

PERSONAL ON-LINE PAYMENTS

- Personal on-line payment systems— Internet-based systems for making small retail payments—have recently emerged as an alternative to cash, checks, and credit cards.
- All these systems use the web to convey payment information, but they differ in the type of accounts they access: In *proprietary account systems*, funds are transferred between special-purpose accounts maintained by a nonbank provider; in *bank-account-based systems*, funds are transferred between demand deposit accounts at banks.
- Increased acceptance of this payment method will depend on effective risk control and improved settlement arrangements among nonbank providers, a group that currently does not participate in a common clearing system.
- On-line payments are unlikely to have a significant impact on monetary policy, but they do raise some regulatory issues relating to consumer rights and protection.

The rapid growth of e-commerce and the Internet has led to the development of new payment mechanisms capable of tapping the Internet's unique potential for speed and convenience. A recent and especially successful example of such a development is the personal on-line payment: a mechanism that uses web and e-mail technologies to facilitate transfers between individuals.¹

In a typical transaction of this type, the payer accesses the payment provider's web site to initiate a funds transfer. The payer enters information about the transfer along with payment delivery instructions. Notification of the transfer is sent to the payee by e-mail; confirmation by the payee also occurs via e-mail. The payment provider's computer then transfers the funds.

The first on-line payment systems were created by dot-com start-ups in 1999, and their usefulness quickly became apparent in on-line auctions. These systems grew out of the limitations of retail payment instruments in meeting the needs of auction participants. Most notably, the on-line systems' Internet integration greatly simplified the logistics of making and receiving auction payments. By offering virtually instantaneous funds transfer, the systems made for a much faster payment process than did paper checks, which can take up to five business days to clear. Credit and debit cards, obvious alternatives to checks, have also been unsuitable for most auction sellers because few individuals are equipped to receive payments this way. Moreover, on-line payments are

Kenneth N. Kuttner is an assistant vice president and James J. McAndrews a vice president at the Federal Reserve Bank of New York.
<kenneth.kuttner@ny.frb.org>
<jamie.mcandrews@ny.frb.org>

The authors are grateful to Stephanie Heller for insightful comments and to two anonymous referees for additional suggestions. The views expressed are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.

inexpensive compared with credit and debit cards, whose providers typically charge a fee of at least 2 percent of the transaction, with even higher fees for smaller merchants.²

Recently, major financial institutions have also begun to offer similar personal on-line payment services—a sign of the systems' increasingly widespread acceptance.³ Today, there are at least twelve providers. The volume of personal on-line payments, however, is still tiny compared with check volumes. Although comprehensive data are not available for these

The distinguishing feature of the personal on-line payment instrument is its use of the Internet for communicating payment information.

relatively new systems, a rough estimate is that 500,000 personal on-line payments are made each day and \$20 million resides in the accounts of the payment providers. By comparison, check volumes were approximately 186 million payments per day in 1999 and \$600 billion was on deposit in domestic commercial bank transaction accounts in 2000.⁴

Nevertheless, the number of personal on-line payments has grown rapidly over the past three years, and their use in the United States has already surpassed the use of other new electronic methods such as general-purpose "smart cards."⁵ Comprehensive industry data again are not available, but one leading payment provider reported 100,000 transactions per day in August 2000 (less than one year after it launched its service) and 200,000 per day by August 2001. Over that same period, the number of users reportedly increased from approximately 3.5 million to 10 million, and the provider estimates that its user base is currently growing at roughly 70 percent per year.

In this article, we examine the personal on-line payment instrument and some of the issues brought to the surface by its development. We sketch the features common to most of the recent instruments of this type as well as draw a distinction between payment instruments based on existing bank accounts and those provided by nonbanks. The problems created by the proliferation of different systems and the importance of interoperability are also addressed, as are issues related to risk management and regulatory and monetary policy. We conclude with some general observations on these unique instruments.

TYPES OF PERSONAL ON-LINE PAYMENT SYSTEMS

The distinguishing feature of the personal on-line payment instrument is its use of the Internet for communicating payment information (Box 1). In fact, these systems are the first to successfully exploit the Internet for that purpose. Typically, payments are initiated from the payment provider's secure web site, with notification taking place via e-mail. This arrangement cleverly utilizes the increasingly ubiquitous electronic address and delivery system to alert a payee that funds have been sent or to request funds from a payer.

How Do the Systems Work?

The first step in a typical transaction is initiation: the payer accesses the payment provider's web site, using a secure, encrypted connection, where he enters the amount of the funds transfer and the e-mail address of the recipient. In the notification step, the provider's computer sends a message to the recipient containing a hyperlink to the provider's web site. Confirmation takes place when the recipient clicks on this link, establishes a secure connection to the provider's server, and confirms the funds transfer.

Although the mechanics of the transaction are similar, the systems differ according to the type of accounts from which the funds are drawn and the payment networks used for

Personal on-line payment systems introduced thus far generally fall into one of two categories: those based on proprietary accounts held at the provider itself and those based on bank accounts.

completing the transaction. Personal on-line payment systems introduced thus far generally fall into one of two categories: those based on proprietary accounts held at the provider itself and those based on bank accounts. Bank-based systems can be classified further according to whether they use Automated Clearing House (ACH) or automated teller machine (ATM)/point-of-sale (POS) debit card payment networks.

Proprietary Account Systems

The first systems introduced were based on proprietary, nonbank accounts. In these systems, values are transferred between special-purpose accounts created and maintained by a nonbank provider. Deposits to the account can be made using a credit card, directly from a bank account via the ACH network, or by paper check. An important advantage of these

systems is the extremely quick and simple process of completing intraprovider payments: the payment is made through a book-entry transfer and occurs almost immediately after the receiver acknowledges receipt of the e-mail.

A typical person-to-person payment transaction is presented in Exhibit 1. The payer begins by transferring (“downloading”) funds from an existing bank or credit card account to his account at the payment provider. The payer then

Box 1

What Is a Payment Instrument?

A payment is a transfer of monetary value from one person to another. A payment *system* is the mechanism—the rules, institutions, people, markets, and agreements—that make the exchange of payments possible. In general, three elements are required to accomplish this task on a widespread scale: a secure communications system, a set of accounts in which the value to be transferred is stored, and a method of moving value from one account to another. The last element is sometimes called the clearing and settlement system. A payment *instrument* consists of the instructions to transfer value bundled together with the communications system. A payment instrument may use a unique clearing and settlement system or one that is shared among many payment instruments.

