

# Issues

## How Do We Pay?

*Consumers' use of newer, less expensive payment alternatives depends on the incentives merchants and payment instrument providers offer, along with consumers' comfort level and faith in the instruments.*

When purchasing goods and services, consumers can choose from an array of payment instruments. These choices include cash, checks, credit cards, debit cards, automated clearinghouse (ACH) payments and stored-value cards. Recent technological advances in electronics and telecommunications have reduced the cost of processing electronic payment instruments to a level that is, in most cases, below that of their paper-based counterparts. However, consumers continue to rely heavily on nonelectronic payment instruments, such as cash and checks.

What forces might stimulate greater acceptance of electronic means of payment over their paper counterparts? Part of the answer lies in the incentives that consumers and merchants have when using and accepting different forms of payment. In the short run, the dominant retail payment instrument will depend not only on cost, but also on the comfort and faith that it engenders. Once consumers are comfortable with and have faith in the electronic alternatives, cost differentials and other incentives, such as rewards for frequent use, will be the key factors in determining the dominant payment instrument.

### A Taxonomy of Retail Payment Instruments

The use of a payment instrument to purchase a good or service has two components: clearance and settlement. Clearance involves the processing of the payment instrument or information in order for the recipient to receive cash or a bank deposit. Settlement occurs when the recipient re-

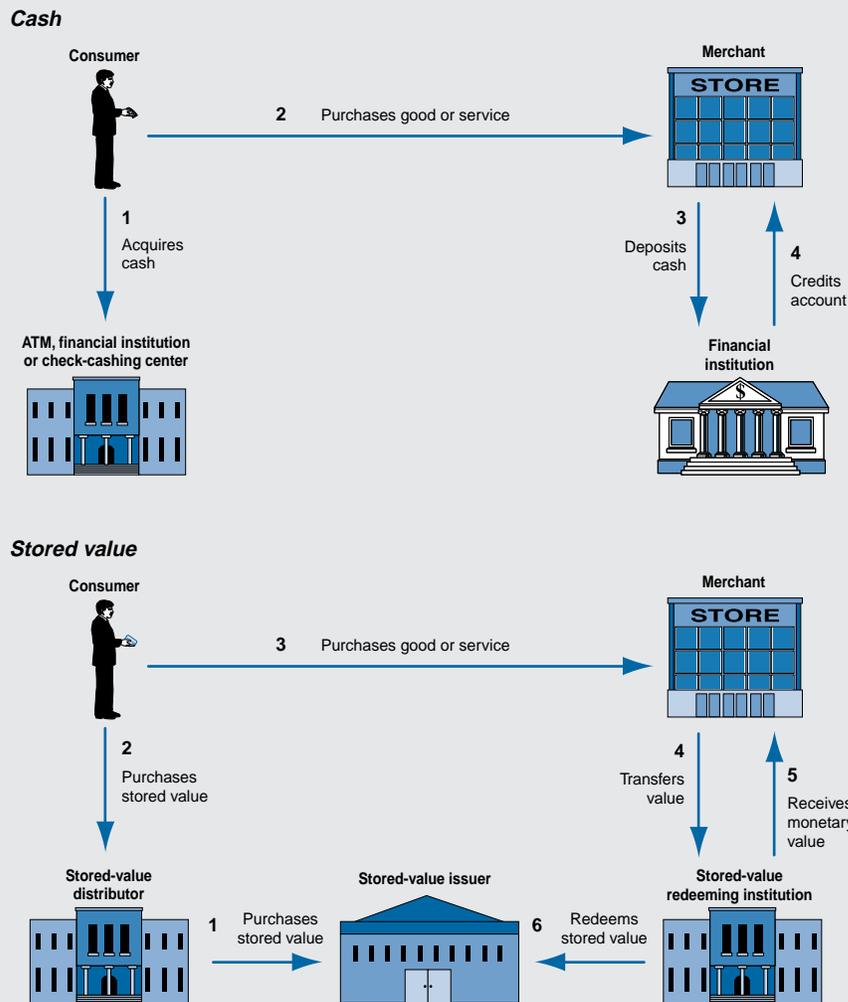
ceives cash or credit on his or her bank account. With these distinctions in mind, a payment instrument can be considered electronic only if both clearance and settlement occur electronically.

