the payments system is undeniable, but technology is not enough to ensure that a payment instrument will be widely accepted. For example, the basic technology for financial electronic data interchange — high-speed electronic communications and computers — has been around for at least 20 years, but the institutional arrangements between those with access to this technology and their banks are still lacking.

Today's advanced economies could not function without an efficient payments system that, from the viewpoint of the user, can handle transactions throughout the world almost as easily as across the street. Modern business organizations could not flourish with anything less. The production of everything from automobiles to the new financial derivative instruments requires coordinating people and capital across regions to ensure that all parties will be paid for their services in a timely manner.

This *Economic Commentary* outlines the evolution of the U.S. payments system, with particular emphasis on the role played by the Federal Reserve. After examining exactly what the payments system is and how it functions, I present some of the technological and institutional challenges confronting the current system.

Payments System Evolution

Describing how the payments system has developed over time illustrates how it depends crucially on both technology and economic institutions. Although no written record exists, the first exchanges must have been barter transactions. Barter requires locating someone who not only has the goods or services you want, but is also willing to take your items or services in exchange. These high search costs, plus the time spent haggling over the exchange rate for your goods relative to his, makes barter an expensive proposition.

A poorly functioning payments system can impose two types of losses on an economy. First, resources employed in completing transactions (time in a barter economy) are unavailable for other uses, resulting in reduced output of additional goods and services. Second, to the extent that transactions are costly, there may be less specialization of labor and capital than is desirable.

One of the first innovations in the payments system was settling on a common medium of exchange, such as precious metals or, in colonial Virginia, tobacco. A common exchange medium lowers search and haggling costs because now, all that matters is the price of an item or service in terms of the medium chosen. The seller can use the proceeds to purchase whatever he desires.

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TABLE 1 CHARACTERISTICS OF PAYMENT INSTRUMENTS, 1987

	Volume (percent)	Value (percent)	Payor Cost ($ per item)	Social Cost ($ per item)
Nonelectronic				
Cash	83.42	0.41	0.09	0.04
Checks	14.07	16.30	-0.04	0.79
Credit cards	1.53	0.09	0.44	0.88
Traveler's checks	0.40	0.01	1.18	1.18
Money orders	0.24	0.02	1.79	1.79
Electronic				
Automated clearinghouse	0.28	1.05	0.29	0.29
Wire transfers	0.03[a]	82.11[a]	7.31	7.33
Point of sale	0.02	0.00	0.47	0.47
Automated teller machine	0.01	0.00	0.69	0.66

a. In 1992, wire transfers accounted for approximately 95 percent of all dollars exchanged in trade, but fewer than 0.03 percent of all transactions.

SOURCES: David B. Humphrey and Allen N. Berger, "Market Failure and Resource Use: Economic Incentives to Use Different Payment Instruments," in David B. Humphrey, ed., *The U.S. Payments System: Efficiency, Risk, and the Role of the Federal Reserve*. Boston: Kluwer Academic Publishers, 1990, pp. 45 – 86; and Bank for International Settlements, *Payment Systems in the Group of Ten Countries*. Basle: BIS, December 1993, pp. 469–70.

Precious metals were first used as a medium of exchange around 2500 B.C. in Mesopotamia. Their enduring popularity is based on the fact that they are nonperishable, easily recognizable, and small amounts generally command a large quantity of other goods.

Coins stamped from precious metals, which date back to 700 B.C., represented a significant advance over nonuniform pieces of metal because of their convenient form and their standardized sizes and metal content. Generally, the face value of a coin exceeds the worth of the metal it contains. Over time, this difference — known as seigniorage — has been a reliable source of revenue for mints, which tend to be government monopolies. People are generally more than willing to pay a small seigniorage fee for the convenience of carrying coins. An even larger amount of seigniorage can be extracted when the law requires that coins be accepted as payment for debts regardless of their actual precious metal content.

Paper money, which is backed by either precious metals or the compulsory power of the state, developed in eleventh century China. Paper represented another vast improvement in payments system efficiency because it requires relatively few resources to produce and is less costly than bullion or coins to transport. To work, however, people must have faith in the authority issuing the currency, since low production costs also mean that paper money is relatively easy to debase by printing too much, eroding its ability to act as a store of value. Another problem is that the official engravers must stay at least one step ahead of the counterfeiters.

