



**EMERGING ELECTRONIC METHODS
FOR MAKING RETAIL PAYMENTS**

JUNE 1996

The Congress of the United States
Congressional Budget Office

Preface

Financial intermediaries such as banks and credit card companies are developing products that will enable consumers and businesses to pay for small-dollar purchases electronically. The new payment methods have been made possible by advances in computer and data communications technology. This Congressional Budget Office (CBO) study examines how the new forms of electronic payment will affect the market for retail payments and the implications they will have for federal policy. CBO prepared this study at the request of the Senate Committee on Banking, Housing, and Urban Affairs. In keeping with CBO's mandate to provide objective and impartial analysis, this report makes no recommendations.

Judith S. Ruud and Philip Webre of CBO's Natural Resources and Commerce Division wrote the report under the supervision of Jan Paul Acton and Elliot Schwartz. The staffs of the Board of Governors of the Federal Reserve System, the Office of the Comptroller of the Currency, the Federal Deposit Insurance Corporation, and the General Accounting Office provided many helpful suggestions and comments. CBO analysts Mark Booth, Matt Eyles, Kim Kowalewski, and Mary Maginniss provided valuable comments and assistance. The authors also wish to thank Mark Bernkopf, Nolani Courtney, Robert Ledig, John Lewis, Herbert Lin, Thomas Vartanian, and John Wenninger for their useful reviews.

Sherry Snyder edited the manuscript, and Christian Spoor provided editorial and production assistance. Angela Z. McCollough typed the many drafts, assisted by Rae Wiseman. Kathryn Quattrone and Jill Sands prepared the study for publication.

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June 1996

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Summary

In modern economies, individuals and businesses can pay for most purchases in a variety of ways. They can use cash, checks, debit cards, credit cards, traveler's checks, or money orders. Subject to certain regulatory and reporting restrictions, the parties in the transaction can choose which payment method to use, based on factors such as convenience and cost.

Financial intermediaries such as banks and credit card companies are interested in introducing small-dollar, or retail, payment methods that are based on sophisticated computer technology. Most large-dollar, or wholesale, payments in the United States, usually denominated in the millions of dollars, are already conducted electronically through either Fedwire—a computer network that connects Federal Reserve Banks with more than 11,000 domestic depository institutions—or a similar private system known as CHIPS (Clearing House Interbank Payment System). The new retail payment methods would bring electronic technologies to financial transactions conducted by individuals and smaller, nonfinancial organizations. Financial intermediaries hope to profit from the new products through a combination of fees and interest income.

The emergence of these new electronic payment methods raises some federal concerns. One set of policy issues deals with whether and how regulations such as reserve requirements, deposit insurance, and consumer protection laws will apply. Other federal issues include the effect of the new payment methods on the federal budget and monetary policy. Gener-

ally, this Congressional Budget Office (CBO) study suggests that the market for those payment methods is likely to emerge slowly, allowing time for gradual adjustment.

Emerging Retail Payment Mechanisms

Most of the proposals involve one of two types of electronic payment methods for making retail purchases:

- o Prepaid stored-value cards, or
- o On-line payments made through the Internet—a worldwide computer network—and related computer networks.

Prepaid stored-value cards are about the size and shape of a credit card. Rather than deducting the money from a checking account or adding to a credit account, however, consumers buy cards with value already stored on them, much like the cards with a magnetic stripe that phone companies and transit authorities issue. The cards function just like a traveler's check: the consumer pays up front, gets a card (or paper checks, in the case of traveler's checks) to authorize a certain amount of purchasing power, and spends down that value over time. The companies introducing stored-value cards plan to make them so inexpensive that they can be used in low-value trans-

actions for which credit cards or debit cards would be too expensive, such as when buying goods in a fast-food establishment or from a vending machine.

In the case of on-line payments, consumers typically use their personal computer to log on to the Internet or other public computer network. Special software (and in some cases, hardware) allows consumers to use their financial accounts to make purchases while connected to the network, or on-line, in a manner similar to making a catalog purchase over the telephone today. Those on-line payment methods typically use encryption and other techniques to permit consumers secure use of a credit card or checking account over the unsecured networks. Some of the proposed systems would be linked to existing credit and other nonnetwork accounts, but many proposals feature pure on-line debit accounts.

Both stored-value cards and on-line payment systems are new commercial products being offered mainly by financial intermediaries and software companies. They will be delivered using the same computer networks and financial relationships currently used for credit card purchases or cash withdrawals from automated teller machines (ATMs). Trials and pilot programs are under way in numerous locations in the United States, and would-be issuers are trying to work out the details of the products for larger introductions.

The new forms of electronic payment face significant technical, marketing, and policy uncertainties. A great deal is unknown about the demand for new payment methods, and the commercial contracts among the suppliers have not yet been clearly defined. The Federal Deposit Insurance Corporation and the Federal Reserve are attempting to resolve some of the policy issues, such as whether the balances on stored-value cards and on-line accounts will be covered by deposit insurance and subject to reserve requirements. Other policy questions have not yet been addressed, such as whether firms that are not depository institutions—and are therefore not subject to strict supervision and regulation—will be allowed to issue the new payment methods. Banks, thrifts, and credit unions are depository institutions, but credit card associations and software companies are not.

Stored-Value Cards

Stored-value cards will probably be used for purchases under \$10—those for which using checks and credit cards is too costly. Thus, stored-value cards are designed to replace cash, not checks or credit cards.

The need for greater security when replacing cash dictates a shift toward so-called smart-card technology, which integrates computer chips into a card roughly the size and shape of a credit card. In one sense, many smart cards are personal computers miniaturized to the size of a credit card. Like personal computers, smart cards are a general platform that can be used for many applications.

One such application is the stored-value card. Most cards in use today store value with a magnetic stripe. With a computer chip, however, stored-value cards essentially hold an electronic ledger. That ledger is typically encrypted to ensure that the value can be spent only once. When a purchase is made, the funds from the ledger are then copied into the memory of the merchant's card reader. When the funds are exhausted, the card is either thrown away or recharged, depending on the type of card.

Current Market Developments

Stored-value cards that have a single purpose, such as paying for fares on mass transit, are used throughout the world, and chip-based cards are in widespread use outside the United States, primarily for telephone services. By contrast, general-purpose stored-value cards are only now being tested in pilot programs, many of which are being conducted by banks and major credit card companies. The three pilot programs garnering the most attention involve Mondex in Swindon, England; Visa and three banks at the 1996 Summer Olympics in Atlanta, Georgia; and Visa, MasterCard, and two banks in New York City.

Swindon, England. Since July 1995, Mondex, a British technology company, in conjunction with National Westminster and Midland Banks, has had a

stored-value card trial under way in Swindon, a town in the south of England. Mondex claims that 8,000 consumers and 75 percent of the town's 1,000 merchants have participated in the trial. Mondex had initially estimated that 40,000 consumers would participate.

Atlanta. The trial for stored-value cards that is now receiving the most attention in the United States is one organized through Visa for the 1996 Olympics in Atlanta, Georgia. With those cards, visitors to the Olympic games—expected to be close to a million people—will be able to buy many items from vendors at the games and even from restaurants and other merchants in Atlanta itself. Three participating banks will issue the cards, much as ATM cards are issued. Visa will coordinate the payment system, just as it does for its credit cards.

The cards used at the start of the trial will be disposable, with preset denominations of \$10, \$20, \$50, and \$100. Eventually, consumers will be able to recharge the cards at a card-dispensing machine or a suitably equipped ATM. As an incentive to use the cards, at least one of the participating banks intends to mail a joint ATM/stored-value card to all its depositors who use ATMs.

New York. In April 1996, Visa and MasterCard, in conjunction with two New York banks, Citibank and Chase Manhattan, announced that they will begin a pilot program in New York City starting at the end of 1996. The companies hope to recruit 50,000 customers and 500 merchants for that test. The sponsors selected the Upper West Side of Manhattan for the pilot program because the concentration of customers and small retailers in that area would enable the companies to achieve a critical mass of both customers and merchants quickly.

This pilot is the first joint venture by Visa and MasterCard to develop stored-value products that are interoperable, just as their credit cards are. Merchants will be able to use the same equipment to process payments made with either a Visa or MasterCard. As a result, the cards from the Atlanta pilot can also be used in the New York pilot.

Potential Markets

Estimates of potential markets for stored-value cards can be based on the total use of cash in the economy or on an analysis of specific niches in which stored-value cards can play a role. Both analyses conclude that a market the size of that for traveler's checks—\$20 billion yearly—is not inconceivable if stored-value cards capture even a small fraction of their targeted markets. Achieving a market of that size, however, would be a very successful outcome for vendors of stored-value cards, and a smaller market would be much more likely in the near term. Annual sales of \$20 billion for stored-value cards should not pose a significant challenge to the operation of monetary policy or the safety and soundness of the financial system.

Cash in the Economy. Although most consumer transactions are made with cash, cash transactions actually represent only a small share of total expenditures, except in families with low income. By adjusting the results of a recent Federal Reserve telephone survey of patterns of consumer spending, and combining them with the national income and product accounts, CBO was able to derive a rough estimate of the use of cash in the economy. Cash payments account for approximately \$1 trillion of consumer expenditures—that is, roughly 20 percent of net consumer expenditures of about \$5 trillion. Therefore, for every 1 percent of cash transactions that were replaced with stored-value cards, issuers would sell \$10 billion worth of cards.

Analyses of Specific Markets. CBO looked at three markets commonly cited as potential major users of stored-value cards: fast-food restaurants, vending machines, and convenience stores. Consumers spend more than \$200 billion a year in those three markets. The differences between the three markets illustrate the difficulties that stored-value cards face: since the product has not yet been widely accepted, each potential user expects something different. In each market, however, stored-value cards must deliver benefits in excess of their costs and, at least for some participants, offer more net benefits than existing payment methods.

On-line Payments

Proposals to develop on-line payment methods are driven largely by the desire to exploit for commercial purposes the Internet and its user-friendly component, the World Wide Web. The Internet is essentially a second telephone system, but one that links computers, not telephone receivers. Tens of millions of computers are in the hands of businesses and consumers and either are already connected to the Internet or could easily be connected. People will probably learn to use the Internet for commerce in many of the same ways they currently use the telephone system.

The proposed on-line payment methods rely largely on existing payment systems to transfer funds from the customers to the merchants. In some instances, they are merely an extension of existing bank or credit card accounts.

The firms developing the on-line payment methods have incorporated large elements of security to compensate for the insecure nature of communications over the Internet. The systems use a great deal of encryption technology to verify as well as hide many aspects of each exchange. Most of that encryption ultimately involves series of numbers that are difficult to forge and that are closely tied to a person and the message, such as the number of a credit card or checking account, that he or she is trying to send.

Types of On-line Payments

On-line payment methods fall into three general categories:

- o On-line use of credit cards,
- o On-line use of checking accounts, and
- o On-line scrip.

One recent tally listed almost three dozen different proposed methods of on-line payments. Many of them, however, lack financial backers to set up a pilot program. Even systems that have major financial

backers are still being revised or are subject to review by potential partners and have therefore not been launched.

On-line Use of Credit Cards. Given the strength of the U.S. credit card system, many groups are attempting to extend its capabilities to on-line merchants. Visa and MasterCard have announced their intention to create universally accepted standards for using existing credit card accounts on the Internet. Rather than just focusing on encrypting credit card numbers, the credit card companies are creating a chain of trust linking all participants in a transaction: the buyer, the seller, the relevant bank, and the card companies themselves. Using modern encryption technology, that chain will certify the creditworthiness of all participants. Software used to log on to the Internet—most notably the so-called browser software, such as Microsoft Explorer and Netscape Navigator—would incorporate those standards.

On-line Use of Checking Accounts. Several organizations and coalitions of organizations have been trying to create ways of using existing checking accounts over the Internet. Typically, the consumer uses his or her regular checking account with a bank or service and then draws down those funds using special electronic checks and digital signatures (actually, a series of hard-to-forge numbers). Most of those programs are not as close to a major commercial introduction as are programs based on credit cards or electronic scrip. Nevertheless, many observers feel that despite a slow start, electronic checks could become a widely used payment mechanism. A consortium of major money center banks has designed an electronic check that most closely parallels a conventional checking account.

On-line Scrip. More proposals have been made for systems involving on-line scrip than for any other type of electronic payment. Most of the proposals are essentially debit systems: the consumer deposits funds in an account, which is then drawn down as he or she spends the funds on the Internet. The consumer recharges the account using a conventional payment method such as a check or credit card. The proposed systems differ from each other in their design features, such as who does the accounting and who issues the electronic scrip. As a group, on-line scrip systems differ from electronic checks in that

they can only be used on a computer network, whereas the electronic check is merely the on-line manifestation of a conventional checking account that can also be used in a traditional way.

Potential Markets

Several attempts to establish Internet payment schemes are under way, and researchers have proposed dozens of others. It is impossible to tell today which system will be important a decade or two from now, just as in the 1970s it was impossible to tell which computer and software companies would be the most important in the 1990s. Those systems are too new to pose an immediate challenge to the conduct of monetary policy or the safety and soundness of the financial system, but their long-run impact on the payments industry could be substantial.

Checks. In theory, on-line payments will be able to replace checks in many applications, but probably no more than a small fraction of checks for the near future. Nevertheless, the volume of checks is so large and they represent such a large fraction of all payments that even a small share of that market could be substantial.

Checks as a form of payment dominate consumer spending. According to preliminary data from the latest Federal Reserve survey of patterns of consumer spending, almost four-fifths of consumer expenditures are handled by check, directly or indirectly. However, many of the checks that would most likely be moved on-line are being targeted by or have already moved to competing payment schemes, such as home banking. Many businesses are doing the same (for example, paying salaries by direct deposit through an automated clearinghouse).

Catalog Sales. According to estimates provided by the direct marketing industry, half of U.S. adults ordered merchandise by phone or mail in 1994. In 1995, direct marketing firms sold \$63 billion worth of goods through catalogs to both foreign and domestic clients.

From a consumer's point of view, the technology for using the Internet to deliver a catalog of products

is more cumbersome and less developed than a paper catalog. The same middle-class households that have personal computers and Internet accounts generally also have a long history of buying from catalogs by providing their credit card number over the telephone. Convincing those customers to use a new payment method may prove difficult unless on-line catalog technology improves substantially.

How Does the Current Regulatory Framework Apply to the Emerging Payment Methods?

The major forms of retail payment used in the economy today are cash, checks, electronic fund transfers, and credit cards. Each has its own regulatory framework (see Summary Table 1). How those regulations are applied to new retail payment methods will affect the development of the market for them.

Although cash, checks, and credit cards are familiar terms, electronic fund transfers warrant some description. Legally, the term refers to any transfer (other than a check or other paper instrument) that is initiated through an electronic terminal, telephone, computer, or magnetic tape for the purpose of ordering, instructing, or authorizing a financial institution to debit or credit an account. Debit cards, point-of-sale transactions, and transfers by automated clearinghouses such as direct deposit of salaries are all examples of electronic fund transfers.

The advent of the new electronic payment methods raises a number of policy issues, some of which arise because current laws and regulations may not clearly cover some of the new forms of payment. Such issues include reserve requirements, deposit insurance coverage, consumers' liability for unauthorized use, and privacy of information about the transaction. Existing laws governing credit cards and checking accounts, however, probably apply to the use of encrypted credit cards on the Internet and the on-line use of checking accounts.

Reserve Requirements

The Federal Reserve requires depository institutions to hold some fraction of checking and other transaction accounts in a cash reserve. Testifying before the Congress in October 1995, then Federal Reserve Board Vice Chairman Alan Blinder stated that under current regulations, stored-value balances issued by

depository institutions would be treated as transaction accounts and hence subject to reserve requirements. However, the Federal Reserve would have no authority to apply reserve requirements to the balances issued by nondepositories. The Federal Reserve has not made a formal statement about whether reserve requirements will apply to on-line scrip, but the same principles are likely to apply.

Summary Table 1.
Regulation of Existing and Emerging Payment Methods

	Reserve Requirements	Deposit Insurance	Consumer Protection	Privacy Laws
Existing Payment Methods				
Cash	No	No	No	Bank Secrecy Act
Checks	Yes	Yes	Yes	Financial Privacy Act, State Laws
Electronic Fund Transfers	Yes	Yes	Regulation E (\$50 loss limit)	Financial Privacy Act, State Laws
Credit Cards	n.a.	n.a. ^a	Regulation Z (\$50 loss limit)	Financial Privacy Act, State Laws
Emerging Payment Methods				
Issued by Depositories				
Stored-value cards	Yes	?	?	Financial Privacy Act
On-line scrip	?	?	?	Financial Privacy Act
Issued by Nondepositories				
Stored-value cards	No	No	?	?
On-line scrip	No	No	?	?

SOURCE: Congressional Budget Office.

NOTE: n.a. = not applicable.

a. A credit balance on a consumer's credit card issued by an insured depository is considered an insured deposit, however, and would be covered by deposit insurance up to the limit of \$100,000 if the issuing bank failed.

Deposit Insurance

Deposit insurance protects depositors up to \$100,000 per insured account in the event that a bank fails. Checking accounts and electronic fund transfer accounts are covered by deposit insurance, but an individual's cash holdings are not. A credit balance on a credit card at the time the bank issuing the card fails is also deemed to be an insured deposit and is covered by deposit insurance.

In the absence of legislation, the Federal Deposit Insurance Corporation (FDIC) will be the final arbiter of whether deposit insurance will cover the balances on stored-value cards and on-line scrip accounts. Coverage depends in part on whether a deposit contract is deemed to exist between the issuer and the customer. Balances that the FDIC views as a discrete portion of an existing account will probably be covered, but balances that are transferred from an individual's account to a pooled account that is a general liability of the issuer probably will not. The question of deposit insurance coverage will be moot for nondepository institutions that issue stored-value cards or on-line scrip. Only the account balances in depository institutions are covered by deposit insurance.

Consumer Protection

Perhaps the most important aspect of consumer protection is the limit placed on consumers' financial liability in the event of unauthorized transactions.

Current payment methods offer varying degrees of protection. Cash, of course, offers consumers no protection—if cash is lost or stolen, the consumer is out of luck. Checks afford some protection; for example, a consumer can stop payment on a check, and banks are obligated to verify signatures to ensure that checks are authentic. The policy of most companies that issue traveler's checks is to replace them if they are lost or stolen. Consumers are also well protected when transferring funds electronically. The consumer gets a written receipt with each transaction and also receives a periodic statement detailing the transfers. A consumer's liability for unauthorized transac-

tions involving an electronic fund transfer or a credit card is limited to \$50.

The level of protection that government regulation will give the new electronic payment methods is unclear. The developers of stored-value cards and some forms of on-line scrip argue that their products are essentially cash equivalents and therefore do not warrant protection for consumers in the event of loss, theft, or unauthorized use. Since cash has value in its own right, the final exchange of value, or settlement, occurs at the time of the transaction. The settlement process for many stored-value cards and on-line scrip, however, is more similar to that for deposit accounts than cash and so may deserve the same protection. If stored-value cards are limited to low values—for example, \$50 or less—protecting consumers in cases of loss or theft is not as important. If limits are higher, however, competition may encourage providers to offer some insurance for lost or stolen cards.

Providing receipts for each transaction or issuing a periodic statement detailing transactions, as is required for electronic fund transfers, may prove prohibitively costly for the markets with low-value transactions that the issuers of stored-value cards and on-line scrip are targeting. The Federal Reserve has proposed largely to exempt stored-value cards from requirements for receipts and periodic statements.

Privacy

Different payment methods afford varying levels of privacy. Cash transactions provide the most privacy, although the Bank Secrecy Act of 1970 requires cash transactions over \$10,000 to be reported promptly to the Treasury and requires banks to keep records of certain other cash transactions for five years. Thus, the Bank Secrecy Act actually limits the privacy of cash transactions.

The Right to Financial Privacy Act of 1978 covers most other payment methods. That law prohibits the federal government from gaining access to an individual's financial records except under subpoena. State laws protect the confidentiality of financial records sought by people or authorities other than offi-

cers or agencies of the federal government. The same laws will probably cover the records of electronic payment transactions but with a potentially significant caveat—the Right to Financial Privacy Act covers only financial institutions. If nonfinancial institutions issue stored-value cards or on-line scrip, they may not be bound by either that act or state laws concerning the confidentiality of an individual's financial records.

Major Policy Issues

The emerging methods for making electronic payments raise two major policy issues: their effect on the Federal Reserve's ability to conduct monetary policy; and the effect of having nondepository institutions issue the new forms of payment. Although the new methods pose no immediate threat to the financial system, policymakers will need to monitor their development and perhaps change laws or regulations should problems arise.

Effect on Monetary Policy

A chief responsibility of the Federal Reserve is to control monetary and credit aggregates with the goal of achieving price stability. The introduction of privately issued stored-value cards and on-line scrip has the potential to undermine the central bank's ability to monitor and control the money supply and inflation. Furthermore, if nondepository institutions are allowed to issue stored-value cards and on-line scrip, the Federal Reserve will have even greater difficulty measuring and controlling the money supply, since under current law such companies have no obligation to report to the Federal Reserve the amount of money they have issued. Given the expected small size of the market for the new forms of payment, however, monetary policy will probably not be seriously affected.