In analyzing the potential for electronic payment instruments to replace paper ones, it is useful to categorize retail payment instruments into the following three classifications: value-based, account-based and credit-based (*Table 1*). Cash (paper) and stored-value cards (electronic) are both *value-based* payment instruments because they allow consumers to transfer value when purchasing goods and services. *Account-based* payment instruments access the consumer's transactions account during (or sometimes after) a purchase. These instruments include checks (paper), debit cards and ACH payments (electronic). *Credit-based* payment instruments, such as credit and charge cards, allow the consumer to delay final settlement. Although most U.S.

**Table 1**  
**Classification of Retail Payment Instruments**

	Paper-based	Electronic
<b>Value-based</b>	Cash	Stored value
<b>Account-based</b>	Check	Debit cards ACH
<b>Credit-based</b>	Credit card (Consumer settles with check)	Credit card (Consumer settles with ACH)

Chart 1  
Value-Based Transactions



SOURCE: Bottom panel adapted from Financial Services Policy Committee of the Federal Reserve System, *Primer on Emerging Payment Instruments*, July 1996.

merchants process credit card purchases electronically, most consumers pay their credit card bills with checks, so these types of transactions do not qualify as electronic payments. An example of an electronic credit card transaction is one in which the merchant processes the credit card purchase electronically and the consumer instructs his or her financial institution to pay the credit card bill using an ACH payment.

### Value-Based Payment Instruments

The clearance and settlement processes for value-based transactions are diagrammed in Chart 1.<sup>1</sup> To use value-based payment instruments, consumers must first acquire value. To obtain cash, consumers make withdrawals from their bank accounts at bank branches or automated teller machines (ATMs), or they cash checks at supermarkets or check-cashing centers, as shown in the top panel of Chart 1. For stored-value cards, consumers purchase value from stored-value distributors, as shown in the

bottom panel of Chart 1. Before selling stored value, the distributor acquires it from the issuer. Once this value is obtained, consumers can use the cash or stored-value cards to purchase goods and services. Upon receiving value, merchants usually deposit the cash into their transactions accounts or electronically transfer the stored-value receipts from a stored-value terminal in exchange for a deposit into their transactions account.

**Paper instruments.** Cash remains the most used payment instrument. Payment by cash is estimated to account for more than 80 percent of all U.S. transactions. However, the average value of a cash transaction is fairly small. The percentage of household expenditures paid by cash decreased from 34 percent in 1986 to 18 percent in 1995 but continued to be second only to checks.<sup>2</sup>

Cash is unique in its almost universal acceptance and because it requires no further conversion for use in subsequent transactions. Assets with these features are called *good funds*. Other characteristics of cash include low settlement risk and difficulty in tracking transactions. All these features also make cash an attractive payment instrument for criminal activity.

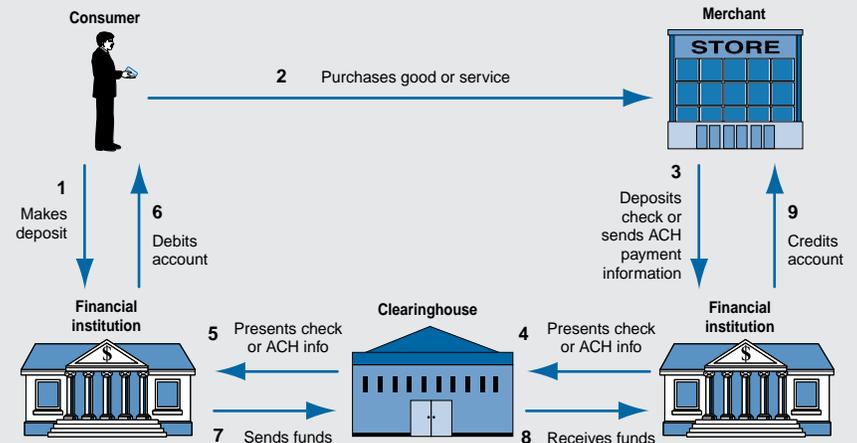
**Electronic instruments.** Stored-value cards can act as an electronic substitute for cash. The most familiar form of stored-value card is a plastic card with a magnetic stripe that can be used to pay for services from a single vendor, such as a transportation system, a copy machine or a telephone company. A different form of stored-value card uses "smart card" technology. Instead of a magnetic stripe, these cards have a small microchip embedded into them. To extend the acceptance of stored-value cards to a group of merchants instead of a single merchant, issuers have recently conducted a number of trials, and others are ongoing or planned.

