

# **The 2004 Federal Reserve Payments Study**

Analysis of Noncash Payments Trends in the United States: 2000 – 2003



Research Sponsored by the Federal Reserve System

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## 1 Executive Summary

This report summarizes the findings of the *2004 Federal Reserve Payments Study*. The study included the two research efforts noted below to estimate the annual number and value of significant types of noncash payments in the United States. The study estimated the number and value of payments by check, automated clearing house (ACH), credit card, debit card, and electronic benefits transfer (EBT).<sup>1</sup> The study also estimated the number and value of ATM withdrawals. Estimates of check payments and ATM withdrawals were based on findings from the *2004 Depository Institutions Payments Study* (2004 DI study). Electronic payments volume estimates were based on findings from the *Electronic Payment Instruments Study* (2004 EP study) and supplemented by the 2004 DI study.

The number of noncash payments in the United States has grown since 2000. Checks are the only payment instrument being used less frequently now than three years ago.<sup>2</sup> The annual number of payments initiated by cards (credit card, debit card, and EBT) increased 11.0 billion between 2000 and 2003, for an annual growth rate of 13.2 percent. Debit cards, in particular, have experienced even greater growth rates, illustrated in Exhibit 1 below.<sup>3</sup>

### Exhibit 1: Annual Number of Noncash Payments in 2003 and 2000

	2000 Estimate (billion)	2003 Estimate (billion)	CAGR <sup>4</sup>
<b>Noncash Payments</b>	<b>72.5</b>	<b>81.2</b>	<b>3.8%</b>
Check	41.9	36.7	-4.3%
Credit Card	15.6	19.0	6.7%
ACH	6.2	9.1	13.4%
Offline Debit	5.3	10.3	24.9%
Online Debit	3.0	5.3	21.0%
EBT	0.5	0.8	15.4%

<sup>1</sup> The study does not include Fedwire funds transfers and funds transfers processed by the Clearing House Inter-bank Payment System CHIPS. Such payments are large in value but small in number.

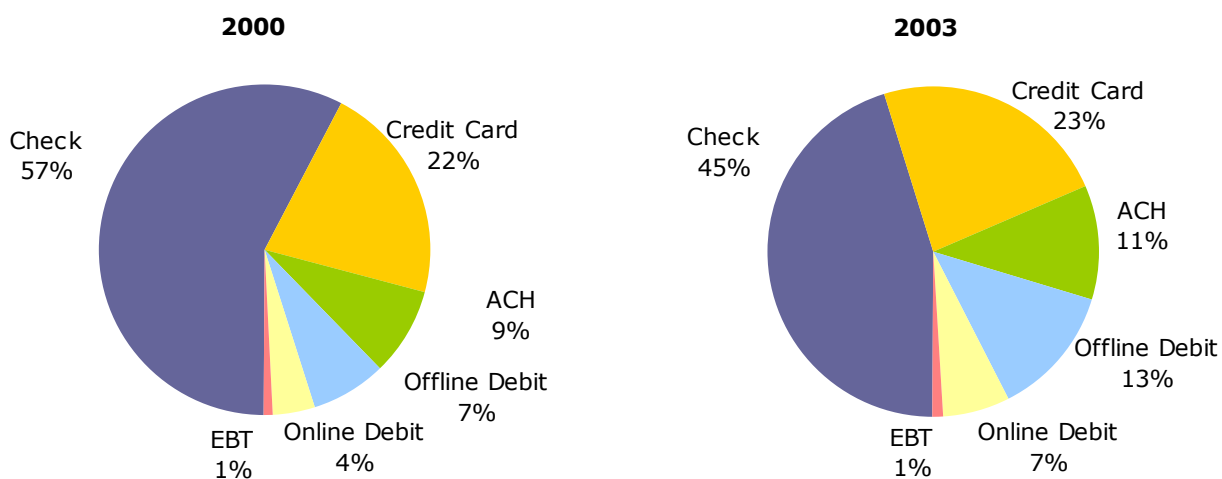
<sup>2</sup> The check estimates represent checks paid, not checks written. See section 2.1 for details.

<sup>3</sup> Debit card payments include online debit (PIN-based), which includes purchases at the point of sale with ATM cards, and offline debit (signature-based).

<sup>4</sup> CAGR is the compound annual growth rate.

As a group, the number of electronic payments increased more rapidly than the total, while the number of check payments declined. Exhibit 2 illustrates the change in the distribution of noncash payments from 2000 to 2003.