Acceptance of paper money requires not only the technology to produce a secure currency, but also institutions that inspire public confidence. A hapless thirteenth century Persian court advisor discovered the hard way what happens when the technology is in place but the institutions are not. Rather than accept the newly decreed paper money, merchants closed their shops and hid their wares. To defuse the resulting economic crisis, the paper currency was withdrawn and the official responsible was torn to pieces in the bazaar.[1] Perhaps this helps to explain why central bankers have become such a conservative lot.

Within the territory that ultimately became the Fourth Federal Reserve District, the payments system has undergone most of these same innovations.[2] Two hundred years ago, a local merchant wanting to buy goods from Albany, New York would probably have sent an agent bearing other wares — paper money, coins, and precious metals being scarce on the frontier — to make the purchase, a time-consuming and hazardous process.[3]

A hundred years ago, the procedure would have been much easier and less costly. The buyer could place his order by mail or telegraph and then arrange for his local bank to handle the payment. The banker would face the cumbersome task of finding an institution in Albany that was part of a common clearinghouse, probably in New York City. After debiting the customer's account, the local bank would wire the New York clearinghouse and direct it to transfer the funds from its own account to that of the Albany bank. The Albany bank would in turn pay the supplier. This process, though much improved, was still expensive. The customer would probably even be charged for changing Cleveland dollars to New York dollars. Incredible as it may seem today, newspapers at the time published tables of domestic exchange rates.[4]

■ The Payments System Today

The same transaction can now be completed by phone, fax, or E-mail, and the payment can be made by any of five types of nonelectronic instruments (cash, checks, credit cards, traveler's checks, or money orders) or by four types of electronic instruments (automated clearinghouse [ACH], wire transfer, point of sale, or automated teller machine [ATM]). For the user of these services, the transaction is relatively painless unless something goes awry, such as a check being returned for insufficient funds. Each of these instruments has different production and processing costs, is subject to varying amounts of float (the time between a payor liquidating his obligation and the payee receiving use of the funds), and offers the user different levels of convenience and security.

When vast amounts of money must be moved, wire transfers (Fedwire and the private Clearing House Interbank Payment System, or CHIPS) are overwhelmingly the preferred means of payment because the funds are available almost immediately. In the United States, wire transfers accounted for more than 80 percent of the dollars exchanged in trade in 1987, but comprised only 0.03 percent of all transactions (see table 1).[5] Most transactions are conducted using cash (83 percent) or checks (14 percent), but the dollar amounts tend to be small. As more businesses and individuals become accustomed to paying their bills electronically, the already strong double-digit annual growth in the use of these payment instruments should surge.

The last two columns of table 1 present estimates of the cost per item of various payment instruments. Payor cost is the net expense incurred by a user of a payment service. From this perspective, cash and checks are the least costly alternatives. In fact, checks on average generate a 4-cent benefit to the user.[6] Of course, there is no such thing as a free lunch, and in this case, it is the payee who loses. The delay in accessing the funds is a benefit to the payor (who can earn interest on the float) that just equals the cost to the payee (who loses the opportunity to earn interest on the funds). Thus, on a social basis, the transfer offers no net advantage.

The last column of table 1 presents the social cost of various payment instruments, ignoring float costs and benefits. By this measure, the payor cost per check is 79 cents, because float benefits average 83 cents per check.[7] Consequently, although the float nets out, there is an indirect cost of 50 cents if the payor writes a check rather than initiating an ACH transaction. When considering the total resources expended, cash and ACH are the least costly options. The potential problem that arises because of the divergence between payor and social costs is discussed below.

■ The Federal Reserve's Role: Past and Present

The apparent ease and low resource cost of making payments are the result of many hidden technological and institutional arrangements. Clearly, technology is an essential component of any advanced payments system, but as the brief history above demonstrates, institutional arrangements cannot be ignored. To examine current institutional arrangements in more detail, it is necessary to focus on the Federal Reserve's role in the nation's payments system.

Like the central banks of Europe and Canada, the Federal Reserve is responsible for setting monetary policy and ensuring the stability and integrity of the payments system. To varying extents, all of these institutions are also *providers* of payment services. However, Europe and Canada tend to have highly concentrated markets with relatively few national financial institutions, meaning that a large percentage of payments can be processed internally. Consequently, these nations have less need for a central authority to facilitate payments than does the United States, with its thousands of financial entities spread over 50 states.