Unlike other types of stored-value instruments, the electronic wallet from Mondex allows two individuals to exchange value via their stored-value cards. Mondex is an electronic payments provider founded in 1996 by the British NatWest Group Inc. Mondex' technology, while new and not yet widely used, may offer a glimpse into the future of electronic money, or *E-money*, as a means of unintermediated electronic payment.

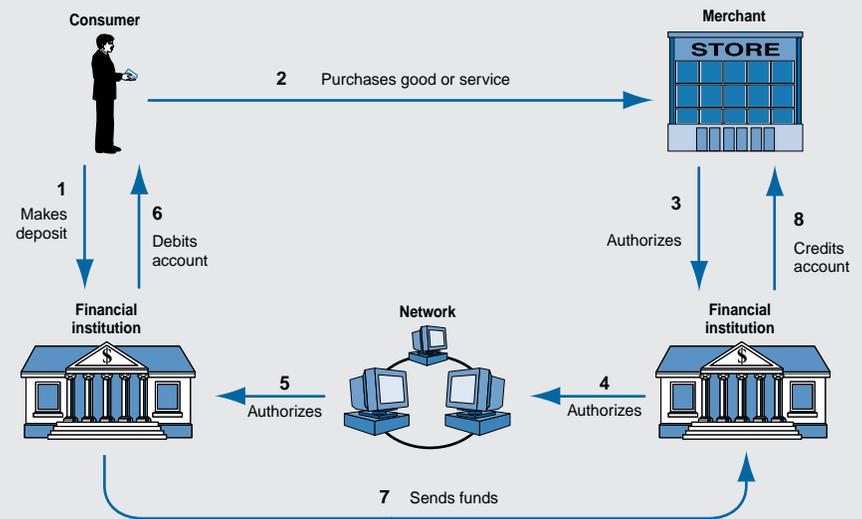
As they do with cash, consumers, in most cases, bear the risk of loss on the total value remaining on the card if it is lost or stolen. As a result, consumers may be reluctant to use stored-value cards except for relatively small purchases.

**Chart 2**  
**Account-Based Transactions**

**Check and ACH**



**Debit card**



SOURCE: Bottom panel adapted from Financial Services Policy Committee of the Federal Reserve System, *Primer on Emerging Payment Instruments*, July 1996.

**Paper versus electronic instruments.**

There are certain benefits for consumers who use general-purpose stored-value cards, but their use in the near future will be minimal compared with the use of other retail instruments. Consumer benefits from stored-value cards include the convenience provided by not having to carry cash (especially coins), faster transactions processing at the point of sale and possible rewards for use, such as discounts associated with frequent purchases.

However, consumers may be reluctant to use stored-value cards for two reasons. First, general-purpose stored-value cards are currently undergoing market trials and probably will require some time before merchants widely accept them and consumers widely use them. Second, given the potential for issuer failure, consumers may face greater risk with stored value than with government-backed alternatives.<sup>3</sup>

By accepting stored value, merchants hope to benefit by reducing costs associated with handling cash. Along with accounting and transportation costs, these costs include the risk of loss from robbery or employee theft. However, merchants may initially be reluctant to embrace stored-value cards because of the costs of the necessary equipment and training and because of relatively low consumer usage. In addition, it is unclear what safeguards merchants will have against the risk of issuer failure.

**Account-Based Payment Instruments**

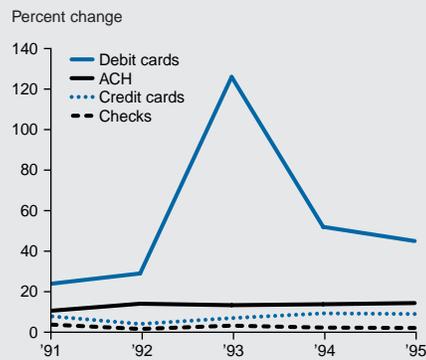
Checks, debit cards and ACH payments are account-based payment instruments that allow consumers to access their transactions accounts to make payments. Consumers benefit in several ways from using these instruments. Unlike value-based instruments, consumers can earn interest on deposited funds until their accounts are debited. Account-based instruments also reduce the risk associated with theft or loss of the instrument. Finally, some account-based instruments allow consumers relatively safe alternatives for making payment without being physically present.