Issuance by Nondepository Institutions

Many of the legal and regulatory questions about stored-value cards and on-line scrip, such as the ap-

plicability of reserve requirements and deposit insurance coverage, prompt an even more basic question: Should nondepository institutions be able to issue stored-value cards and on-line scrip? Many single-purpose stored-value card systems now in use, such as prepaid phone cards and transit fare cards, do not involve depository institutions.

When nondepository institutions issue stored-value cards and on-line scrip, it raises the question of whether regulations will apply equitably to all issuers. The supervision and regulations governing depository institutions safeguard the safety and soundness of the financial system and facilitate the conduct of monetary policy. Banks and other depositories may be at a competitive disadvantage to issuers who are not subject to such supervision and regulation. Bankers may point to the dramatic shift of bank deposits to money market mutual funds as an example of the success that firms outside the banking business have had in capturing a portion of banks' traditional business—largely because they are not as heavily regulated. Competitors of banks, however, may point to other advantages, such as access to lower-cost funds, that banks have over nondepository institutions.

Other Policy Issues

The new electronic payment methods also present other budgetary and legal issues. Those issues include seigniorage, federal issuance, law enforcement concerns, and the application of antitrust and state escheat laws.

Budgetary Issues

The use of stored-value cards and on-line scrip may have budgetary effects if they replace a significant amount of cash, thereby reducing the federal government's profits from seigniorage. Having the federal government issue stored-value cards may allow it to retain those profits but raises other questions.

Seigniorage. Seigniorage is the government's profit from the manufacture of coins. The amount of the

profit is the difference between the face value of the coins and the cost of producing them. Strictly speaking, the concept of seigniorage does not apply to U.S. paper currency, since the Federal Reserve System reimburses the Bureau of Engraving and Printing for the cost of producing it. But the federal government collects interest income from public holdings of paper currency: that is, the Federal Reserve holds U.S. government securities corresponding to the value of currency in circulation and turns the interest income on those holdings over to the Treasury.

If stored-value cards and on-line scrip replace substantial holdings of coin and currency, the government will receive less from seigniorage and interest income. In 1994, the interest earned on assets backing U.S. currency amounted to about \$20 billion and the seigniorage on coins was \$700 million. If, for example, electronic payments replaced 10 percent of all coins and currency in denominations of \$10 and under, the government would forgo about \$370 million in seigniorage and interest per year.

Federal Issuance. The United States Mint has proposed issuing stored-value cards, both as a new form of currency and as a collectible like their commemorative coins. A federally issued stored-value card would allow the government to retain the seigniorage profits that would otherwise be reduced by the decline in the demand for cash.

The prospect of federal issuance raises several questions. Could a stored-value card issued by the government be legal tender? Anyone can accept cash, but accepting money stored on a card requires special equipment. Furthermore, is it prudent for the federal government to enter the market for electronic payment methods—and perhaps interfere with free-market competition—before that market has matured?

Legal Concerns

Stored-value cards and electronic scrip raise questions in several areas besides typical banking regulation and federal budgetary policy. They pose new difficulties for law enforcement officials and for applying antitrust law and states' escheat laws.

Concerns of Law Enforcement Officials. Law enforcement officials share consumers' concerns about the security of the new electronic payment methods but are at odds with consumers' interests in privacy. Those officials prefer that the new payment methods be designed such that financial crimes can be tracked down and stopped.

Electronic payments that allow person-to-person (or computer-to-computer) transfers of value may facilitate money laundering. They may also make it easier to avoid paying both income and sales taxes. Furthermore, the sales tax jurisdiction may be difficult to determine—particularly for purchases made on the Internet—let alone detect and enforce.

The counterfeiting of stored-value cards could cause the impersonated issuer to suffer heavy losses. On a grand scale, such counterfeiting could destabilize the banking industry. Because stored-value cards would be off-line—that is, no outside verification would be confirmed at the time of a transaction as is the case with debit and credit cards—the use of a counterfeit card would be more difficult to detect, track, and stop. Countering that grave scenario is the presumption that counterfeiting smart stored-value cards would probably be extremely difficult.

Antitrust. Applying traditional antitrust analysis to a network industry such as electronic payment methods is complicated. Unlike traditional industries, which are kept from certain interactions by antitrust law, network industries require interconnections among companies in order to provide the industry's products or services.

Anticompetitive challenges in the arena of electronic payment services, should they develop, will require careful analysis of the products and markets in which the payment methods compete. The formation of alliances or large joint ventures may be necessary to get an electronic payment method off the ground. Will such alliances be found to violate antitrust laws? Determining whether a particular business merger will benefit consumers or harm them may be difficult. A merger may benefit consumers if the resulting company can provide its product or services more cheaply. But if the merger creates a com-

pany with too much market power, the prices consumers pay may increase.

Escheat. Most states have laws on the disposition of abandoned property. In many cases, the state is entitled to escheat, or take custody of, abandoned property. Examples of abandoned property include bank accounts that have been inactive for some period of time and unclaimed amounts paid in advance for services not rendered, such as prepayment for utilities.

How will states' escheat laws relate to the balances on stored-value cards and on-line scrip accounts? Will the cards have expiration dates, after which the funds are no longer usable? Which state will have escheat jurisdiction, particularly if records of purchases and customers' addresses are not kept? Will an issuer have the authority to preclude refund rights—that is, by simply stating that there is no refund for nonuse? Suppose, for example, that a company issues prepaid cards (collecting the money up front) and subsequently some of the cards are lost, kept as collectibles, or simply not used. Given the potentially substantial sums involved, states with escheat laws would probably not allow the company to keep the abandoned funds for its own account.

Conclusions

In addition to technological and market uncertainties, the new electronic payment methods face many legal and policy uncertainties. Understandably, government agencies do not want to impose regulation prematurely for fear of stifling a fledgling industry. However, if the government resolved some legal ambiguities, even provisionally, that might further the acceptance of the payment methods by consumers and merchants. For example, industry participants believe that the costs of fulfilling some of the requirements of the regulations governing electronic fund transfers, such as providing written receipts for each transaction and periodic statements detailing transactions, would prove prohibitive for stored-value cards and on-line scrip. Without Congressional action to clarify those requirements, the federal agencies that are currently responsible will make decisions, perhaps in a coordinating fashion, but possibly on a case-by-case basis.

Introduction and Background

When consumers—businesses and individuals alike—pay for relatively small purchases, they can usually make those payments in several ways: they can pay with cash; they can transfer funds from a checking account using a check or, much less frequently, a debit card; or they can use a credit card to charge purchases against an established line of credit. Except for cash, those forms of payment involve computer networks linking banks and other financial intermediaries. The networks make such payments more rapid and efficient.

Advances in computer technology and communications are creating opportunities for new electronic payment methods. Banks, major credit card associations, other financial institutions, and software companies have recently shown interest in providing consumers with new electronic payment systems. Most of those systems involve two types of payment mechanism:

- o Prepaid stored-value cards, and
- o On-line payments made on the Internet—a worldwide computer network—and related computer networks.

Prepaid stored-value cards are similar to a credit card in size but not in function. With a credit card, consumers pay for goods and services by drawing on a credit line. In contrast, consumers buy the stored-value card with a prepaid amount stored on it and then make their purchases by debiting the card, much like the cards that phone and transit companies issue today. The companies introducing stored-value cards

intend to make them so cost-effective that they can be used in low-value transactions, such as when buying goods in a fast-food establishment or from a vending machine.

In the case of on-line payments, consumers typically use their personal computer to log on to the Internet or other public computer network. Special software (and, in some cases, hardware) allows consumers to use their financial accounts to make purchases while connected to the network, or on-line, in a manner similar to making a catalog purchase over the telephone today. Some proposed payments use existing credit card accounts; others use existing checking accounts. A number of the new network payment schemes are not linked to credit and other nonnetwork accounts but involve pure on-line debit accounts.

Although a consumer using one of the new electronic payment methods will perceive a change in how the transactions are made, the unseen financial part of the transactions will take place on the financial computer networks existing today or on new networks that will be just like them. When a customer uses a credit or debit card to pay for a product, he or she sets in motion a series of transactions involving the merchant, the merchant's bank, the card company's computer network, and the customer's bank. Moreover, many merchants use a clearinghouse, which adds yet another layer. With the new forms of payment, most of the financial relationships between the merchant, the merchant's bank, and all the other financial intermediaries will remain the same.

The emergence of new electronic payment methods for consumers raises some federal concerns, since current federal laws and regulations dealing with financial transactions may not adequately cover the new methods. Of special concern are whether they pose any danger to the safety and soundness of the nation's financial system and, in turn, risk to the deposit insurance system. Perhaps the most significant federal policy question is whether nondepository institutions, which are not subject to the stringent supervision and regulation that banks are, should be allowed to issue these new forms of payment if they are intended for general use.

Forms of Money and Payments

Money, as a means of exchange, has evolved from commodities such as gold or silver coins that have inherent value, to paper money, which does not. Being able to use paper money has facilitated trade, since paper money is a portable, efficient way to transfer value. Another important way of improving the efficiency of money has been to eliminate its physical existence and merely note who owns it. The evolution of money from physical commodities to paper money has now extended to notational money—money that exists as notations in the ledgers of depository institutions. The new electronic payment methods take the concept of money beyond its physical and notational forms to intangible electronic forms that exist only on-line.

A common form of notational money is the checking account. Banks and other financial institutions hold money in the form of bookkeeping entries: to effect a money transaction, they debit one party's account and credit another party's account. In normal circumstances, depository institutions can convert notational deposits in a checking account into currency on demand.

An important consequence of converting cash to notational money is that the process delays final payment of the purchase. In cash transactions, payment

and transfer of the value are simultaneous. By contrast, a check does not represent value; it is an order authorizing the transfer of money from one account to another. When accepting a check as payment, the recipient collects the value of the check after the check is presented to the bank on which it is drawn. Because a check can be returned for insufficient funds, the bank may not make the funds available to the recipient until the returned check should have been received—two days for a local check and five days for a nonlocal check. Consequently, the recipient of the check does not receive final payment until the check has cleared. Furthermore, because a check can be discovered to be fraudulent even after it clears, notational money introduces uncertainty into the payment process.

By investing in electronic computers and modern telecommunications, banks have made notational money even more efficient. The computer connections and financial networks through which major financial institutions discharge and settle obligations by transferring deposit claims on banks' books are called the settlement system.

Most large-dollar, or wholesale, payments in the United States are already conducted electronically via Fedwire (a computer network that connects Federal Reserve Banks with over 11,000 domestic depository institutions) or the Clearing House Interbank Payment System (a private network run by the nation's largest banks). Based on value, roughly 90 percent of all noncash payments in the United States are currently made by electronic transfer.¹ Based on quantity, however, large-dollar payments, most of which are transfers by financial institutions, constitute only a small fraction of all noncash payments.

The proposed electronic payment methods are bringing to small-dollar, or retail, payments many of the advantages that already accrue to large-dollar payments. One major difference is that transactions

1. Office of Technology Assessment, *Information Technologies for the Control of Money Laundering* (September 1995), p. 25, provides 1994 data. Federal Reserve staff estimate that 86 percent of the value of noncash payments was handled that way in 1993. See Scott Knudson and others, "Business-to-Business Payments and the Role of Financial Electronic Data Interchange," *Federal Reserve Bulletin*, vol. 80, no. 4 (April 1994), p. 271.

using Fedwire settle immediately whereas settlement with most other proposed systems is delayed.²

Consumer Transactions and the Payment System

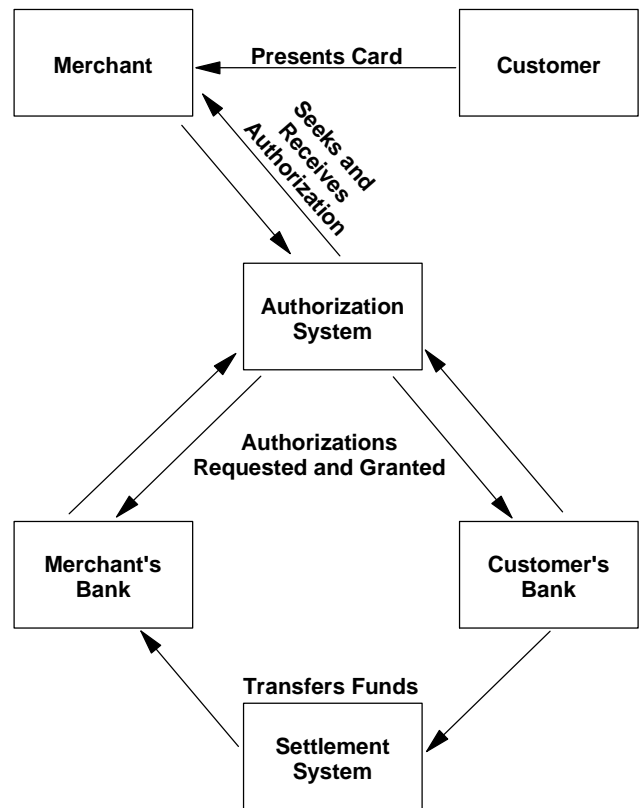
Retail transactions other than cash involve a complex system of financial intermediaries that stretches far beyond those immediately involved in the purchase. This section compares the flow of information and funds under two existing payment methods (debit cards and credit cards) and under one of the proposed new systems—a stored-value card.

Existing Payment Methods

In a typical purchase using a debit card, the customer enters a personal identification number to authorize the transaction. The merchant's computer then requests authorization from the computer network—usually the regional automated teller machine (ATM) network—that links the merchant's bank with the customer's bank (see Figure 1). The customer's bank (or sometimes the network) verifies that the customer's account has sufficient funds to pay. The network then contacts the merchant's computer and authorizes the purchase. The network also contacts the two banks, which debit the customer's account and credit the merchant's account. (The banks typically do not credit the merchant's account with the entire amount of the transaction: a percentage referred to as the discount is charged by the banks and other intermediaries.) Later, usually at the end of the day, the two banks use a different computer network to make a net settlement of all the transfers between them. Although that sounds like many steps, the widespread use of electronics makes most of it almost instantaneous.

Notice that there are two separate flows—the flow of information followed by the flow of funds.

Figure 1.
Payments Made with a Debit Card



SOURCE: Congressional Budget Office.

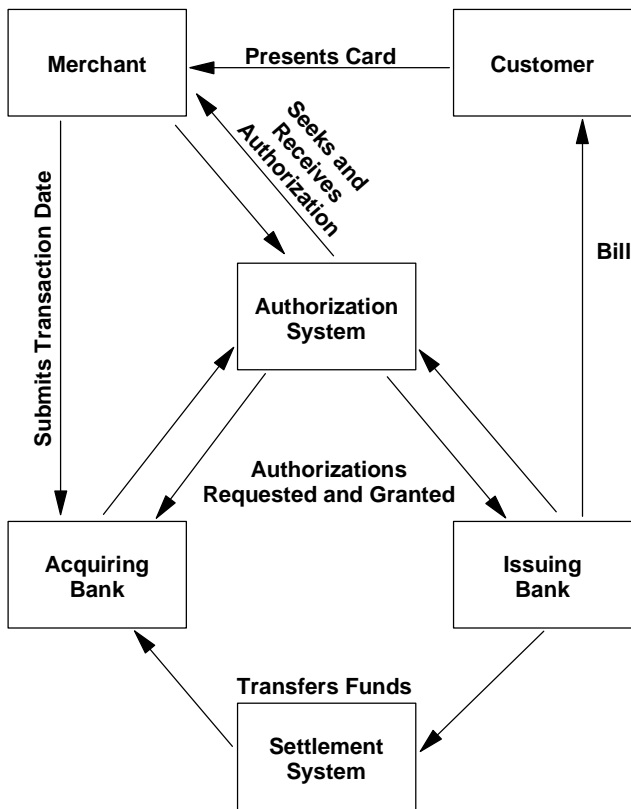
Many of the proposed electronic retail payment schemes would similarly divide transactions into a stream of information followed by a later transfer of funds.

A credit card purchase is very similar (see Figure 2).³ The merchant has to have an account at an acquiring financial institution or bank that is authorized to accept credit card charges for payment. Like the issuing bank, the acquiring bank has a relationship with a credit card association such as Visa or Master-

2. Transfers made by the Clearing House Interbank Payment System settle at the end of the day. See "Large-Dollar Payment Flows from New York," *Quarterly Review*, Federal Reserve Bank of New York (Winter 1987-1988), pp. 6-13.

3. For a more detailed discussion of the mechanics of a credit card purchase, see David Evans and Richard Schmalensee, *The Economics of the Payment Card Industry* (Cambridge, Mass.: National Economic Research Associates, 1993), pp. 8-12. Private charge cards, such as American Express, operate in a slightly different manner.

Figure 2.
Payments Made with a Credit Card



SOURCE: Congressional Budget Office.

Card. Furthermore, the bank that issued the credit card charges the acquiring bank an interchange fee. As with a debit card, the merchant pays the banks and credit card network a percentage of the transaction amount for their services.

Proposed Methods for Electronic Payment

The new mechanisms for making electronic payments would simply change the first step in the purchase sequence. The variety of potential on-line payment systems is such that no single simplified schematic could represent all of them. As an example, the flow of information and funds is discussed here for a generic stored-value card (see Figure 3).

The customer buys a stored-value card with cash or with a debit or credit card. The purchase of the card sets off a chain of settlement transactions according to how that purchase was made. When the customer pays with a stored-value card, the system transfers electronic notations, or tokens, from the card to the merchant's electronic cash register. The merchant periodically contacts the computer network connected to the bank issuing the stored-value cards and presents the tokens for payment. The network then notifies the customer's bank to pay the appropriate sum to the merchant's bank, and the two banks make a net settlement. The banks keep a percentage of the payment (the discount) as compensation for the services they and the networks have provided.

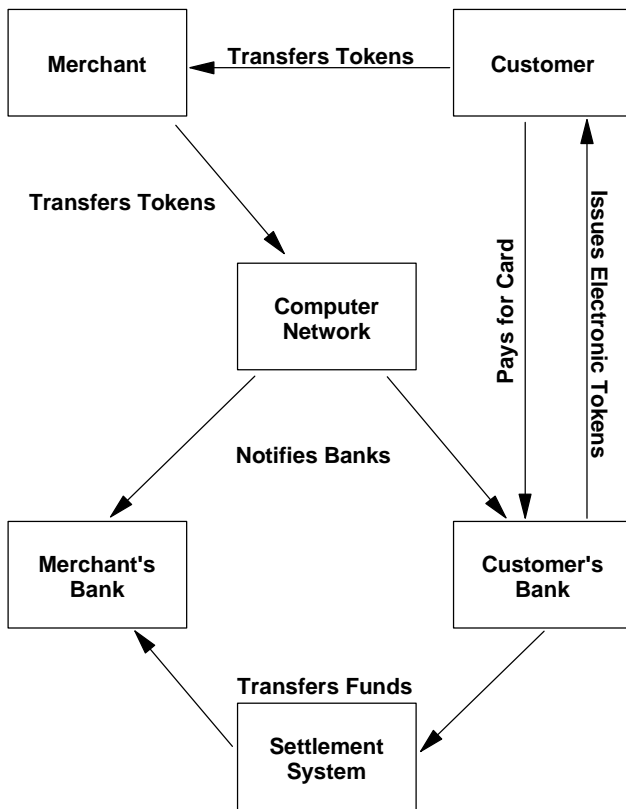
Use of electronic payments will transform cash payments, which typically involve only one bank and no computer network, into a multiparty transaction. The electronic payment mechanisms will be transferring money from one pool of funds, often a segregated account of a bank or other financial institution, to a second pool of funds, usually a checking account in a different financial institution. The consumer will not see most of the actual transfer of funds, as is the case now with purchases using a debit or credit card.

The very complexity of the transactions raises policy questions about the new forms of electronic payment. Over the past several decades, the Congress and federal agencies have enacted laws and issued regulations that define legal responsibilities and limit consumers' liabilities in several areas related to money transactions and banking. Some observers have suggested that the Congress needs to clarify how current laws and regulations will apply to the new payment mechanisms.

Issues Surrounding the Development of New Electronic Payment Systems

For electronic payment schemes to become widely used, they have to provide value to some, if not all,

Figure 3.
Payments Made with a Stored-Value Card



SOURCE: Congressional Budget Office.

participants involved in the transaction. Major participants—customers, merchants, banks, and the operators of the electronic financial networks—have to benefit, or at least not lose directly. The benefits can be immediate: for example, the new payment methods may be more convenient or less expensive to use. Alternatively, the benefits can be long term or strategic: for example, firms may wish to adopt the new systems as part of an overall marketing strategy even though, examined alone, they make little financial sense.