The Federal Reserve was created in the aftermath of the Panic of 1907, which led to a clamor for a central bank that could provide an "elastic currency" capable of preventing contractions in the money stock when business turned down. Another of its legislated goals was to reduce the cost of payment services. The establishment of the "gold wire" (leased wire communications between the 12 Federal Reserve Banks) allowed interbank balances to be settled through book entry methods rather than by shipping gold or currency or relying on regional clearinghouses, as was then common. Further, in allowing member banks to transfer funds daily over leased wire at minimal cost, domestic exchange rates were eliminated. Check processing fees were also reduced by banning nonpar checking (charging by the dollar value of a check rather than per item) and lowering the incentives for circuitous check routing.[8]

Prior to 1981, the Federal Reserve provided wire transfers, check processing, and ACH services to member banks that held reserve balances, but it did not explicitly charge for these services. Nonmember banks contracted for similar services from private providers or relied on correspondent relationships with banks that were members of the System. During this time, the Fed initiated some significant innovations in payments efficiency. The most notable was the implementation of MICR (magnetic ink character recognition) encoding in the late 1950s, which enabled checks to be processed by high-speed reader–sorters.

The Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA) drastically altered the makeup of the payments system. Before 1981, the Federal Reserve's no-fee policy meant that it faced less competition from the private sector for its member bank customers. It offered a basic, no-frills level of service, while a few private, value-added providers (those offering more rapid intercity collection or more extensive processing) competed wherever a profitable niche arose. Private providers also encountered reduced competition for nonmember depository institutions' business, since the Fed did not actively pursue those firms as customers. One of DIDMCA's most important effects was to increase the degree of competition in the market for payment services.

DIDMCA required the Federal Reserve to price its services explicitly and to make them available to all U.S. depositories. Over the long run, fees for payment services must be set to recover all direct and indirect costs, including "interest on items credited prior to actual collection, overhead, and an allocation of imputed costs which takes into account the taxes that would have been paid and the return on capital that would have been provided had the services been furnished by a private business firm."[9] Thus, when the Federal Reserve prices its services, return on equity — currently set to equal the average return earned by the nation's 50 largest bank holding companies — is factored in.

DIDMCA has had a largely positive effect on payment services, enhancing competition and lowering unit costs even while improving product quality. Although the Federal Reserve lost about 25 percent of its check processing volume immediately after passage (accounting for about half of its total revenue), the initial loss from member banks was more than offset by steady volume gains from nonmember depositories.

■ Future Challenges

New technology and institutional arrangements require continual reworking of the payments system. In general, there are two ways to boost efficiency. The first is to increase the productivity of payment instruments wherever possible. A good example is the move to an all-electronic ACH system, which was completed at the end of June. Before that, some volume was generated by tapes and diskettes, which are expensive to process. For paper checks, the adoption of imaging — that is, creating an electronic picture of all of a check's components and then storing that information electronically — may permit even further cost savings.

The next phase in the evolution of the payments system is to conduct each step of a transaction (ordering, payment, and inventory) electronically via ACH or financial electronic data interchange (EDI). Payors will benefit through increased control of the timing of payments and the receipt of funds, more accurate record keeping, and potentially lower costs. Although only appropriate for business-to-business transactions, financial EDI can replace paper checks with a less expensive ACH transaction and at the same time reduce accounting costs for both the payor and payee by tracking invoices and payments electronically. Unfortunately, while such systems are now in place, widespread usage will likely be delayed for some time given the coordination problems involved.[10]

The second strategy for improving payments system efficiency is to remove the wedge between payor and social costs caused by float. While it is true that for large dollar payments and payments that occur frequently, the means of payment will probably be negotiated by the parties involved, this is not practical for most transactions. The 50-cent social cost divergence between checks and ACH items may sound inconsequential, but it adds up quickly given the billions of transactions that occur in the United States every year. If the payee really wants to extend the payor a no-cost loan over the float period, both parties could agree to delay the payment and split the savings.

Several strategies could be invoked to reduce or eliminate float costs. In Canada, banks have agreements among themselves to backdate checks. The United States has opted for speeding up the check collection process by transporting the physical checks faster and by offering new services such as electronic check truncation, which converts a paper check to an ACH transaction at the bank of first deposit.