Examples of the clearance and settlement of account-based transactions are shown in Chart 2. After depositing money into his or her transactions account, the consumer is ready to use an account-based instrument. If a check (or ACH payment) is used, the merchant deposits the check with (or sends the ACH information to) its financial institution, as shown in the top panel of Chart 2. The merchant's financial institution

then presents the check (or sends the ACH information) to the appropriate clearinghouse. If the consumer's account has sufficient funds, the consumer's financial institution sends the funds to the merchant's financial institution. Upon receiving the funds, the merchant's financial institution credits the merchant's account.

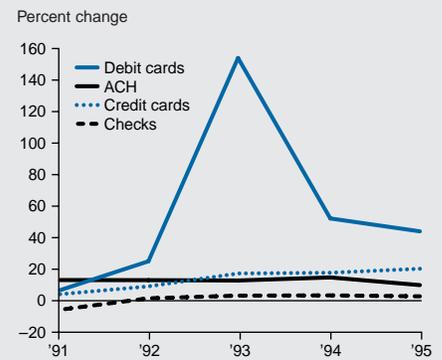
Unlike payments by check or ACH, transactions in which merchants accept debit cards rely on networks to authorize payment, as shown in the bottom panel of Chart 2. If the consumer's financial institution approves, the merchant accepts payment. After the authorization process, the consumer's financial institution sends the funds to the merchant's financial institution, which in turn credits the merchant's account. Depending on the type of debit card used, this process could be immediate or take a day or two.

**Chart 3a**  
Number of Transactions  
By Payment Instrument



SOURCES: Bank for International Settlements, *Statistics on Payment Systems in the Group of Ten Countries*, various issues; National Automated Clearing House Association (visited March 18, 1997), *ACH Statistics Fact Sheet 1988–1995* <<http://www.nacha.org/achstats.htm>>.

**Chart 3b**  
Value of Transactions  
By Payment Instrument



**Paper instruments.** In the United States, 63.0 billion checks, with a total value of \$73.5 trillion, were written in 1995, making checks the second most used payment instrument and the retail instrument with the greatest value.<sup>4</sup> This total represents more than 85 percent of the value of noncash retail payments. These figures include checks written by businesses, government and consumers. The aggregate value of checks has not been further divided into consumer and nonconsumer transactions. However, based on the consumer surveys cited in note 2, check payments increased from 56 percent to 67 percent of household expenditures from 1986 to 1995.

A potential reason for checks' dominant use is that consumers may not always appreciate the cost associated with this payment instrument. In addition, many consumer bills can be paid only by check. Per-check fees may be bundled into a monthly fee for checking services or into a minimum account balance. If financial institutions imposed per-check fees that accurately reflected per-check costs, perhaps consumers would be motivated to switch to less expensive payment instruments. Another reason consumers may prefer using checks is the float incurred from the time the check is written to the time their transactions accounts are debited. However, with recent improvements in check processing, this float may be as little as one day.

**Electronic instruments.** Debit cards are an electronic alternative to checks that let consumers pay for purchases directly from their transactions accounts. Debit card use is growing quickly with respect to both volume and value (*Charts 3a and 3b*). Recently, debit cards have been heavily promoted by credit card networks, issuing banks and merchants. According to an *American Banker*

survey, 40 percent of consumers own debit cards; however, 29 percent claim never to have used them for a point-of-sale transaction.<sup>5</sup> Some debit card issuers offer cash-back bonuses and prizes to promote usage, although this practice is not widespread.

There are two types of debit cards: online and offline. With online debit cards, a consumer's deposit account is immediately debited at the time of the transaction. Online debit cards require special point-of-sale machines that access regional or national ATM networks that require verification of the consumer's personal identification number. For online debit transactions, funds are transferred immediately from the consumer's transactions account into the merchant's transactions account. Offline debit cards use existing credit card networks to authorize payment. For offline debits, the merchant conducts the transaction in the same manner as for a credit card. But unlike credit card transactions, the funds are debited directly from the consumer's transactions account within a day or two.<sup>6</sup> By accepting debit cards instead of checks, merchants eliminate settlement risk (online) or substitute the consumer's credit risk with his or her financial institution's credit risk (offline).