The technical and market uncertainties facing these products are quite large. No one knows what will be the demand for the new payment mechanisms among consumers or the value of new payment methods to merchants. Consider the fate of the Susan B. Anthony dollar coin: it merely added a new denomination to current payment mechanisms, yet most con-

sumers and many merchants soundly rejected it.⁴ How much less certain then is the fate of retail payment systems far removed from current experience?

If the new systems reduce transaction costs to the economy as a whole, how will the parties involved share the benefits? Although the merchants or other parties initially experiencing the cost reduction may wish to keep the benefit, competitive pressures may force them to share it. In other instances, laws or commercial practice may define how benefits are allocated.

Purchasers' Concerns

Users of electronic payment mechanisms for small-dollar purchases will probably include private consumers and households, nonfinancial businesses, and even governments. Although the issuers of stored-value cards are generally targeting the types of purchases most often made by private consumers, the on-line payments may be useful to all purchasers.

Convenience and Cost. All purchasers—businesses and households alike—expect that electronic payment schemes will carry lower costs, sometimes in the form of greater convenience. But a new payment method is unlikely to affect the decisions of households about spending and saving. If more commerce is conducted using electronic payments, then less will be conducted using other means. Even if the new electronic payment systems are based on credit, the household sector will probably not increase its overall indebtedness, especially given the high level of credit card debt outstanding. With businesses, the situation is different; if electronic payment schemes prove to be less costly or time consuming than current payment schemes, businesses can actually increase their net income and so spend more.

Security and Privacy. All potential users of the new electronic payment systems are concerned with the traditional issues regarding financial institutions: soundness, security, and privacy. First, if a person or

4. John Caskey and Simon St. Laurent, "The Susan B. Anthony Dollar and the Theory of Coin/Note Substitutions," *Journal of Money, Credit and Banking*, vol. 26, no. 3, part 1 (August 1994), pp. 495-510.

business trusts a financial intermediary with his or her funds, what assurances stand behind the card or account number? In the case of prepaid stored-value cards, most of the financial institutions now planning to issue the cards are major credit card associations and banks. But do the funds that back those cards enjoy the same protection as insured savings and checking accounts? That concern would become greater if other institutions that were less well funded and less regulated offered such cards. Second, on-line payment systems raise concerns about the security of payments over the Internet. Neither businesses nor households want their private dealings rebroadcast to other parties. What kind of privacy do the on-line payment systems offer?

These issues are not novel, nor are the problems insurmountable. Theft and fraud exist in the current financial system and will probably exist with the proposed systems as well. What remains to be worked out is how to ensure that fraud and theft are at minimal levels and that victims do not suffer catastrophic losses. If the system is to cushion victims against catastrophic losses, how will the costs of those losses be distributed?

Furthermore, the ways of treating these problems already exist. Just as the new payment mechanisms are being built on the existing commercial framework, the regulation of the new payment systems will also be built on the existing regulatory framework. For current payment mechanisms, state law defines most of the rights and responsibilities of each party.

Merchants' Concerns

To attract merchants, the new means of exchange have to increase sales, reduce costs, or do both. Merchants are also concerned with how new payment methods will affect their contractual obligations.

Increased Sales. Can the merchant believe that there are enough potential customers who would not make a purchase because the merchant did not offer a particular payment system? Even if a particular payment system is not a merchant's first choice, if enough purchasers want to use it, competitive pres-

ures may force the merchant to invest in it. The thought of missing sales to customers who did not have coins led many operators of vending machines to install dollar-bill acceptors in new vending machines. The bottom line is whether the increased revenue from additional sales will be greater than the increased costs incurred by accepting the new form of payment.

Reduced Costs. Added sales is not the only appeal of electronic payment mechanisms; they might also reduce costs. Handling cash, for example, is expensive and slow; many banks charge merchants for making cash deposits and withdrawals, and small merchants of the type targeted by the issuers of stored-value cards are often also the target of thieves and robbers. Systems that reduce the use of cash could reduce those costs, although they could increase capital and other costs. Will the new forms of payment offer reduced costs, over the appropriate period of time, that are sufficient to induce merchants to adopt them?

Contractual Obligations. Historically, new payment systems such as bank-issued credit cards have offered the promise of increased sales or reduced costs. Their benefits to the merchant usually also entail a series of responsibilities, risks, and costs. For example, sales made with a credit card can be disputed long after the transaction has been made. Similarly, with credit card sales made by mail or telephone, the merchant often bears the risk for fraudulent sales. The specific details regarding the responsibilities and risks that the merchants and card issuers bear are spelled out in contractual agreements between the two parties.

With the proposed electronic payment methods, however, the merchants and card issuers will have to negotiate new contracts. Merchants' acceptance of the new system will hinge critically on the provisions of those contracts. Government policies, however, will play only a small role in those areas. For example, federal regulations do not tell a bank and a merchant what level of discount the merchant can be charged or what the terms of payment will be. Yet those matters are obviously important factors in determining the success of a new form of payment.

Banks' Concerns

Banks are under substantial competitive pressure from other types of financial institutions to provide a wide range of financial services. Two decades ago, money market funds were able to persuade customers to move a large portion of their savings accounts from banks to the funds. Banks do not want to lose business in that way again. Software producers, such as Intuit, are becoming the window through which an increasing number of consumers see their banks. Banks fear that if they do not provide modern electronic payment services, other institutions will, and they—the banks—will become marginalized into operations that carry high costs and low profits.

Banks profit from handling financial transactions, both by charging fees to one or more participants in a transaction and by investing the funds they hold between the time of deposit and the time of withdrawal, commonly called the spread. Existing fees include those charged to customers on certain financial instruments such as traveler's checks, the interest charged to consumers on outstanding balances on credit cards, and the discount levied against merchants on purchases made with a credit or debit card. Some financial instruments also allow issuers to hold funds for extended periods before they have to make payments. Traveler's checks, for example, typically are not cashed for weeks after they are issued, and many consumers (and some merchants) will hold them in reserve for months, providing an additional benefit to the issuing company. The new forms of electronic payment will provide banks with similar avenues for profit.

Banks also have a clear incentive to move into new areas. Banks are already involved in most types of financial transactions: they exchange checks, issue credit cards, and issue debit and ATM cards. They do not profit from cash exchanges, however, except those in which cash is obtained through a bank-owned ATM and a charge is imposed for its use. Thus, banks have incentives to increase the share of exchanges that use a medium other than cash. Since businesses and government typically pay with checks or other noncash means, the switch from cash payments to other means would have to occur mostly in the household sector.

Moving into a new financial service does not guarantee profits. Finding the right structure of costs and services to ensure profits is difficult and may take some time after a new product is introduced. For example, despite the widespread use of bank-issued credit cards throughout the 1970s, banks' credit card operations did not generate as much profit as their other businesses. Only eliminating state usury ceilings and imposing annual fees in the late 1970s and early 1980s ensured that such operations became significantly profitable.⁵ Thus, the issuing companies will probably struggle with the details of the new electronic payment systems before the systems become a stable business.

Electronic Financial Networks' Concerns

Like the banks, the operators of electronic financial networks wish to capture a share of the market for transactions that are currently made with cash. However, they also run the risk that the new payment methods will merely cannibalize their market in payments that they profit from, such as credit card transactions. If prepaid stored-value cards replace cash, financial networks gain because the issuing banks typically pay them a fee for their services. But if the proposed on-line payment systems merely replace credit or debit cards, the only way the network system as a whole may gain is if the new payment methods are less expensive or generate more revenue than either of those two forms of payments.

To replace cash transactions, the financial networks will have to be very efficient. Cash transactions are typically low-value transactions whose costs must also be low relative to the value of the purchase. Some electronic transactions cost as little as 15 cents each, but even that low cost represents a sizable percentage of a 75 cent soft drink. Thus, to make inroads in the marketplace and realize profits, the financial networks will have to reduce costs substantially below current levels.

5. Lewis Mandell, *The Credit Card Industry* (Boston, Mass.: Twayne Publishers, 1990), pp. 75-79.

Like other participants, the financial networks are concerned about the security of the new payment mechanisms and especially want to ensure that no one can counterfeit or intercept the cards or Internet transactions. The two largest credit card associations—Visa and MasterCard—and their members are particularly concerned about the security of their system since the associations are joint ventures and serve as ultimate guarantors of all products that bear their name. Thus, if the security of the stored-value cards or on-line transactions bearing the group's name is compromised, the entire group is at risk if the issuing or acquiring banks are not able to pay all ensuing charges.

Major Policy Issues

Although policymakers are responsible for ensuring that a new product meets relevant federal standards, they typically are not responsible for ensuring the commercial success of a new product introduced by a private firm. When automakers introduce a new car, they must assure federal regulators that the new model meets safety, noise, energy, and other applicable standards. However, federal regulators are not accountable for the market success of the automobile. Similarly, the government is not responsible for the success of the proposed electronic payment mechanisms.

Thus, introducing a new payment method is fundamentally different from introducing a dollar coin or other new unit of money. New coins are the product of the federal government, but electronic payment methods are not. Even if the U.S. Mint issued pre-paid stored-value cards, such cards would probably be more like the Mint's profitable commemorative medallion issues than its coins.

Nevertheless, public policy should not create obstacles to introducing new products and services un-

less there are good reasons involving federal missions. The case of electronic payments is especially complex because banking and consumer finance are highly regulated. Consequently, policy has to ensure that the public goals are met while allowing private decisions to predominate in areas other than those of specified federal interest.

Over the past 20 years, the federal government has promulgated a series of laws and regulations designed to protect consumers and lower their risk in financial transactions. Some laws deal with the electronic transfer of funds and others with credit cards. Those laws, for example, limit consumer liability to \$50 in the case of stolen credit cards or require that a paper receipt accompany each electronic transaction.

Some of the federal concerns flow from the same concerns of consumers: soundness, security, and privacy. The federal government has played a substantial role in ensuring those traits in existing financial instruments. Exactly how that role will extend to the new electronic payment methods is a major policy issue.

Another important question is who will be permitted to issue new payment methods. Banks have seen many of their more lucrative services taken over by other types of financial intermediaries that are not burdened with as many regulatory requirements as banks. Bankers fear that they will operate under a handicap in any new market in which unregulated institutions can participate. Although many of the experiments and pilot programs for the new payment methods are, by their nature, tied to banks, that need not always be the case. When the new forms of payment arrive, banks do not want to be left out.

The payment methods being developed may or may not play a major role in facilitating commerce throughout the economy. The essential question facing policymakers is whether to clarify existing laws with regard to the new forms of payment or to see how they develop before acting.

Stored-Value Cards

Most stored-value cards available today permit users to pay for long-distance telephone calls, public transportation, or some other single purpose. Some people have argued, however, that consumers would find it convenient to be able to use the prepaid special-purpose cards for a wider array of purchases. One advantage frequently cited is that such a card would reduce the need for having exact change. Instead of sorting change and small bills, consumers would insert a card into a slot, approve the purchase, and receive the good.

As was described in the previous chapter, when the consumer approves the purchase, it is only the first step in a complex series of financial exchanges. As with cards for automated teller machines and credit cards, the stored-value card involves relationships between consumers, merchants, banks, and other financial intermediaries.

Many experiments and product introductions are either under way or are being planned. Most of them focus on providing stored-value cards that can economically handle purchases under \$10. Those pilot programs are trying to determine the most efficient way to ensure that the cards are indeed inexpensive enough to handle a \$10 sale but still provide all concerned with a suitable profit or other benefit such as convenience. They are also testing consumers' and merchants' interest in and acceptance of the cards and determining which features interest them.

The Congressional Budget Office has analyzed the potential uses of these cards from different per-

spectives. Measured either in total or in the markets specifically targeted by issuers of stored-value cards, the volume of cash transactions is very large. If consumers eventually use stored-value cards in even a small fraction of all cash or targeted transactions, then the potential market for stored-value cards could be roughly \$20 billion a year—similar to the market for traveler's checks. Reaching that market size will take many years, however, and there is no guarantee that the current efforts or designs will be the successful ones.

Furthermore, these cards are going against entrenched competitors: the automated teller machine and the dollar-bill changer in vending machines. Both technologies make cash more convenient to use. They therefore decrease the benefits of the stored-value card to the consumer.

Stored-Value Card Systems

Systems based on stored-value cards typically have four principal components:

- o The card,
- o The machine that dispenses the card,
- o The card reader in the merchant's terminal or vending machine, and
- o The payment system.

Because programs for stored-value cards are in the experimental stage, few of the details are fixed. What follows are preliminary descriptions of features that have been discussed publicly or tested by the likely vendors. No single pilot program will necessarily have the exact details provided below.

The Card

The stored-value card is often also called an electronic purse because that is how it functions. Unlike the credit card and the ATM card, which derive their purchasing power from a computer at the bank, the stored-value card itself contains a reservoir of purchasing power. It functions just like a traveler's check: the consumer pays up front, gets a card (or paper checks in the case of traveler's checks) to authorize a certain amount of purchasing power, and spends down that value over time. The card can be disposable or rechargeable. In some instances, the stored-value function is being placed on ATM cards or credit cards.

The magnetic stripe technology on most credit and debit cards currently used in the United States would not be sufficient to provide the higher level of security that wider use of stored-value cards would entail. Advocates of stored-value cards argue that wide use would require a card with more sophisticated electronic circuitry—a so-called smart card that contains a computer chip as a substitute for or complement to the magnetic stripe.

Smart cards that store value come in two general types depending on whether they have only memory or include other functions. The disposable cards in widespread use abroad for telephones have only memory capabilities. The other type, which places computation capabilities on the card, functions like a small personal computer within a thin plastic card except that it lacks a keyboard, screen, and disk drive. From the consumer's point of view, however, all smart cards are similar in size and weight to cards with a magnetic stripe.

Smart cards are a versatile platform that can accept many different applications.¹ In addition to storing prepaid value, they can store medical histories or student records. Any application that requires storing more than a few hundred characters of information on a plastic card is suitable for the smart-card technology. The security requirements for stored-value cards designed for general use dictate a move to cards with more memory and computational capabilities, but smart cards need not be limited to that purpose.

Furthermore, not all smart cards used in connection with financial transactions need be stored-value cards. For example, as more people use their home computers to access their bank accounts over the public telephone system, computer break-ins may become more common. Many security analysts argue that the combination of an account number and a permanent password has not proved secure. Eventually, some form of smart card may be necessary to ensure that only authorized people have access to the accounts. In that case, the smart card, when attached to the home computer through a peripheral device, merely serves as a key to the account, not as a store of value.

The Card-Dispensing Machine

Proposals and pilots for stored-value cards generally permit consumers to obtain the cards from tellers at banks or from card-dispensing machines—like those that dispense transit or telephone cards—that banks and companies can place at selected locations. If the cards are rechargeable, suitably equipped ATMs can recharge them. Eventually personal computers could be used to add value to a card. Some companies are discussing using special telephones equipped with built-in display terminals, called screen phones, to perform that function.

1. See Jose Luis Zoreda and Jose Manuel Oton, *Smart Cards* (Boston: Artech House, 1995), pp. 45-48.

Card Readers

The terminal to read the card in the store or vending machine, often called the card reader, takes the information from the stored-value card and stores it in computer memory. At his or her convenience, the merchant then contacts the computer network of the stored-value card system and presents all the electronic receipts for payment. Keeping this information about purchases in the store or vending machine is unique to stored-value card systems. The terminals merchants use with credit cards and debit or ATM cards typically connect immediately to a central computer for verification and authorization and perform the transaction with authorization from the central computer. Systems that perform transactions while attached to the central computer are referred to as on-line. Most of the proposed stored-value card systems will not have that ongoing connection and so are referred to as off-line.

Industry sources report that the cost of card readers varies from \$300 to \$800, depending on what functions the readers perform. Their functions might include providing receipts and internal auditing capabilities. Different merchants might need different functions. For example, a reader in a vending machine needs fewer auditing abilities than a reader in a deli because the range of products it sells is much narrower.

The Payment System

The system by which the electronic cash in the hands of merchants is credited as dollars to their bank accounts is likely to be built on top of the payment systems currently used for automated teller machines or credit cards. Many providers of the existing payment systems, such as Visa and MasterCard, are participating in pilot programs of stored-value cards. Those providers have the computers, networks, and infrastructure already in place, although many of the individual components may change. For example, the computer communications network that transmits the electronic information in a stored-value card system

need not be powerful enough to validate ATM withdrawals or credit card charges instantaneously.

According to current plans, the costs of the payment system will be paid for with a combination of discounts charged to the merchants and fees charged to consumers, as is currently the case with credit cards. The issuing bank, the acquiring bank, and the computer network will all share the profits. Those discounts or fees will vary depending on the nature of the business and the extent of the merchant's market power. Businesses with high volume, such as grocery stores, will probably pay less than other types of establishments.

Experience with Stored-Value Cards

The invention of smart cards, of which stored-value cards are a category, is usually dated to the mid-1970s.² By the mid-1980s, the technology was sufficiently mature that banks and government agencies in Europe and Asia launched several major smart-card initiatives.

France has been a leader in developing smart cards for financial use. Banks in France use them for many of their services that are required to operate off-line, such as their ATMs. In addition, beginning in 1986, France's public telephone system began to use memory-only stored-value cards as a way to reduce vandalism and potential theft from pay phones. More than 30 national phone systems worldwide have followed that example. According to some estimates, single-purpose cards such as those used for telephone calls account for 90 percent of the stored-value cards issued in France yearly.³ Thus, although

2. Zoreda and Oton, *Smart Cards*, pp. 36-38.

3. Francis X. Duffy, "Smart Card Technologies and Markets: Overview," *Datapro Reports on Banking Automation* (Delran, N.J.: Datapro Information Services Group, 1994), p. B07-325-107.

widely used abroad, most stored-value cards have been used for a limited purpose and not as a general-purpose replacement for cash.

Stored-value cards have succeeded abroad and largely failed in the United States for two reasons. First, in contrast with the U.S. government, foreign governments generally perceived their success in smart cards as a vehicle for success in markets for semiconductors and other electronic equipment. Promoting those cards was a component, explicitly or tacitly, of their industrial policies. The government's commitment allowed not only its agencies (for example, the telephone and telegraph monopolies) to move forward, but also banks, which, if not part of the government, were heavily regulated. To some extent, that strategy has paid off: the French Group Bull is a leading provider of smart-card systems, although many of the components are made by non-French companies.

Second, the low cost and ease of making telephone calls to authorize purchases or withdrawals in the United States reduces the need for the type of intelligence delivered by smart cards. Essentially, the electronic intelligence needed to verify a transaction can be put anywhere on the network. With smart-card technology, the intelligence resides in the card rather than in a central computer.

Placing intelligence at the point of purchase could be economic where telephone calls are expensive or where regulations restrict such calls. The infrastructure for data communications abroad is less well developed than in the United States, and the calls needed for centralized verification and authorization are relatively more expensive. In such circumstances, stored-value cards can thrive.

By contrast, companies in the United States have made a large investment in data communications facilities and infrastructure, reducing the need for electronic intelligence at the point of purchase. A quick telephone call is made by the ATM or the merchant's credit card reader, and the transfer of cash (in the case of ATMs) or credit is authorized. Furthermore, over the past 10 years, the technology for making such calls has improved—with automated modems to authorize use of a credit card, for example—reducing any incentive to place the intelligence at the point of

sale. Such a system depends on high-quality infrastructure for data communications, which is something the United States has in abundance.⁴

Thus, the lack of acceptance of stored-value cards in the United States probably does not stem from technological backwardness but from the presence of an economical alternative. Who needs a stored-value card when a nearby ATM or the merchant can quickly authorize a debit or credit purchase?

The greatest success of stored-value cards in the United States has come in circumscribed areas that can be rigidly controlled. As noted previously, the mass transportation systems in several major metropolitan areas issue stored-value cards, usually those with a magnetic stripe. The Marine Corps uses chip-based smart cards to pay recruits during basic training, eliminating a long-standing problem with theft.

What do these lessons imply for the future use of stored-value cards in this country? The limited success of stored-value cards to date and the continuing investment in data communications by U.S. industry do not bode well for rapid acceptance of stored-value cards in the near future. The same factors arrayed against them in the past are still present. Their major opportunities probably exist in expanding the range of payment methods for U.S. consumers, not displacing one of the current forms of electronic payment—that is, as a complement of rather than a substitute for current charge, credit, and debit cards. Stored-value cards may compete not with credit and other cards but with cash. Of course, banks and other financial intermediaries are also interested in ensuring that their products do not cannibalize their other markets.

The apparent costs of stored-value cards are sufficiently low to allow small cash purchases—or at least major banks and credit card associations seem to think so. But any advantage to the merchants and banks will depend on the efficiency with which the

4. See National Research Council, Computer Science and Telecommunications Board, *Keeping the U.S. Computer Industry Competitive: Systems Integration* (Washington, D.C.: National Academy Press, 1991).

program is carried out and its acceptance by consumers.

Current Market Developments

Market estimates suggest that 1 million to 2 million smart cards are in use in the United States for all types of applications.⁵ By comparison, consumers are holding several hundred million credit cards and ATM cards. Many, if not most, of the stored-value cards are in pilot or small-use issues of 5,000 to 50,000 cards each. Also, a number of universities have or are planning to include stored-value applications in their student identification cards.