**Exhibit 2: Distribution of the Number of Noncash Payments for 2003 and 2000**



Many factors, such as growth in economic activity and population, contributed to the increase in electronic payments. Some of the increase is likely also due to the replacement of some cash and check payments with electronic payments. While, by number, checks remain the largest single noncash payment type, the majority of noncash payments made in the United States are now initiated electronically, using one of the three major electronic payment types: debit cards, credit cards, or ACH.

The results in this report reflect the efforts of hundreds of organizations across the industry. The estimates from the 2004 DI study are based on survey data from a nationally representative, stratified random sample of 1,501 depository institutions (DIs). The estimates from the 2004 EP study were based on data provided by 68 payment networks and card issuers that process the vast majority of electronic payments in the United States.

The *Federal Reserve Payments Study* is part of an ongoing effort by the Federal Reserve System to measure trends in noncash payments in the United States. In 2001, the Federal Reserve System undertook the *Retail Payments Research Project* to estimate the annual number and value of retail payments in the United States. To measure changes in the use of different payment instruments in the United States, the same methodologies used in 2001 were also used in 2004. In some cases, adjustments were made to estimates reported in 2001 to ensure consistency with the 2004 estimates.

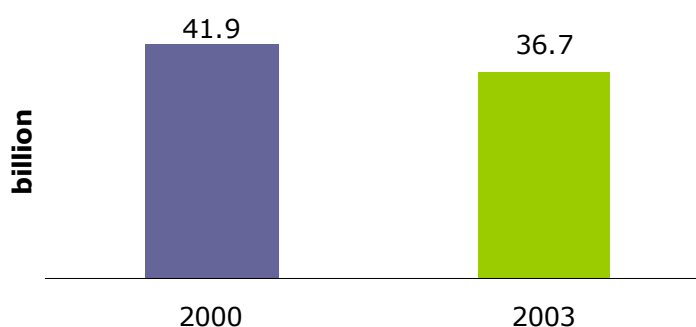
## 2 Summary of Findings

The number of noncash payments in the United States increased at an annual rate of 3.8 percent since 2000. This growth was greater than the growth in real gross domestic product (1.9 percent) but lower than the growth in real personal consumption expenditure (4.5 percent) over the same time period. The growth of total noncash payments may have accelerated in recent years. Based on Federal Reserve estimates, the annual growth in noncash payments averaged 3.1 percent between 1979 and 2000.

### 2.1 Check Payments Declined

The number of checks paid declined 5.2 billion between 2000 and 2003, an annual decrease of 4.3 percent. In 2003, the annual number of checks paid is estimated to have been 36.7 billion, for a value of \$39.3 trillion. The estimate for the number of checks paid in 2000 was revised downward to 41.9 billion from 42.5 billion, and the value was revised upward to \$39.8 trillion from \$39.3 trillion.<sup>5</sup>

#### Exhibit 3: Number of Checks Paid in 2003 and 2000



The number of checks paid differs from the number of checks written. By agreement between the payer and the payee, consumer checks can be converted into electronic payments by merchants at the point of sale and by billers that receive check remittances. The number of checks written declined less rapidly than the number of checks paid. The average value of checks increased from \$950 in 2000 to \$1,070 in 2003. This increase likely reflects a more rapid displacement of consumer checks than business checks by electronic payments. Use of the debit card by consumers, which exhibits a low average value, has grown dramatically in the past three years. ACH "eCheck" payments by

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<sup>5</sup> Several depository institutions revised their 2000 data. See the detailed report for a discussion of revisions to the 2000 estimates.

consumers have also grown dramatically since 2000.<sup>6</sup> They now account for a significant number of ACH payments.

### 2.1.1 Checks Returned Unpaid Declined

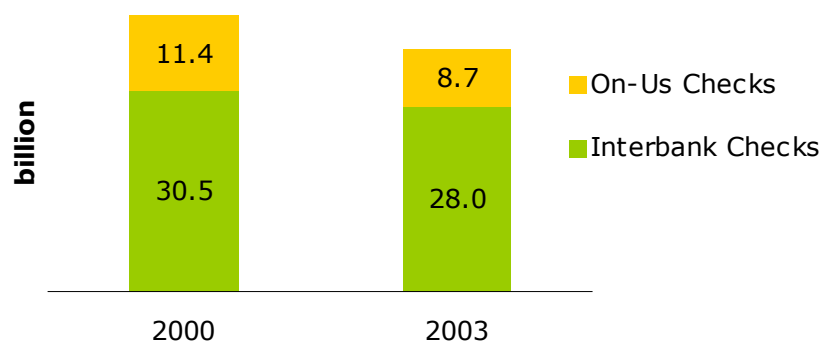
The number of checks returned unpaid declined at an annual rate of 7.7 percent, a sharper decline than the decline in the number of checks paid. In 2000, the number of checks returned unpaid was 0.6 percent of checks paid by depository institutions, compared to 0.5 percent in 2003. The value per returned check has remained relatively unchanged: \$756 compared to \$747 three years ago.