Online debit cards are less expensive than their offline cousins for merchants and their banks. The merchant's bank pays between 3 cents and 13 cents per transaction, plus a small fee to the network for online debit transactions.<sup>7</sup> For offline debit transactions, the merchant and its bank generally pay significantly more because the cost is based on a percentage of the total transaction amount instead of a fixed fee.

Another fast-growing electronic account-based instrument that is less expensive than checks is the ACH payment. ACH payments have grown substantially over the past five

years (*Chart 4*) but are used primarily for recurring payments. ACH payments are significantly less expensive than checks, costing between two-fifths and one-half as much as a check transaction.<sup>8</sup>

There are two types of ACH payments: credits and debits. Once the consumer has furnished the necessary information about his or her transactions account, ACH payments can be made automatically on any specified date. Although ACH payments are not commonly used at the point of sale, one supermarket chain recently began accepting them from consumers who set up the ACH option in advance. Perhaps more merchants will accept point-of-sale ACH payments in the future because of their potential cost savings over checks.

**Paper versus electronic instruments.** Debit cards and ACH payments free the merchant from all costs associated with handling and transporting cash and checks. The Food Marketing Institute's 1993 supermarket survey found online debit cards and ACH payments to be the least expensive noncash payment instruments available to supermarkets (*Table 2*).<sup>9</sup>

Although consumers are relatively comfortable with direct payroll deposit using ACH, they seem more reluctant to debit their bank accounts automatically to pay their bills. This reluctance may be because they no longer control the date of payment or because they fear that incorrect withdrawals may be made. From the merchant's perspective, ACH payments ensure timely payment and are often less expensive to process than paper alternatives. However, the merchant faces the same risk with ACH payments as with checks—that the consumer's account will have insufficient funds.

**Table 2**  
Cost of Alternative Payment Instruments to Supermarkets

Type of payment instrument	Average cost per transaction (U.S. dollars)
Cash	.072
ACH	.279
Online debit	.299
Check	.426
Credit card	.808

SOURCE: Food Marketing Institute, *Benchmarking Comparative Payment Methods: Costs and Case Studies*, 1994.

The federal government, the Federal Reserve and the National Automated Clearing House Association (NACHA) are actively promoting ACH payments as a substitute for checks. The Balanced Budget Downpayment Act of 1996 required the federal government to use electronic payments for all new recipients of government payments after July 25, 1996, and for all outgoing payments starting January 1, 1999. By substituting ACH payments for check payments, the federal government expects to save more than \$100 million per year after 1999.<sup>10</sup> In 1995, NACHA and the Federal Reserve Banks promoted direct payment to 22,000 billers nationwide to pay utilities, cable TV, charities, insurance and loans. Some have argued that the federal government's actions could increase ACH usage in the private sector because both consumers and merchants will become more accustomed to this technology.

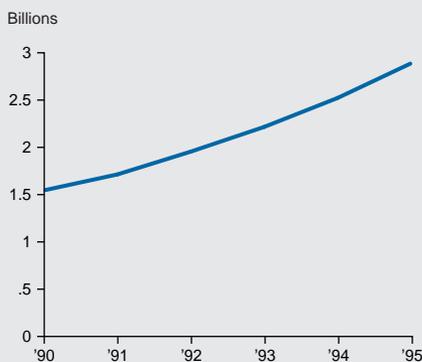
**Credit-Based Payment Instruments**

By using credit-based payment instruments, consumers delay credit decisions to the moment when they settle their charges via another instrument. Hence, credit cards allow consumers to net purchases into one transfer of funds at a later date. Consumers may then choose to pay off the entire bill or pay in installments. Consumers who maintain zero balances enjoy short-term interest-free loans for a month or longer. As a result, credit-based instruments can provide significantly greater float than other retail payment instruments.

In *Chart 5*, the clearance and settlement process of a credit-based transaction is diagramed. The consumer establishes a credit line with a financial institution and then uses a credit-based instrument to make a purchase. The merchant requests authorization from the credit-based instrument's network before accepting payment. The consumer's financial institution then transfers funds to the merchant's financial insti-

*Online debit cards and ACH payments [are] the least expensive noncash payment instruments.*

**Chart 4**  
Total ACH Transactions



SOURCE: NACHA (1997).