Pilot projects involving stored-value cards have been occurring in the United States for almost a decade, without a strong permanent commitment on the part of any major financial institution. Thus, the presence of pilot projects does not necessarily signal that the market in the United States is ready for substantial growth. But now that major trials are under way and issuers and vendors have agreed on specifications, the major components for expansion are in place.

New Pilot Programs

Pilot programs for stored-value cards reflect a wide array of sponsoring organizations, target clientele, and chosen venues. Table 1 presents some of the major pilots now being carried out in the United States or planned for the near future. Not all of the stored-value cards represent money directly: in the Ohio food stamp pilot, for example, the electronic cash represents food stamps, which are one step removed from money.⁶

Atlanta. The U.S. trial of stored-value cards now garnering the most attention is one organized through Visa for use by the nearly 1 million people expected to attend the 1996 Olympics in Atlanta, Georgia. With those cards, visitors will be able to buy many items from vendors at the games and even from restaurants and other merchants in Atlanta itself. The system will not provide personal identification numbers; if the card is lost, other people can use it. Three participating banks will issue the cards much as they issue current ATM or credit cards. Visa will coordinate the payment system as it does for its credit cards and will serve as the ultimate guarantor of payment.

At the start of the program, the cards will be disposable with preset denominations of \$10, \$20, \$50, and \$100. The Atlanta sponsors hope to turn the cards themselves into a souvenir of the Olympics by having Olympic logos and scenes on them. Users will eventually be able to recharge the cards at a card-dispensing machine or a suitably equipped ATM. At least one of the participating banks intends to promote the use of a joint ATM/stored-value card by mailing the cards to its ATM customers. Such mass mailings also help create a large market in a relatively short time.

It is not yet clear what, if any, fees consumers will incur for using rechargeable stored-value cards, but the disposable cards will cost the face value of the card. As with credit cards, both the issuing bank and the merchant's bank will share the discount charged to the merchant. The discount of the acquiring bank is negotiated between the bank and the merchants, as credit card charges currently are.

The sponsoring organizations hope to have 5,000 card readers in Atlanta equipped for the trial by the time the Olympics open. Although the pilot started in the last quarter of 1995, few merchants or dispensing machines were involved initially.

New York. In April 1996, Visa and MasterCard, in conjunction with two New York banks (Citibank and Chase Manhattan), announced that they will begin a pilot program in New York City at the end of 1996. The companies hope to recruit 50,000 customers and 500 merchants for this test. The Upper West Side of Manhattan was chosen because of the concentration of potential customers and small retailers. The par-

5. Duffy, "Smart Card Technologies and Markets: Overview," p. B07-325-106.

6. The Ohio experiment with food stamps is different from experiments with the electronic transfer of benefits in Maryland and other states. In most states, the social service agencies are distributing the benefits through special checking accounts and ATM-like magnetic stripe cards. Although innovative from an administrative point of view, those experiments do not resemble the creation of electronic cash.

icipating banks have a large market share among New York residents and have observed that the residents of that area use ATM machines extensively, which the sponsors feel is advantageous for this test. The fee structure has not yet been decided, although press accounts suggest that the sponsors intend to subsidize the purchase of the merchants' card readers.

The most important aspect of this pilot is that it will be the first joint venture by Visa and MasterCard to develop stored-value cards that are interoperable, just as their credit cards are. Merchants will be able to use the same equipment to process payments made

with a stored-value card from either Visa or MasterCard. The stored-value cards from the Atlanta pilot can also be used in the New York pilot.

The New York pilot differs in a number of ways from the Atlanta pilot. First, the New York trial hopes to tap the permanent concentration of people and merchants on the Upper West Side for its critical mass. In contrast, the Atlanta pilot focuses on a single event, hoping to create a critical mass by using the concentration of customers in Atlanta during the Olympics.

Table 1.
Selected Pilot Programs for Stored-Value Cards in the United States

Sponsors	Location	Users	Application	Study Period	Status
Chemical Bank, AT&T	New York City	Chemical Bank employees	ATM-based card for cafeteria use	Since early 1994	Pilot program
Electronic Payment Services	United States	Electronic Payment Services employees	Cafeteria purchases	Two years	Continued regional testing
Visa, NationsBank, First Union National Bank, Wachovia Bank	1996 Summer Olympics in Atlanta, Georgia	Attendees of the Olympics (Estimated 1 million)	Consumer purchases in restaurants, stores, vending machines, and so on	September 1995 through summer 1996	Began in fall 1995
Visa, MasterCard, Chase Manhattan, Citibank	New York City	Bank account holders	Consumer purchases	Will begin in late 1996	Test interoperability of Visa and MasterCard systems
First Union Corporation, Bay Bank, NationsBank, and Others	Northern Virginia, Washington, D.C., and various metropolitan areas in Florida	First Union customers	Disposable cards of fixed value; ATM- and home-based screen phones for rechargeable cards	Will begin in 1997	Will expand in 1998
Department of Agriculture's Food Stamp Program and Others	Dayton, Ohio	Food stamp recipients	Cards to replace coupon books	Began in 1992	Being incorporated into an EBT program
Jacksonville Jaguars and Others	Jacksonville, Florida	Attendees of home games	Stadium purchases using souvenir cards	Fall 1995	First part of larger pilot

SOURCE: Congressional Budget Office using information from Smart Card Forum, *A Sampling of North American and European Smart Card Programs and Pilots* (Tampa, Fla.: Smart Card Forum, 1995).

NOTE: ATM = automated teller machine; EBT = electronic benefits transfer.

Second, the cards in the New York pilot will be rechargeable and will have multiple functions, serving as a credit or debit card as well as a stored-value card. The banks are therefore trying to interest customers who already have a relationship with one of them, rather than the casual relationship implied by buying disposable cards from a dispenser. Press accounts suggest that the stored-value functions of the cards will be limited to \$100. Even if attached to an ATM card, the stored-value function will not require a personal identification number.

Finally, the Upper West Side of New York is typified by dense urban retailing with many small single-location stores, whereas Atlanta is more suburban, with more retail chains. Thus, the contrasting markets and strategies of the two pilots will allow issuers of stored-value cards to learn about how merchants and consumers respond to the cards in two very different venues.

Swindon, England. Since July 1995, a trial with stored-value cards has been under way in Swindon, a town in the south of England. The trial is sponsored by Mondex (a British technology company) in conjunction with National Westminster and Midland Banks and British Telecom (a telecommunications firm). The Mondex cards are rechargeable and are unique in several ways. First, the value on the cards can be easily transferred between cards using special hardware, making the cards much more like money. (The value on the cards in the Atlanta and New York trials can be used only to make purchases from merchants.) Second, Mondex claims that its card can be used on-line and even over a suitably equipped telephone.

According to Mondex, 8,000 consumers and 75 percent of the town's 1,000 merchants have participated in the Swindon trial—far short of the 40,000 consumers it expected. The company argues that a larger educational campaign about the advantages of the Mondex system over cash could substantially increase consumer participation, especially given the bulkiness of English coins. Nevertheless, the company feels that the results of the Swindon trial warrant launching a second trial in Guelph, Canada, a

town 90 kilometers southwest of Toronto.⁷ Following that trial, Mondex plans to introduce the card in 1997 to towns and cities around the world. In the United States, Mondex is currently testing its system with the employees of Wells Fargo Bank, which hopes to bring the system to the United States, and about 75 merchants in the San Francisco area.

The low degree of consumer acceptance of stored-value cards in the Mondex trial does not bode well for the card's near-term future. Because of the high level of fixed investment in stored-value card systems, the unit cost rises dramatically if the number of customers falls short of expectations.

Specifications for Smart Cards

In June 1995, Visa, MasterCard International, and Europay International agreed to technical specifications for smart cards and merchants' terminals used in financial applications. That agreement will ensure that all cards and readers can operate on a common platform, just as readers of magnetic stripe cards do. Using the same platform will allow banking institutions to leverage a common infrastructure for any new products they wished to introduce.

Since smart cards are more capable than cards with a magnetic stripe, the three companies agreed to specify how some of the additional capability was to be used. The type of standard they agreed on is known as an open standard; the standards have been openly published, and any manufacturer of equipment or components that meets the standards can sell products, such as cards and merchant terminals, incorporating them.

The companies were also concerned that merchants should not have to invest in increasingly sophisticated readers. Consequently, they agreed to a plan for adding new functions to the cards over time. The pilot program in New York described above can

7. See "Swindon—Building Interest," *Mondex Newsletter* (June 1995), p. 3.

be viewed as part of the process of creating interoperable products.

Potential Markets for Stored-Value Cards

Most of the U.S. trials of stored-value cards are either just starting or are in a controlled setting, such as a bank employees' cafeteria. Given the paucity of data regarding consumers' acceptance of a new medium of exchange, conclusions about either the near-term or longer-term acceptance of stored-value cards are clearly premature.

The commercial success of a new technological system usually involves many components, not just the big technological items themselves. For example, the videocassette recorder is a successful product not only because of the machine itself, but because of the development of complementary video stores to provide easy access to prerecorded tapes. Furthermore, such new systems are usually modeled and built on existing systems with which consumers are familiar. For example, economic historians argue that the early electrical lighting systems designed for consumers' use were modeled on the then-familiar gas light system.⁸ Similarly, the stored-value card system is likely to be modeled on the credit card system.

One recent survey of introductions of high-technology products suggests that failures are caused by problems with marketing and management rather than with technology.⁹ That finding further complicates understanding what the future of such systems is likely to be: management and marketing problems are hard to analyze in such a survey. Furthermore, CBO has no way to forecast the ability of banks and other financial institutions to reduce costs enough to make the market profitable.

Stored-value cards are not likely to become a mass phenomenon overnight; rather, even if they are successful, stored-value cards are likely to penetrate the economy only gradually as the right combination of features is assembled. Entrepreneurs do not know at the outset which features of the existing system are important to the consumer and which are not. For example, do consumers want their money to be replaced if their cards are lost or stolen? Thus, the pilot programs and trials build on each other's experience as they try to introduce stored-value cards to different sets of clientele in different parts of the country using different modalities.

CBO analyzed market penetration in two ways: from the top down (that is, by looking at the total use of cash in the economy) and from the bottom up (that is, by examining specific niches in which stored-value cards can play a role). The total use of cash is so large that even a modest penetration by stored-value cards could create a substantial market for them. Similarly, analysis of specific markets reveals some potential if stored-value cards are able to capture even a fraction of all transactions.

The conclusion of both types of analyses is that a market comparable in size with that for traveler's checks—\$20 billion yearly—is not inconceivable. However, such growth will depend on billions of decisions made by millions of individuals and businesses. In the markets discussed below, no single participant has more than a fractional share of the total. Furthermore, most of the markets are very competitive, making it difficult for a strong-willed individual or corporation to impose its vision. Finally, the number of consumers participating in the Mondex trial in Swindon, England, is far below the company's forecast. Thus, achieving a market similar to that of traveler's checks would be a very successful outcome for stored-value cards, with a smaller market being much more likely in the near term.

The Changing Role of Cash in the Economy

The value of outstanding U.S. coins and bills with a face value of \$10 or less is roughly \$50 billion (see

8. Nathan Rosenberg, "Problems in the Economist's Conceptualization of Technological Innovation," *Perspectives on Technology* (Cambridge: Cambridge University Press, 1976), p. 75.

9. Chris Clugston, "High-Tech Demands Own New-Product Push," *Electronic News*, December 4, 1995, pp. 33-38.

Table 2.
Composition of U.S. Currency Outstanding
as of December 31, 1995

	Units (Billions)	Percentage of Total Units	Dollar Value (Billions of dollars)	Percentage of Total Value
Coins	n.a.	n.a.	22.7	5
Bills				
\$1	6.3	36	6.3	1
\$2	0.5	3	1.0	0
\$5	1.5	9	7.5	2
\$10	1.4	8	14.1	3
\$20	4.2	24	84.2	20
\$50	0.9	5	46.4	11
\$100	2.4	14	241.5	57
\$500	a	a	0.1	a
\$1,000	a	a	0.2	a
\$5,000	a	a	a	a
\$10,000	a	a	a	a
Total	17.3	100	423.7	100

SOURCE: Congressional Budget Office using data from Department of the Treasury, Financial Management Service, General Ledger Branch, "U.S. Currency and Coins Outstanding and in Circulation" (no date).

NOTE: n.a. = not applicable. Numbers may not add up to totals because of rounding.

a. Rounds to zero.

Table 2). Those coins and bills circulate, and each one can be used many times a year. Thus, the total value of the transactions involving the stock of coins and bills in circulation is a multiple of the \$50 billion face value. It is the total value of all cash transactions that the sponsors of stored-value card systems are targeting.

Of all payment methods, cash is used in the largest number of transactions but accounts for only a small share of the total value of all transactions. Studies have estimated that between 50 percent and 75 percent of transactions—by number, not value—are for cash.¹⁰ Families with low income, however,

10. The lower estimate comes from David Evans and Richard Schmalensee, *The Economics of the Payment Card Industry* (Cambridge, Mass: National Economic Research Associates, 1993), p. 13. The upper estimate comes from Department of the Treasury, Financial Crimes Enforcement Network, *Exploring the World of Cyberpayments* (September 27, 1995), p. 5. In both cases, the authors are citing industry estimates.

are likely to pay for a larger share of expenditures with cash.

The results of two surveys indicate that as a share of consumer spending, cash transactions have dropped sharply since 1984, whereas the use of checks and credit cards has increased.¹¹ According to a 1995 telephone survey commissioned by the Federal Reserve, cash transactions account for 18 percent of the expenditures of the average adult in the United States, compared with roughly two-thirds for checks and 13 percent for credit and debit cards. A similar Federal Reserve survey in the mid-1980s revealed that in 1984, cash transactions accounted for 36 percent of consumers' expenditures and checking for 57 percent.¹² Use of credit cards was half its current level.

What do these changing patterns in the use of cash, checks, and credit cards portend for stored-value cards? The rapid rise in the use of credit cards has largely been accomplished through an extraordinary extension of credit to consumers. In fact, the revolving debt of consumers, which is dominated by credit card debt, has more than tripled since 1985, reaching \$350 billion in 1995 (see Figure 4). However, other payment methods, such as stored-value cards, cannot increase the net purchasing power of consumers, and so their share of transactions is likely to grow more slowly.

The increased share of checks probably stems from factors outside the financial system. For example, housing has commanded an increasingly larger share of household income, and the overall share of checking has risen because households typically pay their mortgages and rent with checks.

11. The two surveys are not perfectly comparable. The more recent was a survey of individual adults, and the one done 10 years ago was a survey of families. The changes in spending have been so large, however, that those differences should not affect interpretation of the results.

12. Robert Avery and others, "The Use of Cash and Transaction Accounts by American Families," *Federal Reserve Bulletin*, vol. 72, no. 2 (February 1986), pp. 87-108.

Converting the percentages in the Federal Reserve telephone survey into an estimate of the total use of cash in the economy requires combining the survey results with data in the national income and product accounts (NIPAs). The concept of consumer expenditures used in the survey differs in many ways from that found in the NIPAs. Those differences alone could change the estimate of total consumer expenditures using cash. For example, the NIPAs treat the purchase of cars as a lump-sum transaction, whereas the Federal Reserve survey counts each monthly car payment separately. Housing services are imputed in the NIPAs, but the mortgage or rent check is counted directly by the survey. Thus, that survey double-counts credit card purchases, since credit card debt, which is counted as a transaction, is usually paid off with a check, which is another transaction. Because the Federal Reserve survey overstates the use of one payment method, as a matter of arithmetic it must understate the use of another payment method, most notably cash. The share of cash used by consumers should be adjusted upward by the appropriate amount (13 percent—the percentage of expenditures paid for with credit cards) to compensate.

Even though the data from the NIPAs and the Federal Reserve survey are not perfectly consistent, the survey leads one to conclude that roughly 20 per-

cent of net consumer expenditures use cash. Data in the NIPAs put total consumer expenditures at about \$5 trillion. That estimate suggests that cash accounts for roughly \$1 trillion of consumer expenditures.

Thus, capturing even a modest share of cash transactions could lead to substantial markets for stored-value cards. For every 1 percent of cash transactions that stored-value cards replaced, issuers would sell \$10 billion worth of cards. If stored-value cards also replaced credit cards or check payments, then cash sales would obviously understate the card's total potential.

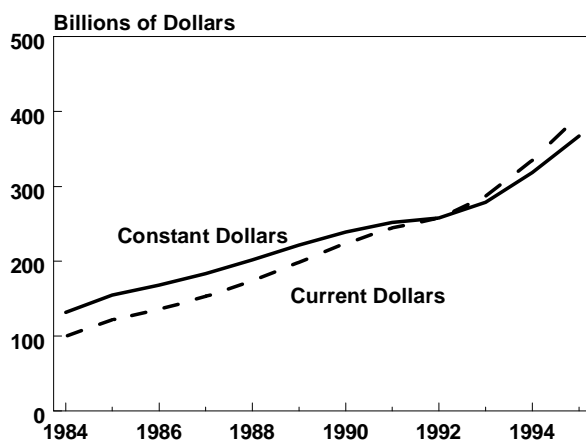
Analyses of Specific Markets

The Congressional Budget Office looked at three markets commonly cited as potential major users of stored-value cards: fast-food restaurants, vending machines, and convenience stores. That list is far from exhaustive, however; indeed, entire categories in the retail and service sector are characterized by transactions under \$10, which the stored-value cards explicitly target. Consumers spent more than \$200 billion in those three markets in 1994. Each of the markets is very different from the others. Those differences illustrate the difficulties facing stored-value cards: since there is no widely accepted product yet, each potential user expects something different.

CBO was able to find government data for only one industry—fast-food restaurants. The Bureau of the Census does not have a separate data series for sales in vending machines and feels that the series it has for convenience stores is not of sufficient quality to be published. Consequently, CBO used industry estimates in those cases.

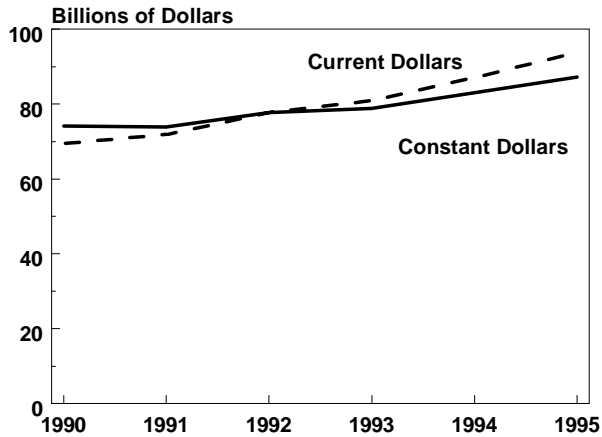
Fast-Food Restaurants. A very large percentage of meals in the United States are consumed away from home, often at inexpensive fast-food restaurants. According to industry data based on the Census of Retail Trade, consumers spent \$94 billion on fast food in 1995, up from \$69 billion in 1990—an increase of 35 percent (see Figure 5). Fast-food sales have grown even when they are adjusted for inflation. Although such consumption actually dipped in 1992, presumably because of the recession, it recov-

Figure 4.
Revolving Debt Owed by U.S. Consumers



SOURCE: Congressional Budget Office using data from the Board of Governors of the Federal Reserve System.

Figure 5.
Sales at Fast-Food Restaurants



SOURCE: Congressional Budget Office using data from National Restaurant Association, *1996 Food Service Industry Forecast* (Washington, D.C.: NRA, 1996).

ered after one year. In 1994, inflation-adjusted sales of fast food were 16 percent higher than they had been in 1990.

In addition to the large sales volume at fast-food restaurants, which makes that market a likely prospect for stored-value cards, the market is dominated by a relatively small number of chains, all of which have name-brand recognition. Their offering the option of paying with a stored-value card, even on a regional basis, could positively influence the acceptance of those cards by consumers.

Vending Machines. Many industry observers describe vending machines as one of the largest potential markets for stored-value cards. Operators of vending machines believe they lose millions of dollars in sales annually because potential customers lack exact change. The solution so far has been to install dollar-bill changers in or near the vending machines.

According to industry statistics, sales from vending machines have grown steadily in nominal dollars during the past decade, except during the recession of 1991-1992. In 1994, consumers spent \$46 billion in vending machines that offer products or entertain-

ment (video games and jukeboxes), up from \$34 billion in 1986—a 4 percent average annual increase.¹³ Including sales from other vending machines owned and operated by soft-drink companies would easily push total sales to well over \$50 billion.

If inflation is factored in, however, the picture is less rosy. Sales from vending machines grew by 4 percent until 1990, fell dramatically during the recession, and were still below the 1987 level in 1994. If that market does not recover, operators may not wish to make the investments necessary to ensure widespread acceptance of stored-value cards.