Consider a check. Checks are nothing more than written instructions, delivered by hand or by mail, directing the payer’s bank to transfer account balances from the check writer to the payee. The payee’s bank utilizes the system for clearing check payments to have funds transferred from the check writer’s bank to it, typically at a collecting bank at which they both hold accounts. An analogous arrangement characterizes credit card transactions. For payments processed electronically, the card, together with the terminal, creates instructions communicated (in an encrypted format) over telephone lines to transfer money from a line of credit of the cardholder to the payee, again using a clearing and settlement system to transfer funds between the banks involved.

Cash is unique as a payment instrument in that it *self-clears*. It represents value (a liability of the central bank) that is not in an account, but is instead a circulating liability. This feature of cash is supported, at least in part, by its role as legal tender—that is, cash discharges a debt by force of law. As such, the value is transferred at the same time the (hard-to-counterfeit) cash is exchanged. In effect, the communications

system for cash, which is hand-to-hand transfer, also provides its clearing and settlement mechanism.

Wholesale payment systems, such as the Federal Reserve System’s Fedwire funds transfer service, work in a similar fashion to checks and credit cards. Instructions to transfer funds flow through a communications network operated over telephone lines to the Federal Reserve and its participant banks. The Federal Reserve then deducts funds from the account of the sending bank, credits them to the account of the receiving bank, and notifies both banks of the completion of the transaction. Because of the large amounts that are often involved, wholesale systems typically restrict participation to banks, although banks can offer their customers the ability to use these systems indirectly, while retail systems are intended for widespread use by households and firms. In addition, most wholesale payment systems today offer final settlement of the funds transfer between the two banks on the same day—if not in the same minute—as the instruction is entered, while retail systems typically offer final settlement with a delay of at least one day.^a

Payment instruments can be differentiated according to whether they provide distinct means of conveying the instructions to transfer balances between the payer and the payee. Different instruments may be used to transfer value into or out of the same account: checks and Automated Clearing House debits, for example. By the same token, it is also possible for the different instruments to utilize the same underlying clearing and settlement system. In fact, many personal on-line payment instruments do just that.

^aSettlement becomes final when the transfer of funds has occurred and is irrevocable, even, for example, if the payer’s bank fails.

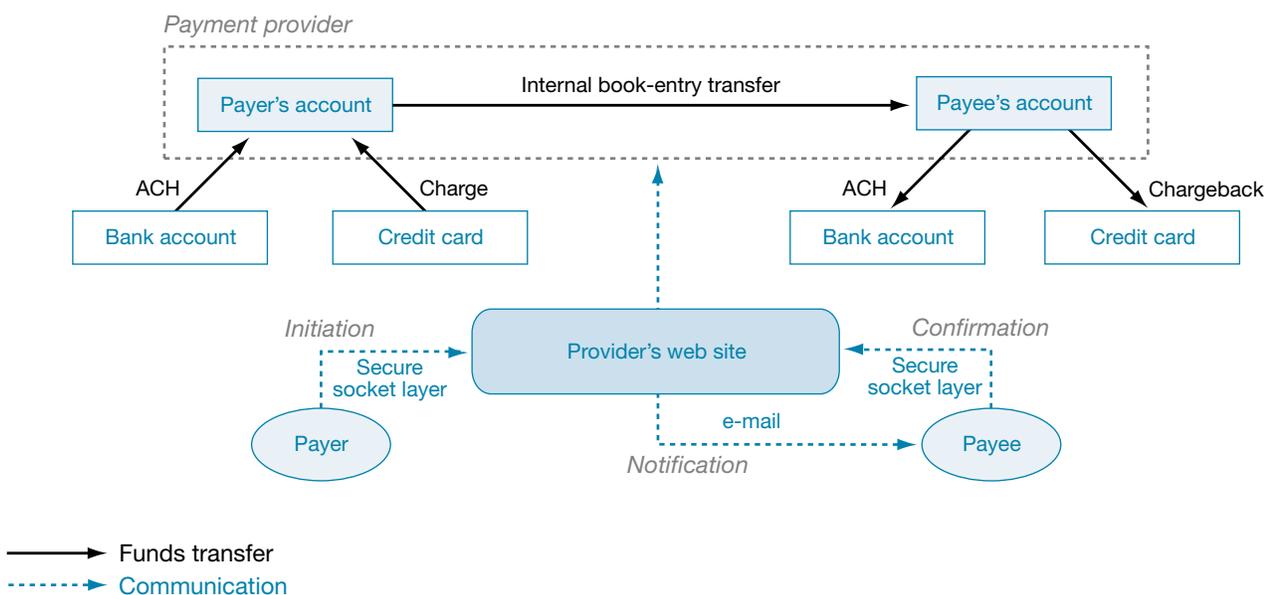
initiates the transfer on the provider's web site, the recipient is notified via e-mail, and the transfer is confirmed. Once the process is complete, the provider's computer transfers the value between the two users' accounts. The recipient can leave the funds in the account for future use, or she may opt to move them to a traditional bank or credit card account.

Two features unique to proprietary account systems are worth noting. First, payments to payees *not* signed up with the same provider either require the payee to establish an account or the provider to use a conventional payment instrument to effect the funds transfer. A payment destined for a bank demand deposit account (DDA) would utilize the ACH network or a paper check. Alternatively, the payment could be completed via a "chargeback" to the payee's credit card. Second, payers who do not wish to maintain a balance with the provider usually can charge payments to a credit card—effectively a just-in-time transfer of value into the account. A key factor in determining whether users decide to maintain positive balances, or opt instead to upload and download funds as needed, is the frequency with which they expect to make payments; this, in turn, will depend on whether on-line payments become widely accepted and the degree of interoperability between competing systems. Broader acceptance and greater interoperability will tend to increase the usage of on-line payments and thus lead to larger average balances maintained in providers' accounts.