The faster decline in the number of checks returned unpaid may reflect better money management by check writers, changes in DIs' practices for posting payments, or greater use of overdraft protection programs.

### 2.1.2 On-Us Checks Declined

The number of on-us checks – checks that are deposited or cashed at the same DI on which they are drawn – declined from 11.4 billion in 2000 (27% of checks paid by DIs) to 8.7 billion in 2003 (24% of checks paid by DIs).

#### Exhibit 4: Number of On-Us and Interbank Checks in 2003 and 2000



### 2.1.3 The Number of Checks Paid by Type of Depository Institution

In 2003 commercial banks paid 79.4 percent of checks by number and 93.1 percent by value. Credit unions and savings institutions paid 11.5 percent and 7.9 percent by number, respectively, and 2.3 percent and 3.7 percent by value, respectively. The proportion of the

<sup>6</sup> ACH "eCheck" entries (identified by their three-letter "standard entry class code") are initiated from checks written at the point of sale (POP) and for bill payment (ARC). In addition, ACH eChecks include transactions manually initiated over the phone (TEL) or online (WEB) by the accountholder.

number and value of checks by type of institution has not changed significantly since the previous study. The average value of checks has increased across all types of DIs.

### Exhibit 5: Checks Paid by Type of Depository Institution in 2003 and 2000

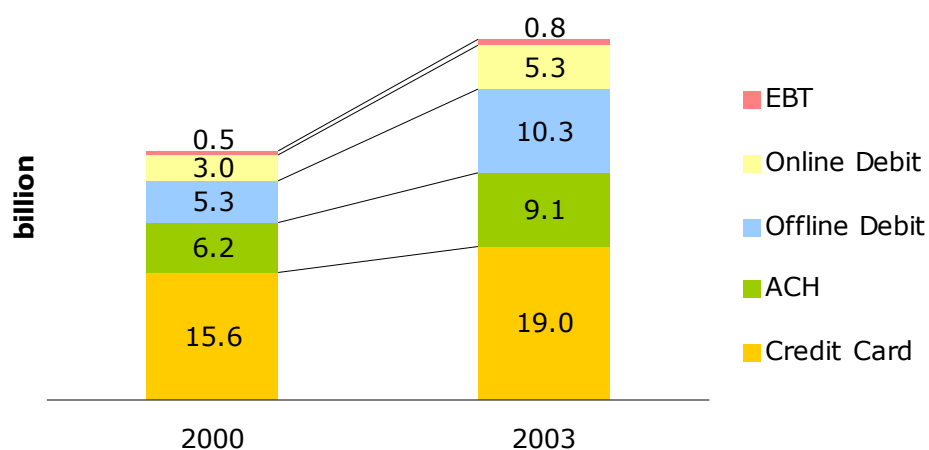
	2000			2003		
	Number (billion)	Value (trillion)	Avg Value	Number (billion)	Value (trillion)	Avg Value
<b>U.S. Market</b>	<b>41.9</b>	<b>\$39.8</b>	<b>\$950</b>	<b>36.7</b>	<b>\$39.3</b>	<b>\$1,070</b>
Commercial Banks	32.9	\$37.2	\$1,133	29.1	\$36.5	\$1,255
Credit Unions	4.7	\$0.9	\$183	4.2	\$0.9	\$218
Savings Institutions	3.8	\$1.4	\$365	2.9	\$1.5	\$505
Postal Money Orders	0.2	*	\$130	0.2	*	\$146
U.S. Treasury Checks	0.3	\$0.3	\$1,080	0.3	\$0.3	\$1,154

\*The value of postal money orders was \$30 billion in 2000 and \$29 billion in 2003.

## 2.2 Electronic Payments Grew Rapidly

Electronic payments grew rapidly between 2000 and 2003. There were 13.8 billion more electronic payments in 2003 than in 2000.<sup>7</sup> During the same time period, checks paid declined 5.2 billion, suggesting that some check payments were replaced by electronic payments. Electronic payments are also likely replacing some cash payments or reflecting general increases in payment activity.

### Exhibit 6: Number of Electronic Payments in 2003 and 2000



<sup>7</sup> This calculation includes revised estimates for payments by ACH and credit card in 2000. See the detailed report for a discussion of revisions to the 2000 estimates.