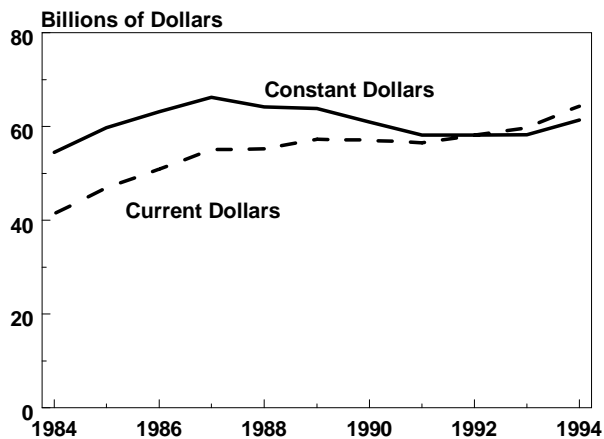
Even if sales are not rising, however, operators of vending machines have some incentives to use stored-value cards to lower their high rate of theft. Industry rules of thumb suggest that between 7 percent and 12 percent of revenue is lost because of theft by employees or outsiders. Especially threatening in this business are thieves who obtain duplicate keys and systematically skim sufficient funds to reduce the vendor's profitability but not enough to draw attention.

Convenience Stores. Convenience stores, either attached to gasoline stations or freestanding, are a common site for small retail purchases and therefore provide a good opportunity for the use of stored-value cards. According to industry estimates, sales of goods other than gasoline at convenience stores totaled \$64 billion in 1994, up from \$41 billion in 1984 (see Figure 6).

Although sales at convenience stores have risen dramatically, that growth has fluctuated over the past decade. Even when adjusted for inflation, sales stagnated or declined. In 1994, however, sales turned up, rising by 5 percent after inflation was factored in. That recent increase in sales may be in response to

13. CBO used the industry estimate as the basis of its calculation on the split between vendors and their suppliers. See "Census of the Industry 1995," *Vending Times* (August 1995) and previous issues for earlier years. CBO based its estimate of the revenues from video games and jukeboxes on an assumption of 300,000 jukeboxes in operation. That estimate excludes vending machines not owned by vending machine operators, most notably those owned by soft-drink companies. Also see "1995 State of the Industry Report," *Automatic Merchandiser* (August 1995), which provides a lower estimate for product sales but a similar growth rate.

Figure 6.
Sales at Convenience Stores



SOURCE: Congressional Budget Office using data from National Association of Convenience Stores, *1995 Fact Book, Convenience Store Industry*, 8th ed. (Arlington, Va.: NACS, 1995).

NOTE: Excludes sales of gasoline.

the industry's efforts to upgrade the quality of its food and product lines.

Like the fast-food market, the convenience store market has several major chains that might play a role in introducing stored-value cards. However, such chains do not dominate this industry as much as they do the fast-food industry.

Developments in the Technology of Competing Methods of Payment

In deciding whether to use stored-value cards, consumers and suppliers will consider not only the potential uses to which those cards can be put but also how they compare in such uses with existing payment mechanisms. The main competitor to stored-value cards is cash and will remain so. (At the upper end of expenditures—say, above \$10—stored-value cards can compete with most of the other forms of

payment. However, the main target of the current pilot programs for stored-value cards is the under-\$10 transaction.)

Although coins and bills have not changed, new technologies such as automated teller machines and dollar-bill changers have substantially reduced the cost and inconvenience of using cash, and consumers have responded by using them more frequently. The broad-based acceptance of those technologies, however, will increase the difficulty in getting consumers to accept stored-value cards.

On the positive side, the investments that ATMs and dollar-bill changers require of merchants and banks are not dissimilar to those needed by stored-value cards. The relatively rapid uptake of the earlier technologies bodes well for the adoption of stored-value cards by merchants and bankers if consumers accept the new technology.

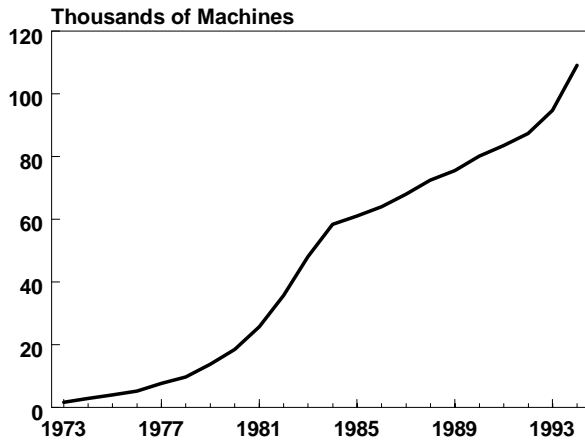
The Automated Teller Machine

One analog to the development of a market for stored-value cards might be the automated teller machine. Banks began introducing ATMs in the early 1970s. ATMs clearly increased the ability of consumers to adjust their cash balances more closely than before and to obtain cash more conveniently.

History of the Market. Until recently, the growth in ATMs followed the typical "S" curve for the introduction of new technology (see Figure 7). In the mid-1970s, banks were experimenting with the marketing, location, and legal requirements of ATMs. Growth accelerated in the early 1980s as access to ATMs became a competitive advantage for a bank. By the mid-1980s, the most productive sites for ATMs had presumably all been filled. At that point, the less desirable sites began to be filled but at a slower rate. Growth seems to have picked up again during the past couple of years, however, breaking out of the expected "S" curve and indicating that the economy may not yet be saturated with ATMs.

Banks quickly found that they could not individually provide all the ATMs that consumers desired. In

Figure 7.
Number of Automated Teller Machines in Use



SOURCE: Congressional Budget Office using data from the Board of Governors of the Federal Reserve System, Division of Reserve Bank Operations and Payment Systems.

response, they formed state and regional networks.¹⁴ Consumers did not have to travel long distances to use their bank's ATM, which would have defeated the convenience of the service, and each bank did not have to invest in as many ATMs, which would have defeated the cost savings attributable to them. The number of ATM networks rose rapidly, peaking in the mid-1980s at almost 180.

Given the level of business and other travel in the United States, however, regional ATM networks proved insufficient. The regional networks began to consolidate and, simultaneously, national networks began to form. The formation of national networks exploited three phenomena:

- o *The desirability of larger networks.* Consumers prefer to be able to use more ATMs with the same card.
- o *The economies of scale.* The computer network and other fixed costs can be spread over more machines.

14. For more details, see James McAndrews, "The Evolution of Shared ATM Networks," *Business Review*, Federal Reserve Bank of Philadelphia (May-June 1991), pp. 3-16.

- o *The spread of interstate banking.* Interstate bank holding companies prefer to pay for membership in only one ATM network.

Because all of those features favor larger networks, the largest networks have continued to garner increasingly larger shares of the volume of ATM transactions.

ATMs reduce the amount of cash consumers hold, thus bringing consumer behavior more in line with modern corporate cash management techniques.¹⁵ ATMs reduce the cost of obtaining cash. In response, consumers have opted to leave more money in their interest-bearing bank accounts and hold less currency in hand, withdrawing cash only as needed. Individuals make many small withdrawals from ATMs; the machines are used much more often than were bank tellers.¹⁶

Banks have recently been trying to transfer the cost of stocking and maintaining ATMs to consumers by imposing a fee on such use or by increasing existing fees. Banks especially wish to recover the costs of maintaining ATMs that are not on bank premises. Those machines can be expensive to maintain and are not thought to reduce a bank's costs as much as ones on-site, which can substitute for visits to tellers. Industry sources estimate that about 40 percent of ATMs are not on bank premises.¹⁷ In December 1995, Visa, which owns the PLUS ATM network, announced that it will allow banks with ATMs on its network to begin charging fees. Those fees may vary between \$0.25 and \$2.50 per transaction and will be determined by the banks according to their competitive environment. Those fees may prompt consumers to use ATMs less frequently.

15. Kenneth Daniels and Neil Murphy, "The Impact of Technological Change on the Currency Behavior of Households: An Empirical Cross-Section Study," *Journal of Money, Credit and Banking*, vol. 26, no. 4 (November 1994), pp. 867-874.

16. David B. Humphrey, "Delivering Deposit Services: ATMs Versus Branches," *Economic Quarterly*, Federal Reserve Bank of Richmond, vol. 80, no. 2 (Spring 1994), pp. 63-64.

17. Karen Gullo, "ATM Fees Could Jump," Associated Press Newswire Service, December 7, 1995 (available in LEXIS, Nexis Library, AP file).

Implications for Stored-Value Cards. The experience of ATMs provides both good and bad news for rapidly deploying stored-value cards. The good news is that the rapid growth and proliferation of the ATM networks have shown that a new technological system can be put into place and become an integral part of the payment system without stressing the banking system. The bad news is that ATMs have provided many consumers, and especially those most likely to use stored-value cards, with the same conveniences that they would derive from stored-value cards. In some measure, ATMs may have preempted many of the benefits of stored-value cards.

The demographics of ATM use may indicate the conflict between ATMs and stored-value cards. Users of ATMs tend to be younger, more affluent, and better educated than the population as a whole.¹⁸ The target audience for stored-value cards shares those characteristics. Thus, the issuers of stored-value cards are targeting the very same people who already have the most convenient access to cash.

Furthermore, for many years after ATMs became available in the United States, banks on average were able to persuade less than a third of their customers to become regular ATM users (that is, using a machine one or more times a month).¹⁹ Although usage has subsequently increased, the low level of initial acceptance suggests a slow start-up period. However, because ATM cards are widely used, banks may have an easier time convincing customers to accept the idea of paying with a card.

Dollar-Bill Changing Machines

Twenty-five years ago, machines to change dollar bills into coins were rare. Now many vending machines accept dollar bills, and some machines can read bills of larger denominations. Since use in vending machines is one of the principal functions conceived for stored-value cards, looking at the growth in dollar-bill changing machines might provide some insight into the potential market for those cards. Like ATMs, however, dollar-bill changers are

not only a model for stored-value cards but also their competition: a machine that accepts dollar bills reduces the stored-value card's advantage of not requiring coins to make a purchase.

Many vending machines incorporate a bill changer—called an acceptor in the trade—or are located in a facility with a freestanding dollar-bill changer. According to one industry survey of operators of vending machines, 50 percent of those machines had dollar-bill acceptors in 1994, up from 44 percent the year before.²⁰

History of the Market. The market for dollar-bill changers was relatively small—a few thousand machines per year—until the equipment was actually incorporated into vending machines. The two-step process of changing the dollar bills into coins and then using the coins in the vending machines apparently limited its use. It is not clear whether use was low because customers resisted or because operators could not cluster enough vending machines in many locations to justify a separate and expensive dollar-bill changer.

Then, about a decade ago, dollar-bill changers began to be incorporated into vending machines. As a result, the sales of dollar-bill acceptors skyrocketed to several hundred thousand units per year. Those figures include sales from new vending machines and from existing machines that were retrofitted with a dollar-bill acceptor. (By contrast, sales of freestanding dollar-bill changers have not grown substantially.) At \$300 to \$350 apiece, dollar-bill acceptors cost roughly the same as a basic reader for stored-value cards. Industry sources report that the vast majority of new vending machines have bill acceptors largely because vendors feel that they increase sales.

Sales of vending machines have also risen. In 1984, manufacturers sold 250,000 vending machines of the type that is able to incorporate bill acceptors (see Figure 8). Sales in 1993 and 1994 averaged more than 355,000 units per year.²¹

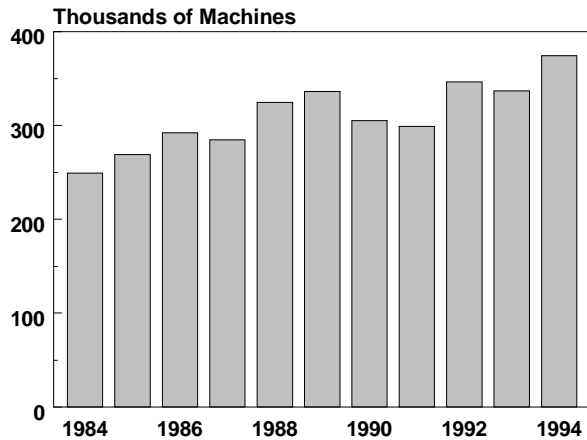
18. Daniels and Murphy, "The Impact of Technological Change on the Currency Behavior of Households," pp. 867-874.

19. Linda Fenner Zimmer, "ATMs: An Industry Status Report," *Bank Administration* (May 1987), p. 31.

20. "1995 State of the Industry Report," p. A6.

21. These data from the Bureau of the Census are only for vending machines that currently accept dollar bills. They exclude so-called bulk vending machines (such as gum-ball dispensers). The bureau does not collect data on the number of video arcade games or pin-ball machines shipped.

Figure 8.
Shipments of Vending Machines That Can Incorporate Dollar-Bill Acceptors



SOURCE: Congressional Budget Office using data from the Bureau of the Census, Manufacturing and Construction Division, Metal and Machinery Branch.

Of course, not all the increase in sales of vending machines during that period is attributable to dollar-bill acceptors. Many lifestyle factors, such as the rising percentage of meals eaten outside the home, probably explain a large fraction of the increase.

Implications for Stored-Value Cards. As a model for stored-value cards, dollar-bill acceptors also present a mixed picture. First, the dollar-bill acceptor indicates that if a new technology is perceived as increasing sales, firms can easily incorporate it. But the details matter. The freestanding dollar-bill changer is not as profitable as the dollar-bill acceptor. The freestanding changer requires a larger initial

investment and has higher maintenance costs. Costs for the incorporated bill acceptor are lower because it is self-refilling—that is, consumers who pay for their drinks or candy with coins supply the change that the machine can then use to provide change for those who pay with bills. By contrast, the freestanding bill changer has to be refilled more often, reducing vendors' profits. (The sensitivity of profits to the need to refill the change pool should not be underestimated. Many acceptors can change \$5 bills, but they are often disabled by vendors who do not want to have to refill them more often and are willing to forgo sales to people who have only \$5 bills.)

This example reinforces the argument presented above that the marketing details of new high-technology products play a more important role in their commercial success or failure than do the technical features. The act of providing the technology is not necessarily sufficient to ensure commercial success. That technology must be incorporated into the sales process in a way that provides value to the consumer and profit for the vender. Thus, one might expect more changes in the marketing and financial details of the stored-value card programs than in their technology as issuers modify their programs in search of success.

The dollar-bill acceptor, however, differs from potential stored-value cards in significant ways. Most important, since the dollar bill is already an accepted means of exchange, bill acceptors have immediately increased sales from vending machines. Whether that will happen with stored-value cards is not clear. Most people already have dollar bills in their pocket, but initially at least, few people will have only stored-value cards in their pocket.

On-line Payment Systems

What prompts the recent surge of proposals to develop on-line payment systems? One major factor is the desire to exploit for commercial purposes the Internet and its user-friendly component—the World Wide Web. The Internet is essentially a second telephone system, but one that links computers, not telephone receivers. Tens of millions of computers are in the hands of businesses and consumers and are either already connected to the Internet or could easily be connected.

People will probably learn to use the Internet for commerce in many of the same ways they currently use the telephone system. In fact, that is already happening. According to a recent estimate, worldwide sales on the Internet total more than \$300 million a year and that number is growing.¹ However, some industry observers believe that commercial use of the Internet will not become widespread until an on-line payment method emerges with which businesses and consumers feel secure.

Experiments with on-line payment methods fall into three general categories:

- o On-line use of credit cards,
- o On-line use of existing checking accounts, and
- o On-line scrip.

One tally listed almost three dozen different proposed systems of on-line payments.² Many of them, however, are somewhat academic in that they lack financial backers to launch even a pilot program. Others have been proposed by major financial companies but are not yet in place because the systems are still being revised or are subject to review by potential partners.

Which system will be important in a decade or two is impossible to predict, just as in the mid-1970s it was impossible to tell which computer and software companies would be the most important in the mid-1990s; the personal computer, for example, was still largely a hobbyist's plaything in the mid-1970s. Operations that currently seem little more than quaint ideas may become quite important, and operations that are backed by major financial institutions may fade into oblivion. In fact, the most important forms of electronic payments and the companies that will issue them 20 years hence may not yet exist.

Furthermore, no one can project who will use the Internet for commerce. A lot of discussion has focused on catalog shopping and "virtual shopping malls" as a model for commerce on the Internet, but that may not happen. Instead, since most computers and rapid access to the Internet are at places of work, business-to-business commerce may come to domi-

1. "Netscape Sees Boom in Electronic Commerce," Reuters Ltd., June 13, 1996 (available at http://www.yahoo.com/text/headlines/960613/compute/stories/netscape_1.html).

2. For more detailed analyses of the individual on-line proposals, see Andrew Singleton, "Cash on the Wirehead," *Byte* (June 1995), pp. 71-78; and John Lewell, "Paying for It on the Net," *Net Commerce International* (August/September 1995), pp. 6-8.

nate commercial Internet traffic just as it dominates telephone traffic.

Finally, no one knows how the Internet is likely to be used for commerce. An on-line payment system is not a necessary condition for electronic commerce on the Internet. Businesses could use the Internet for ordering and delivering information services while maintaining their current billing systems. Business purchases are usually prearranged and are often based on regular delivery and billing schedules. If business-oriented commerce eventually dominates the Internet, the Internet might be a conduit merely for billing information and tallies of goods delivered, not payments. Since the Internet is essentially a telephone system for computers and most of the business conducted over the telephone does not involve immediate payment, most of the business traffic on the Internet may not involve payment either. Furthermore, businesses now have access to inexpensive electronic payments through automated clearinghouses. For example, electronic payment of salaries is often accomplished in that manner. What businesses lack is an inexpensive on-line means for making one-time or occasional payments.

Two aspects of on-line payments, however, are certain: security on the Internet is a major concern, and the underlying nature of the payments is not likely to change. Would-be providers are aware of the current level of fraud with credit cards and checks. They also believe that any new payment system, if it is not properly secured, could present a large opportunity for criminals. Consequently, proposals for new payment methods on the Internet contain large elements of security. The most secure systems use a great deal of encryption technology to verify as well as hide many aspects of each exchange. Most of that encryption ultimately involves series of numbers that are difficult to forge.

One special use of encryption is called a digital signature. That signature is closely tied to a person and the message, such as the number of a credit card or checking account, that he or she is trying to send. Digital signatures simultaneously confirm that a given individual sent the message and that the message has not been altered since it was sent. Those unique electronic signatures and serial numbers at-

tempt to recreate the audit trail that usually accompanies any but the most mundane conventional transaction.

Even more important, however, those exercises in encryption do not change the underlying nature of the payments. Like the stored-value cards, the most important of the new payment mechanisms rely on existing payment systems to transfer the funds from customers to merchants. Many on-line systems merely serve as extensions of either existing checking accounts or existing credit card accounts. In fact, one way to classify those on-line payment schemes is by the payment system of which they are part.

On-line Use of Credit Cards

Regardless of the technical details, on-line purchases using credit cards are analogous to mail or telephone purchases. The only difference is that instead of dialing an 800 number or faxing a credit card number, the buyer is using a computer and the Internet or another on-line network. The payment system involving the bank, the merchant, and the consumer remains (see Chapter 1).

Given the strength of the U.S. credit card system, many groups are attempting to extend its capabilities to on-line merchants. But the lack of security presents a major obstacle. Determining whether concerns about security are well founded is beyond the scope of this paper, but a large fraction of potential users clearly are not making purchases on-line because of such concerns.

As more people begin to use the Internet to make purchases, intercepting credit card numbers becomes more profitable to criminals. The Internet is essentially a system in which computers pass unsealed messages among themselves—messages that, like those on the backs of postcards, are there for all to see. If consumers increasingly used credit cards to make purchases over the Internet, then a would-be criminal could intercept numerous card numbers by placing eavesdropping software near one of the computers that handles many of the Internet's messages.

Even though billions of messages travel through the Internet, the design of credit card numbers makes them especially easy to recognize and retrieve from this constant stream of messages. Credit card numbers were designed when computers were relatively slow and expensive. They were designed to be easy to recognize—a group of 16 digits that have a distinct mathematical relationship. Developing software to scan Internet messages for those groups of numbers is a straightforward exercise, though probably beyond the capabilities of most people on the Internet. Thus, unlike most current credit card fraud in which one card number is picked up at a time, the use of unencrypted numbers could automate the theft of credit card numbers.

People wishing to use or accept credit cards for commerce on the Internet have three general concerns about security: proving the consumer has the right to use that particular account number; making sure that no one intercepts the number while it is being transmitted; and ensuring that the merchant does not misuse the account number.

Giving the would-be purchaser a unique digital certificate would confirm that the person (actually, the computer) using the credit card was authorized to do so. The credit card associations plan to use modern cryptographic techniques to create digital signatures—a hard-to-forge series of numbers—that would link an on-line order with a particular credit card account in a manner parallel to a conventional signature. Before delivering the merchandise or service, the merchant who received the account number and digital signature would check on-line with his or her financial institution to confirm that the signature was valid and corresponded to the card. Merchants cannot yet do that for credit card purchases made by telephone. Thus, that level of security could in theory reduce credit card fraud.