Thus far, these proprietary on-line payment services have remained free for consumer transactions, although the transfer of funds to or from the provider sometimes incurs a fee. In an apparent effort to encourage the use of credit cards for such services, credit card companies usually treat the download of value into these accounts as a sale, rather than as a cash advance, which allows the user to avoid interest and cash-advance charges. The provider absorbs the "interchange fee" associated with the transaction, although at least one provider charges a small fee for credit card downloads and ATM withdrawals.⁶ Businesses and high-volume individuals typically pay fees for receiving funds and transferring the funds into DDA accounts. The sum of these two fees is approximately the same as the credit card providers' discount fee, making the cost competitive with traditional credit cards.

One drawback of e-mail-based on-line payments is that they are rather cumbersome for person-to-business payments. Most businesses prefer to have funds transferred automatically to an existing account, rather than receiving an e-mail notification and manually confirming each transfer. This limitation has led to a variation on the basic personal on-line payment scheme—one that combines a proprietary account with a "virtual" signature-based debit card. In such a system, the account holder downloads value to his account in the usual way, but initiation takes place on the merchant's web site rather than on the provider's. The transfer of value takes place over a debit

EXHIBIT 1
Person-to-Person On-Line Payment: Proprietary Account System



card network (either MasterCard's MasterMoney or Visa's VisaCheck, but currently not over a PIN-based debit card system) and settles the next day, just like any other debit card transaction. A major attraction of such a hybrid system is that it leverages the existing debit card network, so it is automatically accepted by the millions of businesses already set up to take debit cards. In addition, the user can employ the debit card in the conventional way to withdraw cash from ATMs and make other purchases at the point of sale.

Bank-Account-Based Systems

Although systems based on proprietary accounts were the first to appear, a number of providers—typically banks—more recently have developed systems that obviate the need to establish a special-purpose transaction account. In these systems, the web and e-mail communications links are similar, but the systems allow a payer to transfer funds directly from his account to that of the payee, even when the payee's account is at a different bank. As in the proprietary-account-based systems, payments from credit cards are also possible, as are payments to credit card accounts via a chargeback transaction. (However, not all providers treat a credit card payment as a purchase rather than a cash advance.)

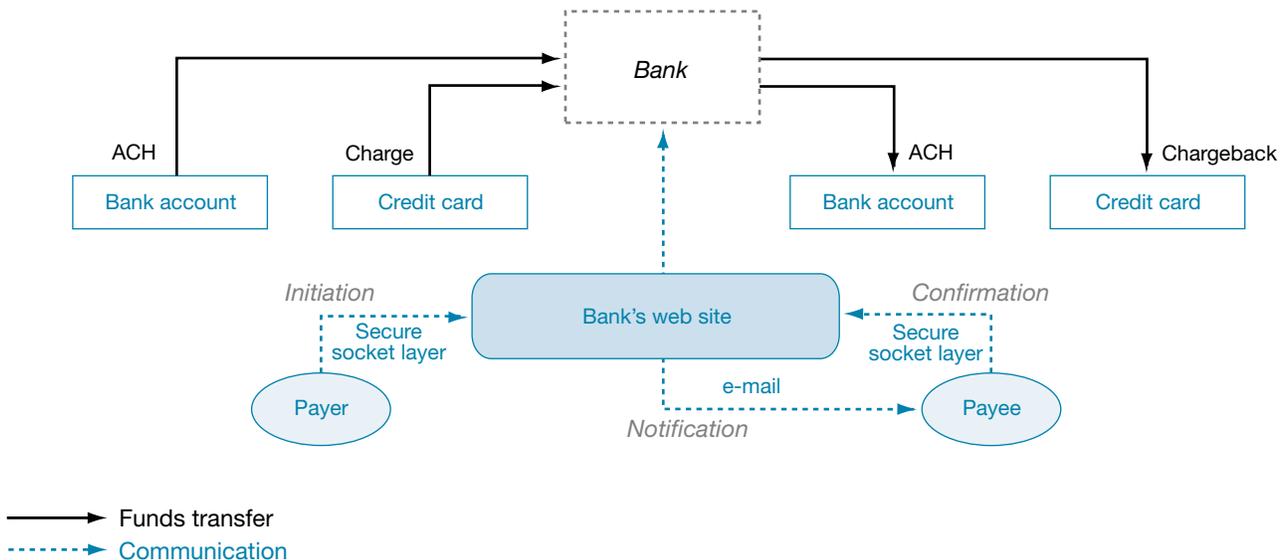
Exhibit 2 depicts a simple transfer of funds in a DDA-based system. The initiation, notification, and confirmation steps are

essentially the same as those in the proprietary account system. The main difference is the source of funds and how value is transferred. Here, the accounts accessed are demand deposit accounts at banks, rather than proprietary funds transfer accounts set up by the payment provider. Essentially, the arrangement provides yet another way to access a bank account, supplementing the check, point-of-sale debit card, telephone-based automated account system, and automated teller machine mechanisms.

A further distinction can be made between those bank-based systems that use the ACH network to transfer funds and those that use the ATM/POS network. The ACH network is relatively slow, typically requiring one to two days for transaction authorization and settlement. By contrast, the ATM/POS network provides a real-time authorization and guarantee to the payee that funds are available, and settlement is usually completed the next day. ATM/POS-based transactions currently require the payee to give her ATM/POS debit card number to the payer, however, which adds a layer of complexity, as well as a security concern, not present in systems based on e-mail addresses.

Furthermore, these bank-account-based systems are typically subject to slightly higher fees than the proprietary account systems. These amounts can either be a fixed charge or a fee based on the amount of the transaction. In some systems, the payer bears the cost; in others, the payee incurs it.

EXHIBIT 2
Person-to-Person On-Line Payment: Bank-Account-Based System



PROLIFERATION AND INTEGRATION OF SYSTEMS

The number of providers of personal on-line payments has grown quickly in the past few years, and there are currently at least a dozen. In what has become a familiar pattern for on-line services, it appears that several firms have entered the business with the intention of quickly gaining market share. This pattern stems from the fact that payment instruments display what are known as positive network effects (McAndrews 1997), which accrue when an increase in the number of users of a good makes the individual user better off. In this case, more widespread acceptance of a certain provider's system makes that provider's services more useful and convenient for an individual user, by virtue of his ability to send payments to and receive payments from a wider circle of people. Product differentiation can work against the network effects, however, as differences between products can be valuable to users with different tastes or needs. If providers cater to customers with distinct tastes, the benefits of product differentiation can outweigh the gains from having a single dominant provider.