*In today's marketplace, consumers should choose credit cards as the preferred instrument if they face no additional costs for using them and pay off their monthly balances.*

tution. Once the funds are received, the merchant's financial institution credits the merchant's account. At some later date, the consumer's financial institution sends the consumer a bill that lists all charges for a given period.

Credit card expenditures and usage have increased in both absolute terms and relative to other retail payment instruments. From 1990 to 1995, the number of credit card transactions increased 30 percent, and the value of transactions increased 47 percent.<sup>11</sup> The proportion of household credit card expenditures increased to 11.7 percent in 1995 from 8.0 percent in 1986, according to the two consumer surveys cited in note 2.

In addition to float, consumers often benefit from using credit cards by receiving extended warranties, rebates on purchases, cash discounts and travel awards. Also, if lost or stolen, credit cards can be made inactive. Acceptance of credit cards is also more geographically diverse than for other retail payment instruments. Credit card purchases can easily be made via phone or mail and, more recently, over the Internet.

Similar to the costs of checks, consumers' costs for credit card usage are often bundled. Consumers who carry a balance may pay annual fees in addition to interest charges. Income and other factors, such as employment and credit histories, may limit the consumer's ability to acquire a credit card and the amount of credit extended.

Merchants benefit from credit card

usage by attracting consumers who prefer to make payment using a credit-based instrument. Merchants are willing to accept these instruments because of their faith in the credit card brand. Although the consumer's credit card bank makes payment to the merchant's bank and the merchant's bank credits the merchant's account, credit card networks such as Visa and MasterCard attempt to ensure low settlement risk to maintain their brands' reputations. However, merchants do not receive full value for their credit card receipts. Discount percentages are negotiated based on the volume and value of receipts.

Most merchants in the United States process their credit card receipts electronically because of convenience and quicker availability of funds. However, most consumers still choose checks to settle their credit card bills. With the growth of banking via the personal computer, more credit card bills may be paid electronically with an ACH payment, thus making these credit-based transactions electronic.

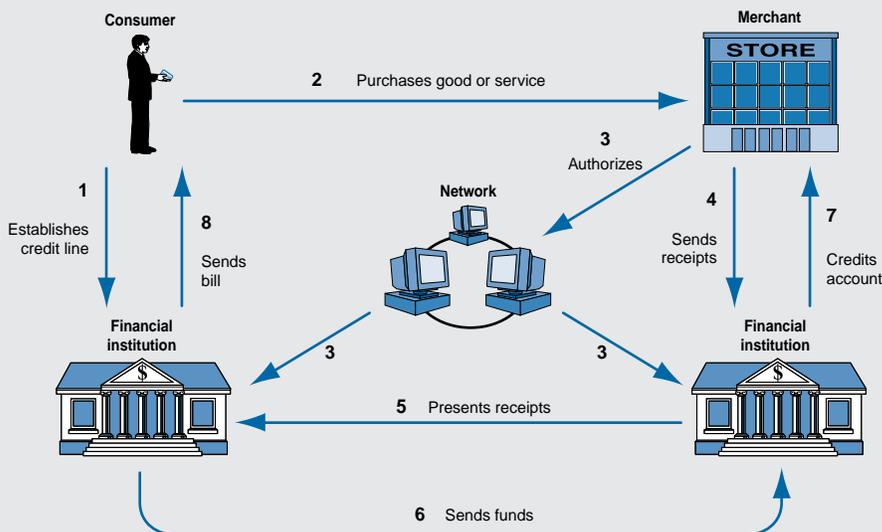
#### Which Payment Instrument Will Dominate?

Not only do consumers choose between payment instruments within a payment classification, but they also choose across payment classifications when selecting their preferred instrument. Consumers are likely to continue to use value-based instruments only for relatively small-value transactions and for transactions with limited alternatives. Over the past decade, the proportion of household expenditures paid by cash has decreased significantly, according to the consumer surveys cited in note 2. This decline suggests that when alternatives to cash transactions exist, consumers are choosing them more often.

Consumers prefer instruments that are convenient, safe and secure; inexpensive to use; and widely accepted. If consumers are free to choose from any payment instrument discussed, pay off their balances every month and face no surcharges based on the instrument used, credit cards should dominate other payment instruments. With credit card transactions, consumers enjoy a substantial period of float and often receive benefits such as frequent flyer miles.