Developing standards for software that would encode the account numbers when buyers transmitted them over the Internet would help prevent a third party from intercepting a credit card number. The merchant would then contact the financial institution that issued the card. That institution would unscramble the account number and confirm to the merchant that the purchase was legitimate.

These systems also prevent merchants from misusing the card. The merchant never sees the real account number and digital signature, only the encrypted version, which can be automatically stamped with the date and time, preventing its reuse. Again, the same concerns arise with telephone purchases, but the telephone system cannot address them. Depriving the merchants of the ability to misuse account numbers would be a step forward against fraud.

Efforts by Credit Card Associations

The two major credit card associations—Visa and MasterCard—are organizing the most prominent effort to develop a system for using credit cards over the Internet. Rather than just focusing on encrypting credit card numbers, they are creating a chain of trust linking all participants in a transaction: the buyer, the seller, the relevant bank, and the card association itself. That chain will certify the creditworthiness of all participants by verifying digital signatures.

Despite earlier conflicts, Visa and MasterCard have agreed to develop standards, called the Secure Electronic Transaction (SET) specification, for making payments with a credit card over the Internet.³ In February 1996, they were joined by American Express. The agreement will include universally accepted standards for encrypting credit card numbers and verifying their use. The standards will be incorporated into software for using the Internet—most notably, the so-called browser software, such as Microsoft Explorer and Netscape Navigator, that is widely used to access the World Wide Web and other popular parts of the Internet. The initial proposal for SET was released in the first quarter of 1996 for comment by consumers, merchants, and financial institutions. The final standards are scheduled to be incorporated into software in the last quarter of 1996 or early 1997.

Many analysts believe that the credit card standard could eventually dominate the market for payments over the Internet, especially if consumers be-

3. The SET standards derive from a different agreement between Visa and MasterCard than the standards developed for stored-value cards that were discussed in Chapter 2.

gin making large numbers of purchases on-line. Given the widespread use of Internet browsers and the ubiquitous possession of credit cards, SET could easily become widely used for impulse purchases or purchases in which no previous relationship existed between the merchant and the consumer. However, if business uses predominated in Internet commerce, the use of credit cards on-line would probably be more limited.

Other Efforts

Some people have argued that the potential for a large amount of theft means that credit card numbers and other sensitive financial information—encrypted or otherwise—should be kept off the Internet. One such system, First Virtual, is essentially an adjunct to a credit card: it keeps the credit card number entirely off the Internet by using a unique set of identifiers for each buyer and each transaction. The buyer must authorize each purchase through a separate electronic mail (E-mail) transaction. That process is similar to the current authorization that accompanies credit card purchases, except that First Virtual sends confirmation messages on the Internet to the holder of the credit card to approve the purchase rather than to the credit card company. First Virtual provides a further level of security by withholding payment from the merchants for 90 days. Thus, this system has both on- and off-line security. First Virtual has been running for almost two years.

Electronic Checking Accounts

Several organizations and coalitions of organizations have been trying to create ways of using existing checking accounts over the Internet. In most of those efforts, the consumer uses his or her checking account with a bank or service and then draws down those funds using special electronic checks and digital signatures. Generally, those programs are not as close to a major commercial introduction as are those based on credit cards or electronic scrip. Many observers feel that electronic checks, despite a slow start, could become a widely used method for making payments.

A consortium of major banks has designed an electronic check that most closely parallels a conventional checking account.⁴ The customer writes a check electronically over the Internet from a personal computer or other appropriate device using a smart card to provide an electronic signature that the merchant's computer recognizes as valid. The merchant electronically endorses and forwards the check to its bank over the Internet. The merchant's bank in turn uses its internal links to the banks' settlement system to obtain payment from the customer's bank. Security in this system is provided by the special hardware and smart card, which some observers argue is more secure than a system based on software alone. Because not enough consumers have computers with such hardware, widespread consumer acceptance of this type of payment will develop slowly. But such payments could become very important in transactions between businesses.

On-line Scrip

More proposals have been made for systems involving on-line scrip than for any other type of electronic payment. This study uses the term "on-line scrip" rather than some of the other terms being bandied about, such as "on-line money" or "digital cash." Those terms are potentially misleading because they are often interpreted as being the same as money or cash, which has the backing of the U.S. government. Scrip is a more accurate term, connoting the informal (and less certain) nature of the payment product; the value transmitted is no more than a representation of the issuer's promise to pay.

As a group, on-line scrip systems differ from electronic checks in that they can only be used on a computer network, whereas the electronic check is merely one manifestation of a conventional checking account. No single description applies to all the proposals, but the following discussion highlights a few common features or better-known systems that might typify fully developed systems.

4. Members of the consortium include Bank of America, Chase Manhattan, Citibank, NationsBank, Wells Fargo, and others.

Most of the proposed systems are essentially debit systems: the consumer deposits funds in an account that is then drawn down as the consumer spends the funds. The consumer recharges the account using a conventional payment mechanism such as a check or credit card. The proposed systems differ from each other in their design features such as who keeps the account and who issues the electronic scrip.

The World Wide Web is now generally viewed as facilitating two types of purchases: large purchases for on-line or off-line goods, similar to catalog sales; and small purchases, or micropayments for on-line services, the on-line equivalent of paying for a photocopy of an article. Those two markets present different sets of technical requirements. Larger purchases can support a relatively expensive system such as credit cards, but the technology for micropayments has to be very inexpensive. Generally, the scrip systems are being designed for making micropayments (under \$1), since credit cards and checks will be able to cover larger purchases efficiently. For smaller payments, however, the auditing trail that credit cards and checks require adds an unnecessary cost.

One type of electronic scrip, trademarked "ecash," has been getting a great deal of attention. Since October 1995, the Mark Twain Bank in Missouri has been issuing ecash under license from DigiCash, the company that holds the patents for this particular type of on-line scrip. With ecash, a consumer buys digital money from the bank using a checking account and stores electronic tokens—actually, a series of numbers—on the hard drive of his or her computer. The person then transmits those electronic tokens to the merchant's computer, which automatically retransmits them to the bank and receives confirmation of their validity before sending the goods or services to the buyer. The bank uses the patented security system to ensure that the coin has only been spent once. A unique feature of ecash is that it allows the buyer to remain anonymous, just as cash does. Other on-line payment systems reveal the identity of the participants to each other or to the provider of the payment system.

The future role of on-line scrip is not yet clearly defined, but markets involving micropayments—for

example, information services or on-line entertainment—are likely possibilities in the short run. Authors and other providers of information would like a system that would let them charge for small pieces of information, such as copies of articles or photos and other graphic images. Alternatively, some analysts have suggested that consumers could use electronic scrip to pay for games in an on-line arcade.

As a method for making micropayments, however, on-line scrip faces competition. First Virtual's payment system, for example, uses a conventional credit card account. The merchant accumulates the small charges and stores them in his or her computer until they are sufficiently large to turn in for payment.

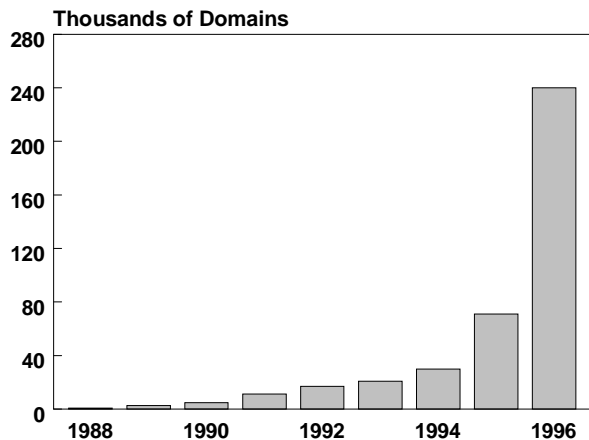
A service such as Lexis/Nexis could also provide access to a multitude of publications and information sources without the need for on-line payment. The subscriber would pay a fixed monthly or yearly fee to the service and then pay an additional fee for each article copied. If that arrangement became the model for information services on the Internet, the need for on-line scrip would be reduced. Depending on how information services are priced, therefore, on-line scrip may play only a niche role.

Development of Markets for On-line Payments

As more individuals and businesses become connected to the Internet and other computer networks, more transactions can be conducted on-line, including making payments. Who, how, and under what circumstances are obviously not knowable. But the widespread use of the Internet for payments is likely.

Which payment method will win the largest market share will probably depend on the competitive stance each payment provider takes in the struggle for market share. Systems that seem quite logical and efficient may misprice their product and thus knock themselves out of the race. And more than one system may be able to develop a large market. For example, businesses and consumers may replicate their current major payment systems with on-

Figure 9.
Number of Domains Registered on the Internet
as of January Each Year



SOURCE: Congressional Budget Office using data from Network Wizards, *Internet Domain Survey, January 1996* (available at <http://www.nw.com/zone/WWW/report.html>).

NOTE: A domain represents the name of an individual or organization that is registered on the Internet.

line analogs. In addition to purchases made with credit cards, checks, and scrip, electronic forms of bidding and billing through electronic data interchange (EDI)—analogous to today's corporate or government purchase order—are likely to play a role.

Demand may not grow rapidly, however. The catalog market has taken decades to reach its present size of roughly \$60 billion. Using that level of sales as a model, on-line sales would probably be only a small fraction of that in the near term.

Another way to estimate the potential market for on-line payment systems is to look at the Internet. By any of several measures—the number of domains, the number of messages transmitted, or the number of host computers—growth of the Internet has been explosive. For example, the number of domains connected to the Internet has grown a hundredfold during the past seven years (see Figure 9). (A domain represents the name of an individual or organization registered on the Internet.) That rate of growth amounts to an annual doubling in the number of domains. The past two years in particular have seen exceptional growth.

As of January 1996, 130,000 of the 240,000 domains registered and responding to the latest Internet survey were registered to commercial organizations.⁵ However, that statistic probably overstates the commercial presence on the Internet, since only about 25 percent of the host computers on the Internet were registered to a commercial domain. Furthermore, each domain does not represent exactly one economic entity and potential buyer or seller. Some domains represent larger organizations and serve more people than others. In addition, roughly a seventh of all commercial domains have been registered by businesses with multiple domain names, one for each of their major product lines. For example, gm.com, pontiac.com, and chevrolet.com are domain names registered by General Motors.

Checks

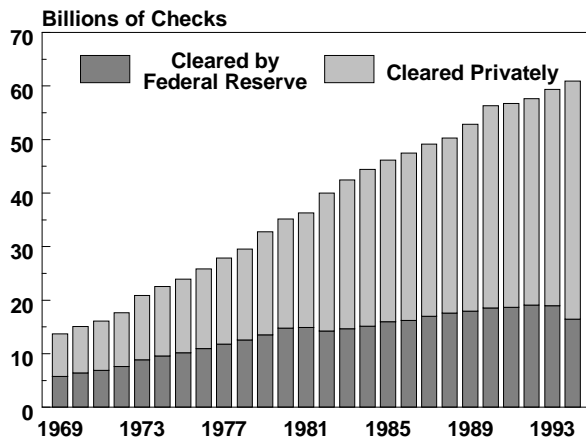
In theory, on-line payments should be able to replace checks in many applications. For the near term, however, they would probably replace no more than a small fraction of checks. Nevertheless, the volume of checks is so large and they represent such a large fraction of all payments that even a small share of that market could be substantial.

Checks dominate as a means of payment for consumer spending. As noted in the previous chapter, the latest Federal Reserve survey of patterns of consumer spending revealed that payments using checks accounted for two-thirds of consumer expenditures and credit cards for 12 percent. Credit cards must eventually be paid, usually with checks. One might think of credit cards as a way of consolidating and postponing checks, rather than as a substitute for them. Thus, almost four-fifths of consumer expenditures are handled by check, directly or otherwise.

The use of checks has continued to grow in absolute numbers. Roughly 60 billion checks were used in the U.S. economy in 1994—40 percent more than

5. Network Wizards, *Internet Domain Survey, January 1996* (available at <http://www.nw.com/zone/WWW/report.html>). Other sources provide similar growth rates and proportions, although their absolute levels may differ.

Figure 10.
Use of Checks in the Economy



SOURCE: Congressional Budget Office using data from the Board of Governors of the Federal Reserve System, Division of Reserve Bank Operations and Payment Systems.

were written 10 years before (see Figure 10).⁶ According to Federal Reserve studies from the early 1980s, consumers account for 55 percent of checks and businesses for 40 percent. Thus, either group would have a substantial number of checks that could be moved into payment systems on the Internet.

What types of checks are amenable to substitution through on-line payments? Most obvious are regular payments to large companies and financial institutions. Such payments include those for mortgages or utilities and those made to regular suppliers of business inputs. Less likely to be transferred to on-line services are checks written spontaneously or on an irregular basis, such as checks written at a school or church dinner.

Many of the checks that would most likely be moved on-line are being targeted by or have already moved to competing payment schemes, such as home banking and automated clearinghouse payments. Ac-

ording to industry figures, for example, direct deposit of private-sector salaries through automated clearinghouses has been increasing quite rapidly, accounting for 45 percent of those salaries in 1995 (see Figure 11).⁷ Government payments have exhibited a similar trend: almost two-thirds of Social Security checks are now deposited directly, and over 90 percent of government employees receive their pay through a clearinghouse. Similarly, the computer-based home banking services such as Quicken and CheckFree give consumers access to an automated clearinghouse for the regular payment of their bills.

Catalog Sales

According to industry estimates, half of U.S. adults ordered merchandise by phone or mail in 1994.⁸ Catalog sales by U.S. companies, dampened by the 1990-1991 recession, have grown respectably during the past two years, reaching \$63 billion in 1995. (See Figure 12 for the Direct Marketing Association's estimates of catalog sales since 1987, in nominal and inflation-adjusted terms.) Although the nominal figures register continued growth throughout that period, the inflation-adjusted figures show decline or slow growth in the early 1990s.

These catalog sales figures include sales to foreign consumers, many of whom fax their orders to U.S. companies. That pattern of international commerce could easily be duplicated if the foreign consumers used the Internet to place their orders instead of faxing them.

The strength of catalog sales has led some analysts to believe that commerce on the Internet can replicate that performance. Those analysts argue that instead of spending a large amount of money producing and mailing out the catalogs, merchants will use the Internet to transmit the catalog's words and images to the home at much less cost. But that view may be overly optimistic.

6. Data are from the Board of Governors of the Federal Reserve System, Division of Reserve Bank Operations and Payment Systems. Only the roughly 15 billion checks cleared by the Federal Reserve System are subject to an accurate and public count. The remaining 45 billion are presented within the originating bank or cleared through local private clearinghouses and are not counted as reliably.

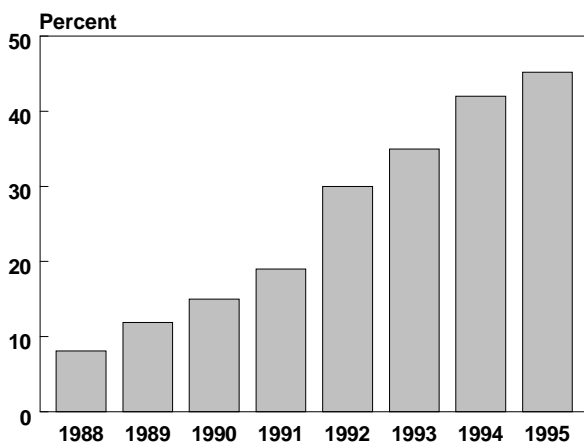
7. National Automated Clearing House Association, "ACH Volume Continues Solid Growth" (press release, Herndon, Va., April 26, 1996, available at <http://www.nacha.org/pr042601.htm>).

8. Direct Marketing Association, "U.S. Catalog Sales Continue to Increase" (press release, New York, Fall 1995).

The technology for viewing a catalog of products on the Internet is, from a consumer's point of view, more cumbersome to use and less developed than a paper catalog. "Surfing" through pages on-line is more time consuming than flipping through the pages of a printed catalog, especially with the relatively slow telephone connections to the Internet currently available to most consumers. Many of the graphics are less well rendered and can be difficult to display properly. At this point, consumers are also much less familiar with on-line catalogs than with print catalogs. Consequently, unless merchants can deliver something to consumers on-line that they cannot currently deliver through print catalogs, a large number of consumers are unlikely to switch to on-line shopping in the near future.

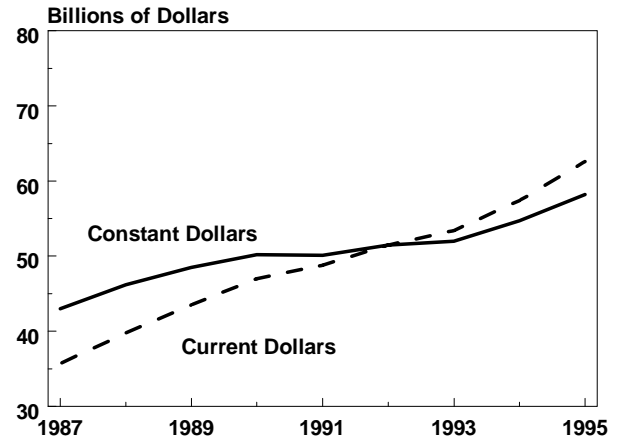
Advocates of on-line commerce claim that companies will soon be mailing out the catalogs on CD-ROM discs. That approach would permit consumers to look through the catalog more quickly than if it was on the Internet. Up-to-the-minute information on prices and availability of items could be provided rapidly through the Internet. That type of catalog sale, however, presumes that the consumer has a

Figure 11.
Percentage of Private-Sector Workers Whose Salary Is Directly Deposited



SOURCE: Congressional Budget Office using data from National Automated Clearing House Association, "ACH Volume Continues Solid Growth" (press release, Herndon, Va., April 26, 1996, available at <http://www.nacha.org/pr042601.htm>).

Figure 12.
Catalog Sales by U.S. Companies



SOURCE: Congressional Budget Office using data from Direct Marketing Association, "U.S. Catalog Sales Continue to Increase" (press release, New York, Fall 1995).

NOTE: Includes sales to U.S. and foreign customers.

fairly sophisticated computer and a rapid connection to the Internet. It is unlikely that large numbers of merchants will care to produce such CD-ROM catalogs and provide the requisite software.

The new developments in Internet software will permit more people to make catalog purchases on-line, just as a small minority of people, especially those in different time zones, currently make catalog purchases via fax. However, middle-class households that have personal computers and Internet accounts generally also have a long history of buying from a catalog by providing their credit card numbers over the telephone, and they may therefore be reluctant to switch.

Electronic Data Interchange

One potential market for on-line payments would be the further development of electronic data interchange. EDI involves organizations electronically sharing business data—particularly procurement-related ordering and billing data—using so-called X12 standards. In the United States, companies that supply grocery stores can automatically restock the

shelves using data provided by bar code readers. Many other retail chains and some government agencies have also used EDI.

A firm that has an EDI relationship with its supplier, for example, sends a message requesting delivery of a given quantity of the desired goods to a number of its locations. The prices and terms of delivery have typically been agreed on in advance, but EDI also has bidding protocols. The supplier responds, and that message may serve as both order and bill. Advocates of EDI claim that automating the exchange of business information reduces the possibilities for error and allows firms to cut their warehousing and transport costs.

Most EDI relationships are conducted on computer networks other than the Internet, mainly so-called value-added networks. Using special software, such networks provide reliable, secure venues for companies to send messages that conform to the EDI standards. Many analysts feel that value-added networks will eventually become integrated with the Internet but will continue to provide the security and reliability their customers want by using special computers and software to connect to the Internet.

Since EDI mainly involves private firms, no solid estimate of its prevalence has been published. According to one estimate, 30,000 to 40,000 organizations in the United States use some form of EDI.⁹

The Department of Defense has established an electronic procurement initiative whose goal is to communicate with industry suppliers on a single network. That two-year plan will initially move 39 DoD procurement activities that currently use EDI to a common DoD network. Value-added networks will be certified to connect to that DoD network. Later phases will move an additional 200 activities. DoD's effort is the result of the Federal Acquisition Streamlining Act of 1994, which established the Federal Acquisition Computer Network and required the government to transfer the procurement process to EDI.

Whether that initiative will increase the use of EDI throughout the economy is not clear. Many previous efforts by DoD to introduce specific business practices have not succeeded.

Competition from Home Banking Systems

As noted in the introduction, on-line payment systems will have to compete for market share with existing payment mechanisms. Thus, when deciding how to pay for something, consumers and merchants will consider not only the potential uses to which on-line payment systems can be put but also how they compare in such uses with other systems. A rival to the Internet-based payment mechanisms is home banking.

The proliferation of personal computers and especially the recent increase in the use of modems, which let computers make telephone calls, has increased the use of home banking services among affluent U.S. households. Some home banking systems use so-called screen phones—special telephones that have a small viewing screen attached and that may have a keyboard. The software to facilitate such activities is among the most popular software sold today. Several competing services now allow individuals to access their bank accounts through dial-up connections or private networks. In essence, those services give all individuals or small businesses access to many of the electronic fund transfer services that financial institutions and large corporations have had for years.