If no single firm establishes a dominant position, the fragmentation of the market among competing providers could limit the usefulness and convenience of any provider's product. One way to mitigate that problem would be for different providers to employ some form of interoperability standard, as long as interoperability did not itself prevent product differentiation.⁷

Clearance/Settlement and Interoperability

What does it mean to make payment instruments interoperable? Interoperability allows an account holder at one provider to make a payment to or receive a payment from an account holder at another provider.⁸ This can be accomplished if both providers participate in a common clearing and settlement system, the purposes of which are to account for transactions, transfer payment messages between the providers, and arrange for the transfer of settlement balances (such as balances at a correspondent bank or the Federal Reserve) among providers.

Familiar check-based payments are interoperable in this sense: existing clearing and settlement systems allow a person who holds an account at one bank to pay an account holder at another bank by writing him a check. The check then travels between the payee and the two banks by way of the clearing and

settlement system, and one bank transfers funds to the other at a third bank at which they both hold deposits.

The systems of the nonbank personal on-line payment providers currently are not interoperable in the same way: no clearing and settlement system exists that would allow an account holder on PayPal, for example, to send funds directly to an account holder on ecount.⁹ To effect such a transfer, either the payer or the payee must first register as an account holder with the other provider and then complete the transaction using other payment instruments. Suppose, for instance, that the payee signed up with the payer's provider. The recipient would then have to request that the funds be transferred to her credit card, wait for the funds to clear, and then use the credit card to add funds to her original account. Thus, the systems provide only *indirect* interoperability through their use of other payment instruments, such as credit cards and checks.

The lack of interoperability imposes obvious costs on users, such as the inconvenience of maintaining accounts at multiple providers, not to mention any fees associated with transferring funds between the various accounts. Yet despite these costs, providers may still prefer not to make their systems interoperable. Notwithstanding the expense involved in creating and managing a clearing and settlement system,

Payment instruments display . . . positive network effects, which accrue when an increase in the number of users of a good makes the individual user better off.

interoperability can work to make the products more closely substitutable and thereby increase the competition between the products. The requirement to open an account in order to receive funds, for example, has been a key element in some providers' "viral" marketing schemes. Although costly, the lack of interoperability is not necessarily inefficient, however, especially in such a dynamic, rapidly evolving industry. The gains from imposing full interoperability through governmental or industry action would need to be weighed against the gains from product differentiation and further innovation.

In Canada, the interoperability issue has been resolved by mutual agreement among that country's five leading banks. The agreed-upon system uses Canada's single clearing and

settlement system for interbank payments to transfer funds between banks (for those recipients who do not wish to receive funds on their credit cards). Two factors help explain Canada's rapid, unanimous adoption of a single system. One is Canada's relatively concentrated banking industry (most demand deposits reside at one of the five largest banks). The second is the country's unified payment infrastructure, which uses a single clearing and settlement system for all interbank transfers, large and small: check, ATM, ACH, and POS.

The fully interoperable Canadian system provides an interesting juxtaposition to the more fragmented, less bank-oriented American system. Given the competitive industry dynamics in the United States, it is unlikely that the different payment providers will agree upon the adoption of a new clearing and settlement system in the near future. Instead, the providers will likely continue to rely on the interoperability of each of their systems with the clearing and settlement systems of banks and credit card associations.

There are, however, a number of steps that nonbank on-line payment providers could take to improve interoperability, short of adopting a common clearing and settlement system. For instance, the providers could each hold an account in a common bank, which would effectively serve as the system's settlement agent: when transfers are completed in the common bank, settlement would be complete. Another step would be for providers to employ a bank to make interbank funds transfers on their behalf (or even establish a bank for this purpose). Finally, providers could set up a clearing house arrangement for netting and settling payments.

POLICY ISSUES

Risk

Providers of on-line payment instruments are concerned about the risks of fraud, operational failure, and other liquidity and credit risks because their success depends on maintaining a system that is useful to customers and protects the provider from fraudulent withdrawal of funds from the system. Therefore, it is important to examine the risk control measures employed by these new systems to combat risk.

Fraud is perhaps the most immediate threat faced by on-line payment providers. To address this risk, all the systems register and communicate credit card information using a secure

socket layer—an encrypted connection to the provider's web site. The payer's information is retained by the provider, reducing the need for repeated transmission over the Internet. Another risk control is a limit on the size of payments that can be made. Some providers, for example, limit transfers to very small amounts until the user's identity and address are verified by conventional mail.

Risk is also posed by the extensive use of e-mail. The systems use this medium for various purposes: e-mail serves as a means of communication, the e-mail address acts as an addressing or locating system, and one's e-mail response to a receipt of

The success [of personal on-line payments] depends on maintaining a system that is useful to customers and protects the provider from fraudulent withdrawal of funds from the system.

payment is used, in part, as a means of identifying the payment recipient. A single e-mail account shared by several people naturally will diminish the effectiveness of e-mail as an identifier and a means to communicate to only one person. As a result, additional means to identify the recipient become necessary. Increasing the number of hurdles a user must overcome to transfer value may lower system risk, but at the cost of reducing system convenience.

It is worth noting that the leading personal on-line payment provider grew out of an encryption firm, which indicates that the sponsors recognize the importance of preventing counterfeit and fraudulent claims from being entered against the company. One company official stated that successful providers will have to supply world-class fraud prevention and detection systems to manage this type of risk. If these systems should mature and create a more universal, interoperable system, then the operational risks will loom larger simply because of the larger values involved. In the meantime, it is safe to say that the existing systems are already under intense scrutiny by security experts (as well as hackers) for any possible weaknesses.

Like traditional financial intermediaries, on-line payment providers also face a certain amount of credit and liquidity risk. So far, this risk has been relatively modest: the dollar amounts involved have been too small to create significant risk for the financial system. In addition, nonbank providers generally

maintain the assets in money market funds or at banks, all but eliminating credit and liquidity risk. Therefore, as long as providers continue to keep their funds in short-term, high-quality assets, credit and liquidity risk will not be a major issue.