### 2.2.1 Debit Cards Grew Most Rapidly

Increases in the number of debit card transactions account for over half of all growth in electronic payments.<sup>8</sup> In 2003, there were 15.6 billion debit card transactions compared to 8.3 billion in 2000. The number of debit card transactions grew at an annual rate of 23.5 percent.

#### Exhibit 7: Number and Value of Debit Card Transactions in 2003 and 2000

	2000	2003	CAGR
Number (billion)	8.3	15.6	23.5%
<i>Offline Debit</i>	5.3	10.3	24.9%
<i>Online Debit</i>	3.0	5.3	21.0%
Dollar Value (trillion)	\$0.3	\$0.6	21.9%
<i>Offline Debit</i>	\$0.2	\$0.4	26.7%
<i>Online Debit</i>	\$0.1	\$0.2	13.9%
Average Value	\$42	\$40	-1.3%
<i>Offline Debit</i>	\$40	\$42	1.4%
<i>Online Debit</i>	\$46	\$38	-5.9%

The use of offline debit has increased more rapidly than that of online debit over the past three years. The number of offline debits card transactions increased 5.0 billion from 2000 to 2003 compared to an increase of 2.3 billion online debit card transactions for the same period. The number of offline and online debit transactions has grown at an annual rate of 25 and 21 percent respectively. The value per debit card transaction (\$40) has declined somewhat since 2000 (\$42). The decline was greater for online debit – from \$46 to \$38 – over the 2000 to 2003 period.

### 2.2.2 ACH Growth Continued

The number of ACH payments grew 2.9 billion between 2000 and 2003, from 6.2 billion to 9.1 billion, for an annual growth rate of 13.4 percent. ACH debits grew faster than ACH credits. Debits made up 39 percent of all ACH payments in 2000 compared to nearly half (47 percent) in 2003.<sup>9</sup> The growth in the number of ACH debits is due largely to the conversion of some check payments to ACH payments.

<sup>8</sup> References to transactions in this report refer specifically to payment transactions or cash withdrawals at ATMs. The study's estimates do not include non-value transactions.

<sup>9</sup> Third-quarter 2004 statistics from NACHA indicate that the number of ACH debits now exceeds the number of ACH credits.

On-us ACH payments – those cleared in-house (i.e. not sent over the network) – make up 17 percent of all ACH payments.<sup>10</sup> This estimate is based on a nationally representative survey of DIs. Previous industry estimates were based on more limited surveys.

### Exhibit 8: Number and Value of ACH Payments in 2003 and 2000

	2000	2003	CAGR
<b>Total Number (billion)</b>	<b>6.2</b>	<b>9.1</b>	<b>13.4%</b>
<i>ACH Credits</i>	3.8	4.8	8.0%
<i>ACH Debits</i>	2.4	4.3	21.0%
<b>Total Dollar Value (trillion)</b>	<b>\$18.6</b>	<b>\$25.1</b>	<b>10.5%</b>
<i>ACH Credits</i>	\$9.0	\$12.7	12.2%
<i>ACH Debits</i>	\$9.6	\$12.4	9.0%
<b>Average Value</b>	<b>\$2,989</b>	<b>\$2,767</b>	<b>-2.5%</b>
<i>ACH Credits</i>	\$2,365	\$2,651	3.9%
<i>ACH Debits</i>	\$3,967	\$2,896	-10.0%

### 2.2.3 Credit Cards Grew Moderately

The number of credit card transactions grew from 15.6 billion in 2000 to 19.0 billion in 2003, an annual growth rate of 6.7 percent. The relatively moderate growth in credit card transactions makes credit cards the slowest growing of all electronic payment instruments. Credit cards, however, are also the most often used electronic payment instrument in the United States.

### Exhibit 9: Number and Value of Credit Card Transactions in 2003 and 2000

	2000	2003	CAGR
<b>Number (billion)</b>	<b>15.6</b>	<b>19.0</b>	<b>6.7%</b>
<i>General Purpose</i>	12.3	15.2	7.3%
<i>Private Label</i>	3.3	3.8	4.4%
<b>Dollar Value (trillion)</b>	<b>\$1.3</b>	<b>\$1.7</b>	<b>9.9%</b>
<i>General Purpose</i>	\$1.1	\$1.4	9.5%
<i>Private Label</i>	\$0.2	\$0.3	11.5%
<b>Average Value</b>	<b>\$82</b>	<b>\$89</b>	<b>2.9%</b>
<i>General Purpose</i>	\$87	\$93	2.1%
<i>Private Label</i>	\$62	\$76	6.8%

<sup>10</sup> This is a weighted average of ACH credits and debits: 14.4 percent of credits and 20.6 percent of debits are estimated to be in-house on-us payments. The percentage of on-us ACH payments was reported as 18% in the previous version of the summary document.