Customers generally obtain home banking services in one of two ways. The bank can offer the services itself, using custom or off-the-shelf software. Alternatively, the customer can sign up with one of the home banking providers. Typically, such providers have their own special software and telephone service with which to access the customer's bank account while acting as his or her financial agent. Those providers are now negotiating with banks to provide their services through the banks, blurring the distinction between the two approaches.

9. "Organizational Issues" in Walter Houser, James Griffin, and Carl Hage, *EDI Meets the Internet*, April 16, 1995 (available at <http://www.va.gov/publ/standard/editing/index.html>). See also Matthew Galland, *Legal Aspects of a Paperless Letter of Credit* (San Francisco: University of San Francisco, December 6, 1994), also available at <http://www.usfca.edu/usf/gallma10/EDI.html>.

Although home banking has been forecast as being "just around the corner" for over two decades, recent trends indicate that may actually be true now. One industry survey in the first half of 1995 found that 300,000 customers nationwide do their banking through those systems.¹⁰ More recently, one company has claimed that it offers such services to more than 500,000 consumers.¹¹

Industry analysts expect home banking to grow explosively. Since the fall of 1995, almost two dozen U.S. banks have signed up to offer home banking through software packages for personal computers. One leading provider of such services announced that electronic banking was available or being set up at

more than 100 financial institutions as of the end of the first quarter of 1996.¹²

A major impediment to on-line banking services is that the majority of home banking transfers still require a physical check because most merchants are not equipped to receive payments electronically. The service provider, not the consumer, writes the check on the consumer's account.

Most home banking systems are computer networks that are proprietary to the bank or software house rather than the Internet. Recently, the home banking companies have begun using the Internet in their transactions with consumers. Thus, the teller may be on the Internet but the check and the payment system are not. The Congressional Budget Office has therefore not included home banking systems in the on-line payment systems described above. Nevertheless, they are likely to be an important competitor, limiting the growth of more direct on-line payment systems.

10. Jerry Lazar, "Bank to the Future," *Netguide*, June 1, 1995, p. 67. See also Gus Venditto, "Home Banking: New Systems of Checks and Balances," *Home PC*, November 1, 1995, p. 207; and Bruce Caldwell and Mary Hayes, "Banks Cash in Online," *Information Week*, July 31, 1995, p. 30.

11. CheckFree Corporation, "CheckFree Corporation Announces a 7 Percent Increase in First Quarter Revenues" (press release, Atlanta, Ga., May 13, 1996).

12. CheckFree Corporation, "CheckFree's Electronic Banking Strategy on Target: Number of Banks Signed on Surges" (press release, Palm Beach, Fla., February 5, 1996).

Policy Issues

The advent of electronic payment methods for retail purchases raises a number of policy concerns because current laws and regulations do not clearly cover the use of stored-value cards and on-line scrip.¹ One set of issues deals with whether the balances on stored-value cards and on-line scrip accounts will be subject to reserve requirements or deposit insurance premiums or covered by consumer protection laws. Several other issues affect traditional concerns of government including monetary policy, competition between regulated depositories and nondepository institutions, antitrust policy, and law enforcement against financial crimes such as money laundering, tax evasion, and fraud.

Regulation of Current Payment Methods

Current payment methods include cash, checks, electronic fund transfers, and credit cards. Unlike other methods of payment, which involve changing notations in the ledgers of financial institutions, payment by cash is an immediate physical transfer of funds. Each method of payment differs in terms of the regulations covering it and the degree of privacy, anonymity, and protection it conveys to consumers (see Table 3). Guidance about how current laws and regulations might apply to stored-value cards and on-line scrip may be gained by assessing whether they

are more like cash or notational money (a deposit). To help put the many legal and policy issues surrounding the new payment methods in perspective, the laws and regulations governing current methods are outlined below.

Cash

Cash is defined as coin and currency (paper money). If cash is lost or stolen, the unlucky party suffers the loss. From the perspective of consumers and merchants, an instantaneous transfer of value occurs in cash transactions; thus, payment and payment finality (the merchant has the money in hand) are simultaneous. Anyone can accept cash as payment; cash transactions require no electronic readers or authorization networks.

Coins are produced by the U.S. Mint, and currency is issued by the Federal Reserve. The Federal Reserve holds U.S. government securities as assets in amounts that correspond to the face value of outstanding U.S. currency. The currency itself is a claim on the Federal Reserve. Paying with currency means exchanging those claims, which are generally accepted as final payment.

Although cash is considered to be a largely anonymous means of payment and is subject to few laws and regulations, banks are required to report cash transactions over \$10,000 promptly to the Treasury, and merchants are required to report cash transactions over \$10,000 to the Internal Revenue Service. Since cash is used in person, however, even small

1. Existing laws will probably cover the on-line use of encrypted credit cards and checks.

transactions are not completely anonymous. Although a customer's identity may be unknown, the sales agent can observe the customer and perhaps give a physical description.

The person or institution holding the cash bears the risk that it may be counterfeit. A merchant can reject money he or she thinks is counterfeit. If a merchant deposits counterfeit money at a bank and the bank detects it, the merchant shoulders the loss. Likewise, if a bank deposits cash at a Federal Reserve Bank and that cash is found to be counterfeit, the bank making the deposit bears the loss.

Notational Money

Most money exists not as cash but as notations in the ledgers of depository institutions (banks, thrifts, and credit unions). Notational money transactions are executed by debiting one party's account and credit-

ing another party's account. Depository institutions must be ready to convert notational checking deposits into cash on demand.

The United States operates a system of federal deposit insurance that protects depositors against loss (up to \$100,000 per insured account in an insured institution) if the depository institution fails. Thus, depositors are protected against the risk of losing all of their money on deposit, a possibility most people do not even think about today but that was a serious concern a few decades ago.

Notational money transactions are generally not anonymous and consequently may not be completely private either. The only federal restriction on a bank's disclosure of a customer's purchasing habits is that information cannot be improperly disclosed to the federal government. The Right to Financial Privacy Act of 1978 prevents financial institutions—banks, thrifts, issuers of credit cards, industrial

Table 3.
Regulation of Existing Payment Methods

	Reserve Requirements	Deposit Insurance	Consumer Protection	Privacy Laws
Cash	No	No	No	Bank Secrecy Act
Checks	Yes	Yes	Yes	Financial Privacy Act, State Laws
Electronic Fund Transfers	Yes	Yes	Regulation E (\$50 loss limit)	Financial Privacy Act, State Laws
Credit Cards	n.a.	n.a. ^a	Regulation Z (\$50 loss limit)	Financial Privacy Act, State Laws

SOURCE: Congressional Budget Office.

NOTE: n.a. = not applicable.

a. A credit balance on a consumer's credit card issued by an insured depository is considered an insured deposit, however, and would be covered by deposit insurance up to the limit of \$100,000 if the issuing bank failed.

loan companies, trust companies, and consumer finance institutions—from disclosing customers' financial records to law enforcement or government agencies except under subpoena or certain other circumstances. The Bank Secrecy Act of 1970 requires that financial institutions provide information about transactions under subpoena to law enforcement officials. Banks are required to keep detailed information about transactions for five years. State laws or court decisions cover the confidentiality of an individual's financial records when other parties seek access to them.

The Federal Reserve requires depository institutions to hold reserves for most notational money. It has the authority to require reserves on many kinds of accounts but currently requires them only on net transaction accounts. Generally speaking, transaction accounts are accounts that holders may make transfers to or withdrawals from on short notice. Checking accounts and traveler's checks are examples of transaction accounts. Since December 19, 1995, the Federal Reserve Board has required depository institutions to hold 10 percent in reserve for deposits over \$52 million and 3 percent in reserve for deposits between \$4.3 million and \$52 million. Deposits up to \$4.3 million are not subject to a reserve requirement.

Checks. A checking account is the most common form of notational money. A check is an order authorizing the transfer of money from one account to another; it is not a token that represents value, as cash does. When a check is accepted as payment, the recipient's bank collects the value of the check after presenting it to the bank on which it is drawn. Because a check can be returned for insufficient funds, the bank may not make the funds available to the recipient until the day a returned check would have been received—a lag of two days for local checks and five days for nonlocal checks. Consequently, merchants who are paid with a check may have to wait several days before they receive their money.

If a check is lost or stolen, the person who wrote the check can stop payment on it by notifying the bank that holds the checking account. As with cash, the holder of a worthless check loses. Unlike counterfeit currency, however, the validity of a check cannot be determined by visual examination. A check

may be worthless because it is counterfeit or because the check writer does not have sufficient funds in his or her account.

Cashier's checks and certified checks are special kinds of checks. A cashier's check is drawn by a bank on its own funds. It is a direct obligation of the bank; individual consumers cannot write cashier's checks. A certified check is guaranteed to be good by the bank on which it is drawn. A customer usually pays a fee to have a certified check issued from his or her account. The payee of the certified check can be sure that it will be paid when presented. Both cashier's checks and certified checks are considered insured deposits. Hence, if the bank they are drawn on fails, the holders of such checks will still be paid (up to the deposit insurance limit of \$100,000).

Traveler's checks and money orders are also included in a bank's net transaction accounts and thus are subject to reserve requirements. Money orders and traveler's checks issued by a bank are covered by deposit insurance, but traveler's checks issued by a nondepository institution (American Express, for example) are not. Some policies, such as replacing lost or stolen traveler's checks, have a commercial rather than a regulatory origin.

Electronic Fund Transfers. Electronic fund transfers are ways of transferring notational money from one account to another or converting notational money into cash. Such transfers are initiated through an electronic terminal, telephone, computer, or magnetic tape to authorize a financial institution to debit or credit a consumer's deposit account. Examples of electronic fund transfers include point-of-sale transfers using a debit card, transfers at automated teller machines, and direct deposits or withdrawals made through an automated clearinghouse. The deposits from which such transfers occur are transaction accounts and consequently are subject to reserve requirements.

The Federal Reserve Board has the authority to write the rules for electronic fund transfers. The Electronic Fund Transfer Act of 1978 and the Federal Reserve's corresponding Regulation E protect consumers against unauthorized transactions that might be generated electronically. The act also covers the

electronic transfer of benefits by government agencies, although those transfers are exempt from some requirements of Regulation E.

Regulation E requires financial institutions to inform customers of their rights in the event an unauthorized transaction occurs. That disclosure must be made when an account is opened or before any electronic transfer is made, and then periodically during the life of the account. The customer also receives a written receipt when an electronic transfer is initiated and periodic statements describing each transfer. Because of the requirements for receipts and periodic statements, electronic fund transfers leave an audit trail and are therefore not anonymous.

Regulation E shifts the risk of unauthorized transfers from the customer to the bank. Consumers are liable for only \$50 of an unauthorized transaction if they notify the bank promptly that their card has been lost or stolen or that they have identified an unauthorized transaction.² Once notified, the bank has 10 days to review the transaction and either resolve it or issue a temporary credit pending further investigation.

Credit Cards

Credit cards are fundamentally different from the other payment methods in that they involve extending credit rather than drawing on an existing store of funds. General-purpose credit cards are issued by banks in conjunction with credit card associations such as Visa and MasterCard. Department stores also issue credit cards to be used for purchases at that particular store. Like electronic fund transfers, payment by credit card is not anonymous.

The Truth in Lending Act of 1968 (TILA) and the Federal Reserve's corresponding Regulation Z address the issues of consumers' liability for unauthorized transactions, advertising for consumer credit, and the disclosure of interest rates for a variety of

consumer credit transactions. The main impetus for passing TILA was to assist consumers in shopping for credit. The act requires financial institutions that make 25 or more loans per year to give uniform disclosures of the interest rate and other loan terms. It also includes specific rules for disclosing the terms of credit card agreements and for assigning liability for unauthorized use. A cardholder's liability for unauthorized use of his or her card is \$50—the same as under Regulation E—provided the cardholder promptly notifies the issuer. In effect, Regulation Z does for credit cards what Regulation E does for electronic fund transfers.

The Congress has passed other laws that protect consumers who use credit cards. Section 161 of TILA specifies how to handle billing disputes. Additional regulations require that disputes about misrepresented or defective merchandise be resolved within 60 days. Discrimination in extending credit is addressed by the Equal Credit Opportunity Act of 1975, which generally prohibits the use of certain categories of personal information such as sex and race as criteria for extending credit. That act also requires all lenders who deny an application for credit to notify the applicant in writing and explain why credit was not granted.

Since paying with a credit card does not involve a store of funds, deposit insurance and reserve requirements are not directly relevant.³ If the cardholder defaults, the bank that issued the card is liable and thus merchants are paid. If the issuing bank fails, the credit card association guarantees payment to merchants with outstanding transactions and then has a creditor's claim on the failed bank.

Regulation of the New Electronic Payment Methods

One of the obstacles to developing and implementing new payment methods such as stored-value cards and

2. An amendment to Senate bill S. 650, the Economic Growth and Regulatory Paperwork Reduction Act of 1995, would increase consumer liability to \$500 in cases in which the cardholder substantially contributed to the unauthorized electronic fund transfer—for example, by keeping the security code with the access card.

3. The Federal Financial Institutions Examination Council's instructions for the Reports of Condition and Income dictate, however, that a positive balance on a credit card account (an infrequent event) is an insured deposit.

on-line scrip is uncertainty as to how they would be regulated and how disputes regarding their use would be governed. The main issues needing clarification include reserve requirements, deposit insurance, consumer protection, privacy protection, and state laws governing lost or abandoned financial instruments (escheat).

Promoters of electronic payment methods argue against imposing any regulations until the market for the new systems has developed further. Several federal regulatory agencies (the Federal Reserve and the Office of the Comptroller of the Currency, for example) claim they do not want to inhibit the evolution of the electronic payments industry by imposing regulation. However, clarifying the rights, obligations, liabilities, and risks borne by consumers, merchants, and issuers would probably facilitate the growth and acceptance of the new payment methods—even if that clarification was provisional.

Two factors are important in determining the likely regulation of stored-value cards and on-line scrip: whether they are more like cash or notational

money, and whether they are issued by a depository or nondepository institution (see Table 4). (Depositories are subject to regulations that do not apply to nondepositories.) The following sections make such assessments for the legal and regulatory issues that might apply.

Reserve Requirements

To comply with reserve requirements, depository institutions must maintain a specific fraction of their net transaction accounts in reserve, either as cash on hand (vault cash) or as non-interest-bearing balances at the Federal Reserve. The rationale for those requirements has changed over time. They currently aid the Federal Reserve in influencing the nation's money supply and in conducting monetary policy through open-market operations—the buying and selling of securities by the Federal Reserve. By helping to ensure a predictable demand for reserves, reserve requirements increase the Federal Reserve's ability to control short-term interest rates through open-market operations.

Table 4.
Regulation of Emerging Payment Methods

	Reserve Requirements	Deposit Insurance	Consumer Protection	Privacy Laws
Issued by Depositories				
Stored-Value Cards	Yes	?	?	Financial Privacy Act
On-line Scrip	?	?	?	Financial Privacy Act
Issued by Nondepositories				
Stored-Value Cards	No	No	?	?
On-line Scrip	No	No	?	?

SOURCE: Congressional Budget Office.

The balances on stored-value cards and on-line scrip accounts will probably be considered transaction accounts and thus be subject to reserve requirements as are the balances that consumers draw on by using debit cards and traveler's checks, which are similar to stored-value cards. In recent Congressional testimony, then Federal Reserve Board Vice Chairman Alan Blinder stated that "under current regulations, stored-value balances issued by depository institutions would be treated as transaction accounts and hence subjected to reserve requirements; the Board will need to review this treatment as stored-value devices come into use."⁴ Although not explicitly stated, presumably the same principles will apply to on-line scrip balances.

Deposit Insurance

Regulations drafted in response to the financial crisis of the 1930s focused on the safety and soundness of financial institutions and the financial system. Restrictions were applied to the banking industry to make it less risky and to establish a system of federal deposit insurance.

Deposit insurance protects both individual depositors and the banking system. Before deposit insurance, banks were susceptible to runs in which many depositors demanded withdrawal of their deposits in cash because they believed the bank to be on the brink of failure. Banks experiencing deposit runs can fail even if they are solvent before the run begins; the process of converting illiquid assets into cash to satisfy the demands of depositors can create losses large enough to deplete the institution's capital. A run on one bank, if not constrained, may quickly spread to other banks if the losses of depositors at one institution motivate depositors at other institutions also to withdraw their money. Deposit insurance protects against a rash of bank runs and the resulting system-wide bank failures by allaying the fears of depositors and reducing the incentive to withdraw deposits from banks believed, correctly or not, to be in imminent danger.

The new forms of electronic payment raise the specter of potential failures of depositories as a result of the fraudulent use of on-line scrip or the counterfeiting of stored-value cards. The concern is that those activities may increase the institution's risk, thereby placing additional risk on the deposit insurance fund.

Whether deposit insurance will cover the new forms of electronic payment is a concern for depositors as well as for banks and the entire financial system. If stored-value cards and on-line scrip accounts are limited in value (say, to \$100 or less), deposit insurance coverage of those products will probably not matter much to consumers. The total amount outstanding from a particular institution, however, may be quite large. Thus, the failure of an issuing institution raises some important concerns. What happens to the total stored value in the hands of consumers? Will merchants continue to accept a stored-value card from a failed institution in on-line transactions? And what happens to off-line merchants whose card readers will consider that card to be valid?

The question of deposit insurance coverage for stored-value cards is ambiguous. When value is transferred from an account to a card, whose liability is it--the customer's or the issuer's? And what happens if the bank that issued the card fails before the value has been used?

Without any clarifying legislation, how the issuing bank structures the card and the Federal Deposit Insurance Corporation's view of that structure will ultimately determine whether stored-value balances are covered by deposit insurance. A key factor is whether a deposit contract exists between the issuer and the customer. In the settlement process for stored-value cards, for example, the merchant eventually collects from the issuing bank, which suggests that the funds on a stored-value card are more like a deposit than like cash. However, stored-value cards that do not identify the user, such as the disposable cards that will be used at the 1996 Summer Olympics, do not fit that definition since the issuer will have no record of the depositor's name and address. Such a record is an important characteristic of a deposit. The balance on the disposable cards will probably be considered a general obligation of a bank and

4. Statement of Alan S. Blinder before the Subcommittee on Domestic and International Monetary Policy of the House Committee on Banking and Financial Services, October 11, 1995.

hence not subject to deposit insurance. Alternatively, if a bank identifies the balance on a stored-value card as a portion of an individual's deposit, deposit insurance will probably cover the balance.

The deposit insurance coverage of on-line scrip is also unclear. The marketing literature for DigiCash's system of on-line scrip (ecash) claims it is equivalent to cash rather than a deposit and thus is not subject to deposit insurance premiums. The Federal Deposit Insurance Corporation, however, may rule differently after examining the issue. A recent FDIC opinion that granted passthrough deposit insurance to the customers of an institution that issues electronic scrip was based in part on the grounds that the issuer of the electronic scrip holds the funds as an agent for the owners of the funds.⁵

Consumer Protection

Laws that protect consumers in financial transactions were passed in the late 1960s and early 1970s, partly in response to the increasing use of credit cards. The goals of those laws include protecting consumers from bearing the risk of unauthorized transactions, prohibiting discrimination on the basis of race or marital status in extending credit, and protecting consumers' financial privacy from unwarranted government intrusion. Given the similarity between the use of credit cards and transactions involving the new electronic payment methods, the new methods probably merit continued protection for consumers.

Security. Security breaches on the Internet and in private computer systems happen with alarming frequency. Developers of electronic payment systems know that to be accepted by consumers, merchants, and issuers, their systems must provide reasonable security against fraud and theft. Encryption is therefore an important aspect of the payment methods.

Encryption scrambles data that are to be transmitted electronically, thus protecting the information from being tampered with or intercepted and also authenticating its source and content. Credit card associations, for example, are trying to create a common stan-

dard for encrypting credit card numbers and digital signatures for on-line purchases.

Until recently, encryption has been almost exclusively the purview of the military. For national security reasons, exportation of cryptographic systems and equipment is controlled under the Arms Export Control Act. Exceptions are made, however, for encryption products used for banking or money transactions. Any software placed on the Internet cannot be prevented from being used internationally and consequently could be viewed as constituting an export. As long as the new electronic payment methods provide strong encryption only for financial information, federal export control policy should not impede their development.

Liability. Protecting consumers from fraud and from substantial liability for unauthorized transactions is important to the commercial acceptance of the new payment methods. Conferring liability for unauthorized transactions directly on issuers gives them a powerful incentive to guard against fraud and theft. The issuers are in the best position to certify the security of their systems. They also have an incentive to contractually protect consumers as a marketing strategy, even if not required to do so by law or regulation. But if liability is unclear, consumers are likely to be wary of making electronic payments.