Regulatory Treatment of Payments

One important issue that could affect the acceptance of on-line payments concerns the rights of consumers when using this payment method. The use of credit and debit cards is governed by a well-established set of legal rights, in addition to any contractual terms agreed to by the card issuer and consumer. In some cases, federal regulations grant consumers a certain amount of protection against fraudulent use of their cards as well as certain rights in case of errors made by the payment provider, including certain rights to resolve errors. Furthermore, consumers' potential losses are limited under the regulations that govern those card payments.¹⁰

In contrast, most personal on-line payments (in particular, those based on proprietary accounts) do not involve a credit or debit card, and therefore the consumer may not enjoy the same set of legal rights that he would in a credit or debit card payment. These rights are governed instead solely by the private contractual terms set out by the providers in the user agreement. It is not clear whether consumers are aware of this distinction, particularly as many of them fund their on-line accounts with a credit card in the first place.¹¹

Regulatory Treatment of Payment Providers

Some personal on-line payment providers are banks and some are not, and this distinction gives rise to differences in regulatory treatment. Bank providers, for example, are required to hold a certain share (3 or 10 percent, depending on the level of deposits) as non-interest-bearing reserves, while nonbank providers currently have no such requirement. In addition, unlike nonbank providers, banks are required to hold a minimum level of capital. Banks are also subject to reporting requirements and periodic examination by supervisory authorities such as the Comptroller of the Currency, the Federal Reserve, the Federal Deposit Insurance Corporation, and state banking agencies. Finally, banks can avail themselves of deposit insurance for account balances up to \$100,000, while nonbank providers cannot offer this protection.

Because nonbank providers of personal on-line payments typically have chosen to invest in low-risk assets, the providers

resemble “narrow banks”—institutions that hold only risk-free, liquid assets, and by doing so avoid the threat of bank runs.¹² Because of this feature, narrow banking is sometimes proposed as a way to render deposit insurance unnecessary. (Nonbank payment providers are not *required* to disclose this information, though.) Consequently, there is probably little demand for traditional deposit insurance. Fraud, however, is a major concern. In light of this concern, some on-line payment providers have offered private insurance against fraudulent use of their customers' accounts, to enhance the attractiveness of their service. (This differs from deposit insurance, however, which insures against bank insolvency.)

These issues raise the question of whether nonbank personal on-line payment providers are in effect banks. The answer depends on the definition of “bank.” If a bank is an institution that “takes deposits and makes loans,” the answer would be no,

Some personal on-line payment providers are banks and some are not, and this distinction gives rise to differences in regulatory treatment.

as these providers typically invest in money market assets, rather than loans.¹³ This is not the only definition of a bank, however. An alternative definition, codified in the Glass-Steagall Act, focuses on the role of banks as deposit takers. The Act precludes any institution other than a state-licensed money transmitter or a state or national bank from engaging in “the business of receiving deposits subject to check or to repayment upon presentation of a passbook, certificate of deposit, or other evidence of debt, or upon request of the depositor.”¹⁴ From an economic perspective, as receivers of funds subject to withdrawal or transfer upon the instruction of customers, nonbank on-line payment providers might be deemed to fit this definition.¹⁵ Alternatively, certain nonbank providers of arguably similar services—for instance, money transmitters such as Western Union and traveler's check firms such as American Express—are legally recognized and are licensed in several states to provide these services.

The resemblance of personal on-line payment providers to narrow banks also raises the issue of the complementarity between lending and deposit taking emphasized in various theories of banking. Some recent theories—such as those of Diamond and Rajan (2001a, b), Kashyap, Rajan, and Stein

(forthcoming), and McAndrews and Roberds (1999)—suggest that the provision of transaction deposits naturally lends itself to wider banking activity, such as lending. In those theories, the provision of transaction deposits creates a form of liquidity that can be utilized to make loans more cheaply than those offered by other firms. If those theories are correct, and apply to the personal on-line payment providers, then the providers might be transformed, over time, into more bank-like firms to take advantage of this economy. In contrast, the transmitters of small-value wire transfers and traveler's checks, although similar to personal on-line payment providers, have not transformed themselves into lenders, as these theories might imply.

These theories suggest that firms that provide only payment services and maintain funds in low-risk and low-return assets may have a difficult time recovering all the costs of their activities. Again, the evidence provided by the long-term viability of wire transfer and traveler's check firms suggests that some payment providers can earn normal profits without engaging in full-fledged banking. This evidence is supported by alternative theories of banking that maintain that the complementarity between deposit taking and lending is weak, and that the two activities can be separated without sacrificing efficiencies.

Monetary Implications

The development of new electronic payment mechanisms raises interesting questions for monetary policy. Some observers have even expressed concern that introducing what is in effect a private currency may undermine the Federal Reserve's control of monetary policy. Such concern is unwarranted, however, at least for the personal on-line payment systems described here. Although the widespread adoption of on-line payments may alter some familiar economic relationships or call for technical changes in the definitions of the monetary aggregates, on-line payments in their current form will not threaten the Federal Reserve's ability to conduct monetary policy in the foreseeable future.¹⁶

Perhaps because these systems all rely on the Internet, it is easy to overestimate their novelty: from a monetary perspective, personal on-line payments are in fact more evolutionary than revolutionary. For years, it has been possible to transfer balances electronically between banks, and the recently introduced bank-based on-line payment instruments do little more than make that technology more readily available to the consumer.¹⁷ In DDA-based systems, web and e-mail

technologies therefore merely replace paper checks as payment instructions and communications links.

The growth of personal on-line payments at *nonbank* providers could have some monetary effects, but these would be of a minor, technical nature. Data on balances held at nonbank providers are not collected, nor are they included in the monetary aggregates (such as M1) as currently defined. This would make the aggregates an imperfect gauge of the reservoir of "liquidity" available for spending, and could further reduce the aggregates' information content. If this were a concern, the impact could easily be remedied by extending

From a monetary perspective, personal on-line payments are in fact more evolutionary than revolutionary.

the aggregates' definition to include balances held at nonbank providers.¹⁸ In any case, prior waves of financial innovation have already diminished the information content of the monetary aggregates to the point where they have lost their status as policy targets.¹⁹ A related, and equally inconsequential, effect would be any change in the so-called money multiplier brought about by changes in the reserve-to-deposit or currency-to-deposit ratios, similar to the change brought about by the adoption of "sweep" accounts in recent years.