In working toward a more efficient payments system, the Federal Reserve must balance its competing roles. By acting as the chief regulator of the payments system *and* an active participant in the market for payment services, the Fed has a huge influence on the market. As the central bank, it sometimes incurs costs that a private provider of payment services would not, potentially putting itself at a competitive disadvantage. For example, extended Fedwire hours were instituted primarily to improve settlement arrangements in the foreign exchange markets. Though conflicts will continue to emerge because of the Fed's dual role, its active involvement in providing payment services has given central bankers a better understanding of the market—knowledge that they can draw on to help ensure the stability and integrity of the nation's payments system.

Conclusion

Great strides have been made in improving the productivity of the U.S. payments system as technology has taken us from goods to coins to paper to electronics. But while technological innovations are necessary, they are not sufficient to ensure high performance when the appropriate institutional arrangements are lacking.

Technological and institutional changes in the payments system continue to present new challenges. One unavoidable wrinkle is that the Federal Reserve has central bank responsibilities, yet by law must also act as just another private provider of payment services. As a central bank, the Fed is concerned with the health of the banking system as a whole, sometimes incurring costs that a private provider would not and putting itself at a disadvantage relative to its private-sector competitors. It also undertakes some actions that the private sector does not, such as publishing a price list and inviting public comment on changes in its operating procedures. On the other hand, the Fed's dual role does generate some social benefit by enhancing the monetary authorities' knowledge of the payments system.

The move to electronic payments, interstate banking, and bank consolidation, coupled with the entry of new competitors into the payment services market, offers the promise of a more efficient payments system, but it also requires the Federal Reserve to reconsider the way in which it operates.[11] By taking an active role in providing payment services, the Fed is acquiring experience that should help it in that task.

Footnotes

1. See Peter T. White, "The Power of Money," *National Geographic*, vol. 183, no. 1 (January 1993), pp. 80 – 108.

2. The Fourth District includes Ohio, western Pennsylvania, the northern panhandle of West Virginia, and eastern Kentucky.

3. Whiskey was also widely used by frontiersmen for such transactions because it was cheaper to transport over long distances than the grain itself.

4. See Kenneth D. Garbade and William L. Silber, "The Payments System and Domestic Exchange Rates: Technological versus Institutional Change," *Journal of Monetary Economics*, vol. 5, no. 1 (January 1979), pp. 1 – 22.

5. While these are the most recent comprehensive estimates, they should be viewed with caution given the many changes in the payments system over the last seven years.

6. Businesses reap 90 percent of float benefits, mainly because they tend to write checks for larger amounts.

7. Although interest rates are now lower than in 1987, reducing float benefits, the value to businesses remains significant.

8. See Garbade and Silber (footnote 4).

9. From "Services Pricing Policy Statutory Provisions," *Federal Reserve Regulatory Services*, vol. 3. Washington, D.C.: Board of Governors of the Federal Reserve System, March 1994, p. 7.37.

10. For an excellent discussion of the benefits and costs of financial EDI, see Scott E. Knudson, Jack K. Walton II, and Florence M. Young, "Business-to-Business Payments and the Role of Financial Electronic Data Interchange," *Federal Reserve Bulletin*, vol. 80, no. 4 (April 1994), pp. 269 – 78.

11. For a thorough discussion of the likely impact of these market changes, see Allen N. Berger and David B. Humphrey, "Interstate Banking and the Payments System," *Journal of Financial Services Research*, vol. 1, no. 2 (January 1988), pp. 131 – 45.

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The views stated herein are those of the author and not necessarily those of the Federal Reserve Bank of Cleveland or of the Board of Governors of the Federal Reserve System.

Federal Credit Allocation Conference Proceedings Offered

The papers in the August 1994 issue of the *Journal of Money, Credit, and Banking* (part 2) were presented at a conference on "Federal Credit Allocation" held at the Federal Reserve Bank of Cleveland on October 18–19, 1993. The purpose of this conference was to stimulate research and discussion of credit allocation and the associated regulations. To order a copy of the conference proceedings, which will be available in September, please send $8.00 (U.S.) in a check or money order drawn on a U.S. bank to the Federal Reserve Bank of Cleveland, Research Department, P.O. Box 6387, Cleveland, Ohio 44101. Make checks payable to the Federal Reserve Bank of Cleveland.

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