However, if merchants charged price differentials based on the type of payment instrument used, or if financial institutions providing the payment instruments instituted a per-transaction fee that reflected the un-

Chart 5  
Credit-Based Transactions



SOURCE: Adapted from David S. Evans and Richard L. Schmalensee, *The Economics of the Payment Card Industry*, National Economic Research Associates Inc., Cambridge, Mass., 1993.

*(continued on page 8)*

# 11K Bank Notes

Eleventh District banks continued their trend of strong performance during 1996. Earnings remained high and capital was strong. Asset quality deteriorated slightly when compared with 1995 levels but was still good by industry standards.

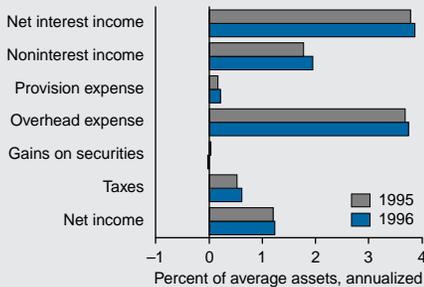
The 969 banks in the Eleventh Federal Reserve District earned net income of \$2.6 billion in 1996 for a return on assets of 1.23 percent, compared with net income of \$2.4 billion and a return of 1.20 percent in 1995. (The Eleventh District comprises Texas, northern Louisiana and southern New Mexico.) Higher noninterest income and net interest income offset increases in provision and overhead expense and boosted District bank profitability in 1996.

District banks' noncurrent loans, those past due 90 days or more or on nonaccrual status, accounted for 0.88 percent of gross loans at year-end 1996, up from 0.77 percent of gross loans at year-end 1995 but still well below the peak of 10 percent during the late 1980s. Growth in

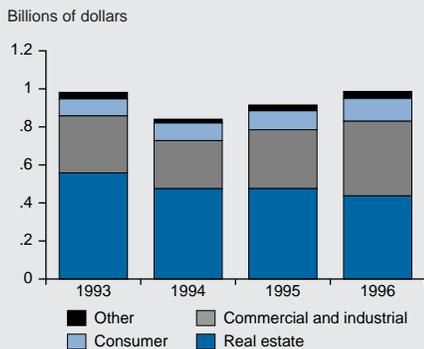
noncurrent consumer and commercial loans contributed to the recent increases in non-current loans at District banks.

Despite the recent increases in non-current loans, District banks continued to maintain a level of loan loss reserves well in excess of noncurrent loans, a trend that began in late 1992. Capital levels also remained high, with equity capital equal to 8.5 percent of assets as of year-end 1996, up from 8.2 percent at year-end 1995.

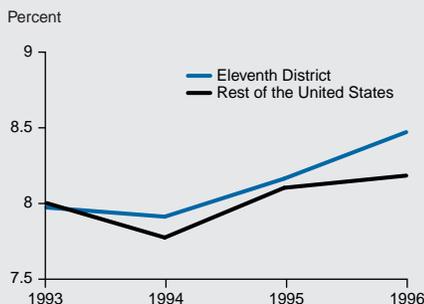
## Major Profitability Components For Eleventh District Insured Commercial Banks



## Noncurrent Loans at Eleventh District Insured Commercial Banks



## Equity Capital Ratio for Insured Commercial Banks



## Financial Industry Issues Federal Reserve Bank of Dallas

Robert D. McTeer, Jr.  
President and Chief Executive Officer

Helen E. Holcomb  
First Vice President and Chief Operating Officer

Robert D. Hankins  
Senior Vice President

Genie D. Short  
Vice President

Economists  
Jeffery W. Gunther, Robert R. Moore, Kenneth J. Robinson,  
Thomas F. Siems, Sujit "Bob" Chakravorti

Financial Analysts  
Robert V. Bubel, Howard C. "Skip" Edmonds, Karen M. Couch,  
Kelly Klemme, Susan P. Tetley, Edward C. Skelton

Research Programmer Analyst  
Olga N. Zograf

Graphic Designer  
Lydia L. Smith

Editors  
Anne Coursey, Rhonda Harris, Monica Reeves

Financial Industry Issues Graphic Design  
Gene Autry, Laura J. Bell

*Financial Industry Issues* is published by the Federal Reserve Bank of Dallas. The views expressed are those of the authors and should not be attributed to the Federal Reserve Bank of Dallas or the Federal Reserve System.