These technical factors may have some effect on the monetary aggregates, but they are unlikely to have a discernible impact on U.S. monetary policy or its efficacy. Although the textbook description of monetary policy involves the control of the money supply,²⁰ current Federal Reserve policy focuses on an interest rate target, adjusting open market operations in light of changes in money demand. Current policy would thereby insulate interest rates from any shift in consumers' preferences from reservable bank deposits, for example, to nonreservable balances at on-line payment providers. Only if the volume of bank liabilities *per se* mattered, would such changes affect monetary transmission.²¹

Looking ahead into the more distant future, some observers have imagined a world in which virtually *all* payments will have gone on-line, drastically reducing banks' demand for reserve balances.²² Leaving aside questions of plausibility, such an extreme situation would undoubtedly present new and unforeseen challenges to monetary policy, and it is reasonable to ask whether policy would remain effective. A complete analysis

of that possibility is well beyond the scope of this article. However, it is important to emphasize that all of the on-line payment instruments described here retain the U.S. dollar as the unit of account, and as long as settlement ultimately takes place in dollar-denominated Federal Reserve balances, the Fed will retain leverage over short-term interest rates.²³

Indeed, payment systems based on nondollar standards have appeared from time to time, and some of these systems

make use of the Internet for initiating and confirming payments (Box 2). If one of these systems were to gain widespread acceptance, it could, in theory, pose a more fundamental challenge for monetary policy. However, use of these nondollar systems has remained very limited, and given their costs and limitations, it is hard to imagine that any one of them could ever displace the dollar as the dominant unit of account in the foreseeable future.

Box 2

New Parallel Money

The new payment instruments described in this article are based on the U.S. dollar. Accordingly, although they replace paper currency or checks as a payment instrument, the dollar retains its basic functions as a unit of account and a store of value. The link to the dollar is maintained by the guarantee of convertibility: users may convert balances at par into cash, bank account balances, or credit card balances at any time.

However, not all payment instruments are based on the dollar. Some actually replace the dollar with a proprietary or commodity-based standard and offer only limited convertibility into dollars. We describe below three examples of this “parallel money” and trace its origins to older, nonelectronic systems.

E-Barter

One form of parallel money has been developed for use in on-line barter transactions, or “e-barter,” which has grown in popularity among businesses. Typically, these arrangements offer participating businesses a way to trade their excess inventories for needed supplies.^a Rather than posting prices in dollars, participants quote prices in the sponsoring firm’s proprietary unit of account. In most systems, there is a stated notional conversion rate between this unit of account and a dollar (usually one-for-one), and in some cases it is possible to purchase e-barter credits with dollars. However, the provider is generally not committed to redeem these e-barter credits for dollars; consequently, the purchasing power of the credits could, in principle, deviate from dollar-denominated prices.

According to the providers, one advantage of e-barter is that it allows firms to economize on their use of cash. It is not entirely clear, however, how this translates into a real benefit to firms. For instance, if a firm has \$1,000 worth of widgets to sell, it is hard to see the advantage in trading those widgets for \$1,000 worth of barter credits, rather than cash. Tax avoidance is presumably not

a factor, as e-barter providers report to the IRS the dollar-equivalent proceeds of barter transactions. Instead, barter arrangements may facilitate price discrimination—that is, one can sell the inventory at two prices to two types of customers, distinguished by their willingness to accept barter.

Although monetary payment systems have almost completely displaced barter in modern economies, barter systems have occasionally cropped up in the guise of alternative currencies. Perhaps the best-known recent example is Ithaca Hours, which have circulated in the Ithaca, New York, region since 1993.^b The unit of account in this system is the Hour, which is supposed to reflect the labor used in providing the good or service. Ithaca Hours may be purchased at a fixed exchange rate of \$10 for one Hour, but like the e-barter systems, Hours are generally not convertible back into cash.

E-Loyalty Points

Another money-like system involves the “points” some merchants offer their customers in return for the purchase of their products. Accumulated points can then be redeemed for prizes, or for more products of that company or a set of participating partners. The idea is to build brand loyalty by giving customers an incentive for repeat purchases. The ubiquitous frequent-flyer miles are the best-known example of such a system. The idea has recently been extended by e-commerce providers, some of whom have begun to offer “e-loyalty” points for on-line purchases.^c In fact, the S&H Green Stamps trading stamp program, popular in the 1960s and 1970s, has recently been reincarnated as on-line “GreenPoints.”

Although these e-loyalty points resemble money in the way that they define a unit of account, they lack many of the essential features of full-fledged parallel money. Most conspicuously, the points are generally nontransferable, which prevents them from circulating as a medium of exchange.^d No points are convertible directly into dollars.

New Parallel Money (Continued)

On-Line Commodity-Based Moneys

Perhaps the most radical direction taken by parallel money arrangements combines electronic book-entry transactions with a unit of account and store of value based on a precious metal, such as gold.^c In this system, account balances represent physical quantities of gold and transactions are ultimately denominated in those terms. Balances can be converted into cash at the prevailing market price.

This arrangement represents the most complete parallel money system, encompassing all the traditional functions of money. Except for the ability to initiate transfers electronically, the system is indistinguishable from the one developed by medieval goldsmiths, in which paper claims on physical stocks of gold circulated in lieu of the metal itself. This arrangement was displaced throughout Europe in the 1400s by the fractional reserve banking system we have today. The main reason for its demise was its high cost: gold earns no interest, yet requires tight security to prevent theft. The same high costs will probably

prevent on-line commodity-based moneys from gaining widespread acceptance, despite the advantages offered by electronic access.

^aExamples of e-barter providers are Bigvine, uBarter, and BarterTrust. For an overview, see Lorek (2000).

^bSee <<http://www.lightlink.com/ithacahours>>. Other local currencies are described in Graham (1996). A classic reference on barter systems is Radford (1945).

^cExamples include beenz and Yahoo! Points.

^dThe “dollars” issued by the Canadian Tire retailer *were* transferable, however, and enjoyed some limited circulation as a medium of exchange.

^eExamples of such systems are e-gold, IceGold, and GoldMoney; also see Ballve (2001).

CONCLUSION

Despite their relatively short track record, personal on-line payment systems have already proven to be especially useful for accommodating small payments made in e-commerce. These systems are also providing a convenient alternative to paper checks, money orders, and cash for a variety of transactions, and they may replace credit cards for some small-scale retail commerce.