Legislation introduced and still pending in the Congress would exempt stored-value cards from the Electronic Fund Transfer Act of 1978 (EFTA) and Regulation E.⁶ In the absence of any legislative clarification, however, the Federal Reserve will decide whether the new electronic payment methods will be exempted from any of the requirements of Regulation E. The Federal Reserve Board is accepting comments on a proposal to exempt stored-value cards from the requirement that receipts be issued and recorded for all transactions.⁷

5. FDIC Advisory Opinion (unpublished, October 20, 1995).

6. House Committee on Banking and Financial Services, *Financial Institutions Regulatory Relief Act of 1995*, report to accompany H.R. 1858, Report 104-193 (July 18, 1995), pp. 18 and 105; and Senate Committee on Banking, Housing, and Urban Affairs, *Economic Growth and Regulatory Paperwork Reduction Act of 1995*, report to accompany S. 650, Report 104-185 (December 14, 1995), p. 60.

7. Board of Governors of the Federal Reserve System, "Electronic Fund Transfers," *Federal Register*, vol. 61, no. 86 (May 2, 1996), pp. 19696-19705.

Payments using stored-value cards are similar to electronic fund transfers in that they involve a transfer of money initiated through an electronic terminal. Those payments must therefore satisfy the requirements of EFTA and Regulation E, which limits consumers' liability for unauthorized transactions to \$50 and requires that consumers receive a receipt for each transaction and a periodic statement detailing their transactions.

But in some ways, stored-value cards do not fit the full definition of an electronic fund transfer, particularly if the card does not access an account. Disposable cards such as those to be issued at the Olympics, for example, are more like cash in that they do not draw funds directly from an account. Many of the developers of the new electronic payment methods tout the similarity of those methods to cash, which implies that the consumer is fully liable for any unauthorized transactions.

Regardless of whether stored-value cards are more like cash or an account, some proponents argue for exempting them from the requirement for receipts to accompany each transaction and for a periodic statement. The expenses of meeting that requirement will probably be too high for stored-value cards to be cost-effective, since the cards will probably be used for small-dollar transactions such as purchases from vending machines, parking meters, and telephone calls.

The treatment of balances on stored-value cards that are lost or stolen also depends on whether the cards are more like cash or a deposit. Obviously, a bank does not replace cash that a depositor has lost. Yet if the technology of a stored-value card allowed the bank to prevent the value on a lost card from being used, the card would be more like a debit card than a cash equivalent. The stored-value cards that will be used at the Olympics in Atlanta will be treated as cash--that is, the money will not be replaced if the card is lost or stolen. As more stored-value cards are issued, however, how their issuers handle loss or theft may become a point of competition.

As for on-line scrip, DigiCash has stated that it will not replace ecash that is lost or stolen. With ecash's technology, however, consumers who keep a separate record of the serial numbers of the electronic ecash tokens on their computer might be able to ask the issuer

to void the lost tokens and replace them if their hard disk crashes.

Privacy. The anonymity and privacy of financial transactions are a concern for many consumers. An anonymous transaction is one in which the customer does not reveal his or her name; privacy refers to protection from unauthorized access to information about the customer or the transaction.

Individuals' concerns about protecting their privacy from intrusions by government and businesses increase as more and more information is created, transmitted, and stored electronically. Although the Right to Financial Privacy Act of 1978 prohibits financial institutions from releasing a person's financial records to federal officials except under subpoena or certain other circumstances, other entities involved with electronic payments--for example, Microsoft and Netscape--are not bound by that law. State laws govern the matter of protecting individuals' financial records from access by parties other than law enforcement or government officials.

Laws protecting the financial privacy of consumers are balanced by statutes that help law enforcement officials combat illegal financial activities such as money laundering and tax evasion. The Bank Secrecy Act of 1970, for example, primarily aids law enforcement officials in obtaining financial records rather than protecting privacy, as the name of the act seems to imply.

Of the current payment methods, only cash is anonymous. Checks, electronic fund transfers, and credit cards all generate a record of a transaction. Consumers' frequent use of those instruments may show that they prefer having some record of many transactions or at least do not mind the lack of anonymity. Or perhaps some consumers have little choice but to use a method of payment that is not anonymous and would value new methods that afforded anonymity.

Some new electronic payment schemes such as ecash claim to be anonymous. Consumers who do not want their purchasing habits to be tracked by a marketer's database may highly value that attribute. But the downside is that anonymous payment schemes may facilitate illegal activities, first in the actual conduct of the fraudulent transactions and then by hampering the ensuing investigations.

The level of anonymity and privacy afforded by transactions involving stored-value cards remains an open question. If written receipts are required, data on individual transactions will be kept and thus be potentially vulnerable to unauthorized access. Law enforcement agencies will lobby hard to have such records kept, since their ability to track down money laundering, fraud, and other illegal activities depends on it.

Other Legal and Policy Concerns

The new electronic methods for making retail payments raise questions in several areas besides typical banking regulation. They pose new difficulties for law enforcement officials and for applying antitrust law and states' escheat laws. They also raise federal budgetary issues.

Concerns of Law Enforcement Officials

The new electronic payment methods raise many concerns for law enforcement officials. Jurisdiction, for example, may be difficult to determine for crimes committed on the Internet. The anonymity a few electronic payment systems seek to achieve may facilitate illegal activities such as money laundering and tax evasion. On-line fraud schemes may be difficult to track and close down. The specter of "hot money" flowing around the world with the stroke of a computer key worries law enforcement officials.

Money Laundering. Most illegal activities involving money use currency because of the anonymity it provides. Criminals involved in such activities, however, face the logistical difficulties of transporting bulky currency from one place to another. Illegal operations have become even more difficult since 1969, when the Treasury stopped circulating currency in denominations over \$100.

Law enforcement officials fear, however, that widespread use of store-value cards and on-line scrip may facilitate illegal activities such as money laundering. If values larger than \$100 are allowed on stored-value cards, criminals will have an easier time concealing and transporting large amounts of money.

Large deposits from stored-value cards into the banking system may receive the same scrutiny as large cash transactions do today, helping to clamp down on money laundering. But systems such as Mondex that allow person-to-person transfers of stored value circumvent that check on criminal activity, since people can move funds to various remote locations and make a large number of small, undetected deposits. In its defense, Mondex claims that its system of having different types of cards for consumers, merchants, and banks will make large numbers of such transfers logistically difficult.

Tax Evasion. Avoiding income tax and sales tax is another illegal activity that electronic payment methods may expedite, particularly in systems that allow person-to-person (or computer-to-computer) transfers of value. Income tax may be difficult to determine and collect if payments come from anywhere in the world directly to a taxpayer's computer. Sales tax jurisdiction may also be difficult to determine even in legitimate on-line transactions, because the relevant taxing jurisdiction may not know that a sale has occurred.

Fraud. The increase in on-line commerce and on-line payment methods may expose consumers to fraud over the Internet through the misrepresentation of goods or services offered. In the "virtual" on-line world, consumers cannot even make rudimentary assessments of the trustworthiness of the merchants they encounter, as they can in person. The same factors that make it difficult to establish jurisdiction may also hinder the tracking of criminals who use the Internet.

Counterfeiting. Counterfeiting stored-value cards could cause the impersonated issuer heavy losses. On a grand scale, counterfeiting stored-value cards or on-line scrip could destabilize the banking system. If an issuer can detect counterfeited value when it is presented for payment, merchants who accept the forged cards may be the ones to suffer losses.

Smart cards, which store value with a computer chip, would presumably be very hard to counterfeit. However, because such transactions are off-line (as opposed to transactions involving debit and credit cards, which require some on-line authorization), detecting and tracking counterfeit cards and stopping the user would be difficult and time consuming.

Antitrust Issues

Applying traditional antitrust analysis to a network industry such as electronic payment systems is not straightforward. Government regulators may view extensive alliances of firms in this industry differently than they would in a traditional production industry. In traditional production industries, individual firms provide products or services, and antitrust law ensures that firms remain independent and are not involved in collusion. Network industries, in contrast, require interconnection among companies. In fact, the broader the network is, the more valuable it is to consumers.

Anticompetitive challenges in the arena of electronic payment services, should they develop, will require a careful analysis of the products and markets in which the payment systems compete. Determining whether a particular business merger creates net benefits or harms consumers can be difficult. The degree of market power (the ability of firms to raise price above cost) that incumbents hold and the difficulty new firms face in entering the market will need thoughtful evaluation. Excessive market power may be a potential antitrust charge.

Another possible anticompetitive complaint may come from firms who find themselves excluded from an existing vital facility (such as an ATM network or a computer authorization network) that cannot be practically duplicated. Courts may compel access to such a facility. The danger in requiring access is that it may create a disincentive to firms that are considering investing resources to create new facilities and may give a free ride to firms that are allowed to join.

Lost or Abandoned Financial Instruments

Most states have laws concerning the disposition of abandoned property. Examples of abandoned property include bank accounts that are inactive after some period of time and unclaimed amounts paid in advance for services not rendered, such as prepayment for utilities. In many cases, the state is entitled to escheat—that is, to take custody of abandoned property.

States' escheat laws differ in approach and detail. Typically, the holder of abandoned funds must annually file a report with the state identifying the abandoned property. If the rightful owner does not claim the property within a statutorily defined dormancy period, the holder must turn the property over to the states.

How will escheat laws relate to the new electronic payment methods, particularly stored-value cards? For example, suppose a company issues prepaid cards (collecting the money up front), and some of the cards are subsequently lost, kept as collectibles, or simply not used. Will the cards have expiration dates, after which the funds are no longer usable? How will escheat jurisdiction be determined, particularly if records of purchases (customers' names and addresses) are not kept? How will issuing institutions track the funds on stored-value cards and determine when the funds have met the statutory period for establishing abandonment? Will an issuer have the authority to preclude refund rights—that is, simply declare that there is no refund for nonuse? How will Mondex-type systems, in which value can be transferred from card to card among individuals but still be traced back to a ledger entry at a bank, be treated? Given the potentially substantial sums involved, states with escheat laws are unlikely to allow the company to keep the abandoned funds for its own account.

The only federal law pertaining to escheat refers to the disposition of abandoned money orders and traveler's checks.⁸ That law gives jurisdiction to the state in which the instrument was purchased. If the financial institution's records do not show that information, the abandoned property goes to the state in which the issuer has its principal place of business. Whether that federal law will need to be extended to cover the unused balances on stored-value cards and on-line scrip accounts is not known.

Budgetary Issues

The introduction of stored-value cards and on-line scrip may have budgetary effects if the new payment methods reduce the federal government's profits from seigniorage. Having the federal government issue stored-

8. 12 U.S.C. 2503; 88 Stat. 1525.

value cards or-line scrip, as some analysts have proposed, may allow the government to retain seigniorage, but it raises other questions.

Seigniorage. Seigniorage is the government's profit from the manufacture of coins; the profit is the difference between the face value of the coins and the cost of producing them. Strictly speaking, the concept of seigniorage does not apply to U.S. paper money, since the Federal Reserve System reimburses the Bureau of Engraving and Printing for the cost of producing currency. However, the federal government does garner interest income from public holdings of currency. The Federal Reserve holds U.S. government securities corresponding to the value of currency in circulation and gives the Treasury the interest income on those holdings. Holders of currency, in effect, provide the government with an interest-free loan. For practical purposes, many analysts refer collectively to the seigniorage on coins and the interest income from the assets backing Federal Reserve notes as seigniorage.

Widespread use of stored-value cards and on-line scrip could eventually lower the demand for cash, reducing the government's income if the new payment methods replaced substantial holdings of coin and currency. In 1994, for example, the interest income from public holdings of currency amounted to about \$20 billion, and the seigniorage on coins was about \$700 million. If electronic payment methods replaced 10 percent of the coin and currency in denominations of \$10 and under, the government would forgo an estimated \$370 million in interest and seigniorage per year.

Federal Issuance of Stored-Value Cards. The U.S. Mint, a branch of the Treasury, has proposed issuing stored-value cards, both as a new form of currency and as a collectible. Issuing a stored-value card would allow the government to retain the seigniorage it would otherwise lose if the demand for cash declined. Furthermore, if the electronic payment industry turned out to be most efficiently served by a single provider, having the government issue stored-value cards might be appropriate. In fact, it might enhance consumers' confidence in that payment method. However, government issuance might stifle the development of private markets and hamper competition among them. At this point, there is no compelling reason to interfere with free-market competition.

Federal issuance of stored-value cards raises the question of whether such cards would be legal tender--money that is legally valid for repaying existing debts and that must be accepted for that purpose when offered. The question of legal tender is irrelevant to retail transactions, however, because consumers are negotiating an exchange, not repaying an existing debt. Retailers are therefore within their rights to specify the types of payment they will accept to consummate a transaction.

Evaluation of Major Policy Issues

Whether firms other than federally regulated depository institutions should be allowed to issue stored-value cards or on-line scrip is a major policy issue. What are the implications for monetary policy? Will introducing the new electronic payment methods increase risk to the payment system?

Issuance by Nondepository Institutions

Although many analysts think that nondepository institutions could effectively issue stored-value cards or on-line scrip, interpretation of current federal law and the banking laws of many states could prohibit nondepositories from doing so. The legal determination may hinge on whether the balances on stored-value cards and on-line scrip are considered to be deposits.

Many closed-system (that is, single-purpose) stored-value cards--prepaid phone cards, cards for photocopy machines, and transit system farecards, for example--do not involve depository institutions. A key aspect of existing closed systems is that the institution issuing the stored-value cards is also the sole provider of the goods and services that the card may be used for. Accepting a stored-value card for payment is not in question, because the vendor received payment when the stored-value card was purchased.

In an open system, the convertibility of stored value is less certain. To be willing to accept stored-value cards as payment, merchants need to be sure that the

issuer will honor the stored-value credits they accumulate. Depository institutions are probably in the best position to provide that level of confidence because they are highly regulated. However, if stored-value cards are deemed to be sufficiently like cash that reserve requirements and deposit insurance do not apply, nondepository institutions could probably issue them as well.

Having nondepositories issue on-line scrip and stored-value cards also raises the question of how regulations will be fairly applied to all issuers. Depository institutions are subject to supervision and regulations that do not burden other firms. For example, they must hold a fraction of their transaction accounts in non-interest-bearing reserves--a cost that other financial institutions do not have to shoulder. Depositories may have difficulty competing with unregulated issuers of electronic payment methods unless all issuers are subject to the same regulations. However, depositories have some advantages that other institutions do not, such as access to cheaper capital.

Furthermore, the supervision and regulations covering depository institutions safeguard the safety and soundness of those institutions. Lacking those safeguards, an electronic payment method issued by an unregulated institution may be more likely to fail. Such a failure could undermine consumers' confidence in other issuers. Thus, the best interest of the payment system may be served by having safeguards in place to protect it from the consequences of the failure of individual institutions.

Effect on Monetary Policy

One of the chief responsibilities of the Federal Reserve is to control monetary and credit aggregates with the goal of stabilizing prices. Introducing privately issued stored-value cards and on-line scrip could weaken the central bank's ability to monitor and control the money supply and hence reduce its ability to combat inflation or recession. If nondepositories are allowed to issue those forms of payment, the Federal Reserve may have even greater difficulty conducting monetary policy, since under current law such companies have no obligation to report to the Federal Reserve the amount of money they have issued.

Many analysts and policymakers argue that the Federal Reserve has been losing its influence on the growth of the money supply, especially as an increasingly larger fraction of it is held outside depository institutions--in money market mutual funds, for example. A judgment that the balances on stored-value cards and on-line scrip accounts should not be subject to reserve requirements or that nondepository institutions should be permitted to issue those payment methods will further weaken the Federal Reserve's ability to measure and influence the money supply. Thus, the potential effects of new electronic payment methods on the ability to conduct monetary policy, and in turn the effects on macroeconomic stability, may be of concern.

What issuers do with their electronic balances is a key factor in determining the effect of electronic payment methods on monetary policy. If the issuers hold 100 percent cash reserves for balances on stored-value cards and on-line scrip, the money supply will not change. Even if nondepositories issue those forms of payment, the money supply will not be altered if they hold the balances in their own bank deposits. However, if the issuers invest the balances pending their use by holders, the money supply might be increased.

Despite those concerns, the expected size of the market for electronic payments is sufficiently small that the conduct of monetary policy will probably not be seriously affected. The shift of consumers' money from traditional deposit accounts to money market funds has posed a much greater threat to monetary policy than do electronic payment methods.

Conclusions

The technology of electronic payment systems is advancing more rapidly than the laws and regulations governing them. Government agencies understandably do not want to impose regulation prematurely for fear of stifling a fledgling industry. However, resolving some legal ambiguities, even if only provisionally, might facilitate acceptance of the new payment methods by consumers and merchants.

The Congress needs to consider both the effect the potential displacement of currency by electronic money

will have on income to the federal government and the possible risks those payment methods will introduce into the payment system. The Congressional Budget Office believes those risks to be minimal since the dollar amounts involved are likely to be relatively small and the markets for them are likely to emerge slowly, allowing time for adjustment. Furthermore, electronic payment methods probably entail less risk than do other financial activities such as certain types of lending.

Finally, a balance needs to be struck between the privacy of consumers' electronic payment transactions and the ability of law enforcement to track and stop crime involving such transactions. Without Congressional action to clarify laws and regulations dealing with the new methods, the responsible federal agencies will need to make decisions about them, perhaps in a coordinated fashion, but possibly on a case-by-case, incremental basis.

Glossary

acquiring bank: The bank to which a merchant involved in a credit card transaction first presents the credit card charge for payment.

automated clearinghouse (ACH): A system of computer networks that allows banks to transfer funds among themselves; used to make recurring, relatively low-value payments, such as the direct deposit of salaries.

CHIPS (Clearing House Interbank Payment System): A privately owned computer network for making large-dollar interbank settlements.

clearing: The movement of a check from the bank in which it is deposited back to the bank on which it is written. Funds flow in the opposite direction, resulting in a credit to the bank in which funds are deposited and a corresponding debit to the accounts of the paying institution.

debit account: An account in which the holder first deposits funds and then draws them down using checks or other means. Contrasts with a line of credit, which is first spent down and then paid off.

depository institution: A financial institution such as a bank, thrift, or credit union that can accept deposits of money.

digital signature: A mathematical encryption technique that associates a specific person with a given computer file, such as a document, and indicates that the file has not been altered since that person signed it. Should not be confused with making a digital (or electronic) representation of a written signature.

discount: The share of the value of a payment made with a credit or debit card that the bank takes for its services. Also referred to as a merchant discount.

domain: The name of an organization or person that is registered with the Internet Domain Name System.

electronic fund transfer: Any transfer of funds—other than by check, draft, or similar paper instrument—that is initiated through an electronic terminal, telephone, computer, or magnetic tape for the purpose of ordering, instructing, or authorizing a financial institution to debit or credit an account.

electronic purse: A stored-value card that can be used to make purchases from more than one vendor.

escheat: The reversion of property to the state under certain prescribed conditions—for example, if the owner dies without heirs, or if a depositor's account remains inactive for several years and the owner cannot be located.

Fedwire: An electronic communications network that connects Federal Reserve Banks with the U.S. Treasury and other federal agencies. Many depository institutions also have access to Fedwire. It is used for large-dollar, time-

sensitive payments. Fedwire transfers are immediate transfers of funds, effective within minutes of the time a payment is initiated.

Internet: A worldwide network of computer networks.

magnetic stripe: A band of magnetic material on the back of many credit cards and other cards that contains encoded information.

modem: An electronic device that allows computers to communicate over telephone lines.

off-line: Not connected to a computer network, or connected only intermittently.

on-line: Directly connected to a computer network.

on-line scrip: Debit accounts on the Internet or other major computer network. On-line scrip works very much like traveler's checks. The consumer buys a pool of electronic tokens (actually serial numbers) and can spend them at participating merchants over the computer network. Commonly referred to as on-line money or digital cash.

payment finality: Actual receipt of funds for payment.

payment system: The financial system creating the means for transferring money between suppliers and users of funds, usually by exchanging debits or credits between financial institutions.

retail payment: A small-dollar transfer of funds that can occur between any buyer and seller. Contrast with **wholesale payment**.

Secure Electronic Transaction (SET): A set of standards for making credit card purchases securely over the Internet. The standards are being jointly developed by Visa, MasterCard, and American Express.

seigniorage: Profit to the government from the manufacture of coins. The profit is the difference between the face value of coins and the cost of producing them.

settlement: The accounting process recording the respective debit and credit positions of the two parties involved in a transfer of funds. Funds transferred through Fedwire are settled immediately. Checks, automated clearinghouse transfers, and other payments between banks are settled on a provisional basis, because the person initiating the transfer of funds may not have sufficient funds to cover the payment or the payment cannot be processed for various reasons.

smart card: A card, typically made of plastic and about the size of a credit card, that contains a computer chip. Smart cards are commonly used for storing financial, health, education, and security records.

stored-value card: A card similar in size to a credit card that stores information with either a computer chip or a magnetic stripe. Consumers buy the cards with prepaid value stored on them. The most common uses today are for telephone calls and mass transit.

wholesale payment: A large-dollar transfer of funds that usually occurs between financial institutions. Contrast with **retail payment**.

World Wide Web (the Web): A graphical portion of the Internet that is unified by the use of a common language—the hyper-text markup language (html)—for computers.