Articles may be reprinted on the condition that the source is credited and a copy of the publication containing the reprinted article is provided to the Financial Industry Studies Department of the Federal Reserve Bank of Dallas.

*Financial Industry Issues* is available free of charge by writing the Public Affairs Department, Federal Reserve Bank of Dallas, P.O. Box 655906, Dallas, Texas 75265-5906, or by telephoning (214) 922-5254 or (800) 333-4460, ext. 5254.

# How Do We Pay?

(continued from page 6)

derlying cost of using the instrument, then credit cards would lose some of their comparative advantage. Online debit card transactions and ACH payments are the least expensive noncash instruments to accept, according to the supermarket study. While these instruments are not as widely accepted as others, their acceptance is growing. Some merchants currently price their products differently based on the payment instrument used, although this is not a common practice. A pricing scheme that reflects the costs faced by merchants would be to charge higher prices for more expensive instruments. By following such a pricing policy, merchants would price online debit cards and ACH payments the lowest after cash, credit card payments would be the highest and checks would be in the middle.

## Conclusion

Consumers' use of newer, less expensive payment alternatives depends on the incentives merchants and payment instrument providers offer, along with consumers' comfort level and faith in the instruments. Once consumers are comfortable with the newer electronic alternatives, cost of usage, convenience and frequent-use incentives will determine which payment instrument dominates. In today's marketplace, consumers should choose credit cards as the preferred instrument if they face no additional costs for using them and pay off their monthly balances. By using credit cards in this way, consumers enjoy significant float and possible frequent-use benefits. However, from the merchants' perspective, credit card payments are among the most expensive and online debit cards and ACH payments are the least expensive noncash alternatives. Nevertheless, until consumers are comfortable with these newer forms of payment and share in the savings created by using them, they will be reluctant to abandon the more expensive alternatives.

—Sujit "Bob" Chakravorti

## Notes

- <sup>1</sup> Part of the intuitive and conceptual framework used to diagram the clearing and settling of different payment instruments is from the Financial Services Policy Committee of the Federal Reserve System, *Primer on Emerging Payment Instruments*, July 1996.
- <sup>2</sup> The results of the 1986 consumer survey commissioned by the Federal Reserve Board can be found in Robert B. Avery, Gregory E. Elliehausen, Arthur B. Kennickell and Paul A. Spindt, "The Use of Transactions Accounts and Cash from 1984 to 1986," *Federal Reserve Bulletin*, March 1987, 179–96. The results for 1995 are preliminary from a similar survey commissioned by the Federal Reserve Board.
- <sup>3</sup> In the United States, there are currently no restrictions on what types of institutions can issue stored-value cards. If banks issue stored-value cards, certain government guarantees—such as deposit insurance—may apply in case of failure. However, such guarantees may not be present for nonbank issuers. For more discussion on this issue, see John Wenninger and David Laster, "The Electronic Purse," *Current Issues in Economics and Finance*, vol. 1, Federal Reserve Bank of New York, April 1995.
- <sup>4</sup> Bank for International Settlements, *Statistics on Payment Systems in the Group of Ten Countries*, Basle, Switzerland, December 1996.
- <sup>5</sup> Valerie Block, "Debit Use Takes Off; ATM Cards Hit a Wall," *American Banker*, January 2, 1997, 13.
- <sup>6</sup> However, immediately memo-posting the consumer's account has become common in offline debit transactions. Although settlement occurs later, the consumer is unable to use these funds for some other purpose.
- <sup>7</sup> "A New Wave of Debit Surcharges Shades the Old Interchanged Fabric," *Debit Card News*, July 29, 1996.
- <sup>8</sup> Kirstin E. Wells, "Are Checks Overused?" Federal Reserve Bank of Minneapolis *Quarterly Review*, Fall 1996, 2–12.
- <sup>9</sup> Food Marketing Institute, *Benchmarking Comparative Payment Methods: Costs and Case Studies*, 1994.
- <sup>10</sup> Elliot McEntee, "New Law Will Enhance Appeal of ACH," *Payments System Report*, NACHA, May 1996.
- <sup>11</sup> Bank for International Settlements, various years.

FEDERAL RESERVE BANK OF DALLAS  
P.O. BOX 655906  
DALLAS, TEXAS 75265-5906

BULK RATE  
U.S. POSTAGE  
**PAID**  
DALLAS, TEXAS  
PERMIT NO. 151