Accordingly, we can make a number of observations relevant to the evolution of electronic payments. For example, personal on-line payments were developed in response to a specific market demand, and this fact likely accounts for much of their success. Persons selling items in on-line auctions could not accept credit cards—the usual way of making consumer-to-business payments on-line—and checks represented a payment option that was neither integrated with on-line auctions nor particularly fast or safe. This attention to market demand allowed personal on-line payment providers to put a working payment instrument into the market quickly, and significant volume ensued. In contrast, some electronic stored-value payment instruments, offered by smart-card providers, have been in development for years, and few real market transactions have yet to be processed on the providers’ systems.

Furthermore, personal on-line payment instruments use the systems of the credit card associations, the Automated Clearing House, and the electronic fund transfer networks to clear and settle payments. This relationship between the new payment instrument and the existing payment systems is therefore complementary. And while personal on-line payments will probably never replace conventional payment instruments, they may actually increase the number of transactions flowing through the credit card systems (a form of “clicks-and-bricks” synergy). As a result, by utilizing existing systems for clearing and settlement, personal on-line payment providers have been able to succeed where others have failed. The alternative—building a new clearing and settlement network from scratch—would have required large investments and would have offered users of existing systems a less familiar way to make payments.

A final observation concerns these new systems’ use of increasingly popular e-mail. The use of e-mail was innovative, and in retrospect it represented a natural approach to delivering payment information on-line. A lesson here is that the use of e-mail to deliver information, while relying on existing secure clearing and settlement systems to transfer value, may ultimately be more practical than more ambitious schemes to transmit digitized stored value directly.

Going forward, we note that other novel uses for these payment systems are in the wings. For instance, most on-line payment providers have plans to offer a capability for making purchases from mobile wireless devices such as cell phones. Another plan is to allow consumers to make anonymous purchases by concealing their identity from merchants. A third goal is to enable small transfers to be made between individuals. Some providers have even marketed their products as a way to fund spending by teenagers and college students while avoiding the risk of overdrafts and overrun credit limits. Finally, another use for these systems involves the delivery of on-line rebates and gift certificates, where integration with the merchant's web site confers a unique advantage over paper checks.

Our review of these innovative systems suggests that although their monetary effects are not likely to be great, their regulatory treatment is likely to evolve. Moreover, the status of various issues relating to personal on-line payments remains open to discussion. These issues include the incorporation of payment transactions in the monetary aggregates, consumer protection rights, the regulatory regime to which the providers are subject, the insurability of deposits in the providers' on-line accounts, and the reservability of the deposits. The development of personal on-line payments therefore compels us to revisit two central questions of economics and law: What is money? and What is a bank?

ENDNOTES

1. Providers of this type of payment service include PayPal, ecount, Citigroup's c2it, BillPoint, and CertaPay in Canada.
2. See Chakravorti and Shah (2001) for information on credit card fees.
3. However, on-line auctions still represent a major source of the demand for on-line payments: eBay alone reports that on any given day it hosts millions of on-line auctions, with more than 600,000 new items joining the "for sale" list every twenty-four hours. See <<http://pages.ebay.com/community/aboutebay/overview/benchmarks.html>>.
4. The 1999 check volume data, the most recent available, are from the Bank for International Settlements (2001, p. 105). The level of deposits is from the Board of Governors of the Federal Reserve System (2001, p. A15).
5. General-purpose smart cards differ from "closed-system" smart cards—which are widely used in some transportation, building access, document reproduction, and laundry facilities—in that the general-purpose cards are meant to be accepted and used in a wide range of businesses. Closed-system cards are intended primarily to serve a single use.
6. An interchange fee is a fee charged by the credit-card-issuing bank to the merchant's bank. Merchants pay a "discount fee" that typically is equal to the interchange fee plus a small markup.
7. The Visa and MasterCard credit card systems originally required that their members not issue the other brand of credit card, and if a member issued one brand it could not accept the merchant receipts of the other brand. The two systems later dropped these restrictions, essentially making themselves interoperable. The Discover credit card system and the American Express charge card system operate independently and are not interoperable (according to the definition used in this article) with each other or with Visa and MasterCard.
8. This definition of interoperability focuses on the use of a common clearance and settlement system for the instrument, rather than on technical aspects of interoperability. It is useful to point out that a person cannot pay another person with a check by increasing the line of credit on the recipient's credit card. Instead, the check typically must clear and settle either for a cash payment or for deposit into the recipient's bank account. In that sense, credit cards and checks are not interoperable according to this definition, even though both methods offer a widely used payment system.
9. Interoperability is less of an issue for bank-account-based systems, which all rely on the bank clearing and settlement system for funds transfers.
10. A number of federal regulations affect the rights and responsibilities of parties using credit cards, debit cards, checks, or deposit accounts. For example, Regulation E establishes the rights, liabilities, and responsibilities of parties in electronic funds transfers and protects consumers when they use such systems. Regulation Z prescribes uniform methods for computing the cost of credit, for disclosing credit terms, and for resolving errors on certain types of credit accounts. More specifically, Section 205.11 of Regulation E and Section 226.13 of Regulation Z both prescribe methods of resolution of errors (of different sorts) by the payment provider. The Federal Reserve has not yet interpreted these regulations as applying to providers of personal on-line payment systems.
11. A similar set of issues arises in the context of "electronic money" and stored-value devices. See American Bar Association Task Force on Stored-Value Cards (1997, pp. 653-72) and Group of Ten (1997).
12. For more information on narrow banks, see Litan (1987).
13. The definition paraphrases the definition of a bank contained in the Bank Holding Company Act of 1956, which considers a bank an institution that "(i) accepts demand deposits or deposits that the depositor may withdraw by check or similar means for payment to third parties or others; and (ii) is engaged in the business of making commercial loans" (Bank Holding Company Act of 1956, Section 2(C)(1) codified at 12 U.S.C. 1841(c)).
14. Glass-Steagall Act, Section 21A(2) codified at 12 USCS § 378(a)(2).
15. The definition of a "deposit," given in the Federal Deposit Insurance Act, is long and involves funds held by a bank. Therefore, at least in part, it involves the judgment that the institution concerned is a bank.
16. Blinder (1995) and Freedman (2000) reach similar conclusions on the likely monetary impact of stored-value cards and other forms of "electronic cash."

ENDNOTES (CONTINUED)

17. A similar point is made by Blinder (1995).

18. Traveler's checks are an example of a privately issued nonbank liability that is included in the M1 monetary aggregate.

19. This deterioration is documented in Friedman and Kuttner (1992, 1996). Beginning in 1993, the Federal Reserve in its semiannual report to Congress reported only "ranges" for broad money and debt growth; even these were dropped in July 2000.

20. The canonical statement of this process can be found in Mishkin (1997, pp. 436-47).

21. Although most recent macroeconomic models have emphasized interest rates over monetary aggregates, the quantity of money remains a key element in some theories of monetary transmission, such as those of Fuerst (1992) and Stein (1998).

22. See, for example, Friedman (1999), Goodhart (2000), and King (1999).

23. See Woodford (2000). Friedman's (2000) rejoinder to Woodford questions this conclusion on practical grounds, and argues that such developments could still decouple monetary policy from economic activity at the margin.

REFERENCES

- American Bar Association Task Force on Stored-Value Cards*. 1997. "A Commercial Lawyer's Take on the Electronic Purse: An Analysis of Commercial Law Issues Associated with Stored-Value Cards and Electronic Money." *BUSINESS LAWYER* 52, no. 2 (February): 653-727.
- Ballve, Marcelo*. 2001. "Cyber Currencies Spawn 21st Century Gold Rush." *SALON*. <<http://www.salon.com/tech/wire/2001/06/17/gold/index.html>> (June 17, 2001).
- Bank for International Settlements*. 2001. "Statistics on Payment Systems in the Group of Ten Countries." February.
- Blinder, Alan S.* 1995. "Statement before the Subcommittee on Domestic and International Monetary Policy of the Committee on Banking and Financial Services, U.S. House of Representatives." October 11.
- Board of Governors of the Federal Reserve System*. 2001. *FEDERAL RESERVE BULLETIN*, January.
- Chakravorti, Sujit, and Alpa Shah*. 2001. "A Study of the Interrelated Bilateral Transactions in Credit Card Networks." Federal Reserve Bank of Chicago Emerging Payments Occasional Paper no. EPS-2001-2.
- Diamond, Douglas, and Raghuram Rajan*. 2001a. "Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking." *JOURNAL OF POLITICAL ECONOMY* 109, no. 2: 287-327.
- . 2001b. "Banks and Liquidity." *AMERICAN ECONOMIC REVIEW* 91, no. 2 (May): 422-5.
- Freedman, C.* 2000. "Monetary Policy Implementation: Past, Present, and Future—Will Electronic Money Lead to the Eventual Demise of Central Banking?" *INTERNATIONAL FINANCE* 3, no. 2 (July): 211-28.
- Friedman, Benjamin M.* 1999. "The Future of Monetary Policy: The Central Bank as an Army with Only a Signal Corps?" *INTERNATIONAL FINANCE* 2 (November): 321-38.
- . 2000. "A Response to Goodhart, Freedman, and Woodford." *INTERNATIONAL FINANCE* 3, no. 2 (July): 261-72.
- Friedman, Benjamin M., and Kenneth N. Kuttner*. 1992. "Money, Income, Prices, and Interest Rates after the 1980s." *AMERICAN ECONOMIC REVIEW* 82, no. 3 (June): 472-92.
- . 1996. "A Price Target for U.S. Monetary Policy? Lessons from the Experience with Money Growth Targets." *BROOKINGS PAPERS ON ECONOMIC ACTIVITY*, no. 1: 77-146.
- Fuerst, Timothy S.* 1992. "Liquidity, Loanable Funds, and Real Activity." *JOURNAL OF MONETARY ECONOMICS* 29, no. 1 (February): 3-24.
- Goodhart, Charles*. 2000. "Can Central Banking Survive the IT Revolution?" *INTERNATIONAL FINANCE* 3, no. 2 (July): 198-210.
- Graham, Ellen*. 1996. "Community Groups Print Local (and Legal) Currencies." *WALL STREET JOURNAL*, June 27, p. B1.
- Group of Ten*. 1997. "Electronic Money: Consumer Protection, Law Enforcement, Supervisory, and Cross-Border Issues." April.
- Kashyap, Anil, Raghuram Rajan, and Jeremy Stein*. Forthcoming. "Banks as Liquidity Providers: An Explanation for the Co-Existence of Lending and Deposit-Taking." *JOURNAL OF FINANCE*.
- King, Mervyn*. 1999. "Challenges for Monetary Policy: New and Old." *Bank of England QUARTERLY BULLETIN* 39 (November): 397-415.
- Litan, Robert*. 1987. *WHAT SHOULD BANKS DO?* Washington, D.C.: Brookings Institution.
- Lorek, Laura*. 2000. "Trade Ya? E-Barter Thrives." *INTER@CTIVE WEEK*. <<http://www.zdnet.com/intweek/stories/news/0,4164,2615766,00.html>> (August 14, 2000).
- McAndrews, James J.* 1997. "Network Issues and Payment Systems." Federal Reserve Bank of Philadelphia *BUSINESS REVIEW*, December: 15-25.
- McAndrews, James J., and William Roberds*. 1999. "Payment Intermediation and the Origins of Banking." Federal Reserve Bank of New York *STAFF REPORTS*, no. 85.

REFERENCES (CONTINUED)

Mishkin, Frederic M. 1997. *THE ECONOMICS OF MONEY, BANKING, AND FINANCIAL MARKETS*. 5th ed. New York: Addison-Wesley.

Mulqueen, J. 2000. "Green Stamps Make Comeback on Web." *INTER@CTIVE WEEK*. <<http://www.zdnet.com/intweek/stories/news/0,4164,2604852,00.html>> (July 17, 2000).

Radford, R. A. 1945. "The Economic Organisation of a P.O.W. Camp." *ECONOMICA* 12, no. 48 (November): 189-201.

Stein, Jeremy C. 1998. "An Adverse-Selection Model of Bank Asset and Liability Management with Implications for the Transmission of Monetary Policy." *RAND JOURNAL OF ECONOMICS* 29 (autumn): 466-86.

Woodford, Michael. 2000. "Monetary Policy in a World without Money." *INTERNATIONAL FINANCE* 3, no. 2 (July): 229-60.

The views expressed in this article are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System. The Federal Reserve Bank of New York provides no warranty, express or implied, as to the accuracy, timeliness, completeness, merchantability, or fitness for any particular purpose of any information contained in documents produced and provided by the Federal Reserve Bank of New York in any form or manner whatsoever.