### 2.2.4 Cash Withdrawals at ATMs

There were 6.1 billion ATM withdrawals in 2003 for a value of \$520 billion. (ATM withdrawals were not measured by the 2001 DI study). Commercial bank customers made 64.7 percent of all ATM withdrawals by number and 68.8 percent by value. Credit union members made 23.6 percent of ATM withdrawals and 19.4 percent by value. Savings institutions' customers made 11.7 percent of all ATM withdrawals by number and value.

#### Exhibit 10: Number and Value of ATM Withdrawals in 2003

	Number (billion)	Value (billion)	Average Value
<b>U.S. Market</b>	<b>6.1</b>	<b>\$520</b>	<b>\$85</b>
Commercial Banks	4.0	\$358	\$91
Credit Unions	1.4	\$101	\$70
Savings Institutions	0.7	\$61	\$85

### 3 Conclusions

Most noncash payments in the United States were made by electronic instruments in 2003, whereas most were made by check in 2000. If current growth rates are sustained, credit cards and debit cards will each exceed the number of paid checks before the end of the decade. Such rapid change presents new opportunities for innovation in the payment system. It also poses serious challenges in achieving a cost-effective, efficient payment system.

*The Federal Reserve System wishes to thank the hundreds of organizations and perhaps thousands of individuals who contributed to the estimates discussed in this report. We recognize that studies such as these shift resources from other important initiatives. We appreciate the commitment of time and energy by all who were involved. Their efforts have provided tremendous benefit to the industry.*

*– Roger W. Ferguson, Jr., Vice Chairman, Federal Reserve Board of Governors*

**Appendix A: Tabular Results**

	2000			2003			Total change (over 3 years)		CAGR(%)	
	Num	Val (\$)	Avg (\$)	Num	Val (\$)	Avg (\$)	Num	Val (\$)	Num	Val (\$)
<b>Total Noncash Payments</b>	<b>72.5</b>	<b>60.0</b>	<b>827</b>	<b>81.2</b>	<b>66.7</b>	<b>822</b>	<b>8.6</b>	<b>6.7</b>	<b>3.8</b>	<b>3.6</b>
<b>Checks</b>	<b>41.9</b>	<b>39.8</b>	<b>950</b>	<b>36.7</b>	<b>39.3</b>	<b>1,070</b>	<b>-5.2</b>	<b>-0.5</b>	<b>-4.3</b>	<b>-0.4</b>
+/-	1.6	1.1	29	0.7	0.9	24	1.7	1.4		
<b>US Treasury Checks</b>	0.3	0.3	1,080	0.3	0.3	1,154	0.0	0.0	0.6	2.9
<b>Postal Money Orders</b>	0.2	0.0	130	0.2	0.0	146	0.0	0.0	-4.9	-1.1
<b>Commercial Checks</b>	41.4	39.5	953	36.2	38.9	1,074	-5.2	-0.6	-4.4	-0.5
+/-	1.6	0.5	29	0.7	0.9	24	1.7	1.0		
On-Ups	11.4	15.9	1,398	8.7	12.8	1,478	-2.7	-3.1	-8.7	-7.0
+/-	0.7	1.1	29	0.3	0.6	78	0.7	1.3		
Reserve Bank	17.2			15.3			-1.9		-3.8	
<b>Checks Returned Unpaid</b>	<b>0.2</b>	<b>0.2</b>	<b>747</b>	<b>0.2</b>	<b>0.1</b>	<b>756</b>	<b>-0.1</b>	<b>0.0</b>	<b>-7.7</b>	<b>-7.3</b>
+/-	0.0	0.0	41	0.0	0.0	25	0.0	0.0		
Reserve Bank	0.2			0.1			0.0		-3.8	
<b>Electronic Payments</b>	<b>30.6</b>	<b>20.2</b>	<b>660</b>	<b>44.5</b>	<b>27.4</b>	<b>617</b>	<b>13.8</b>	<b>7.2</b>	<b>13.2</b>	<b>10.7</b>
<b>ACH</b>	<b>6.2</b>	<b>18.6</b>	<b>2,989</b>	<b>9.1</b>	<b>25.1</b>	<b>2,767</b>	<b>2.85</b>	<b>6.51</b>	<b>13.4</b>	<b>10.5</b>
Debits	2.4	9.6	3,967	4.3	12.4	2,896	1.87	2.82	21.0	9.0
Credits	3.8	9.0	2,365	4.8	12.7	2,651	0.98	3.69	8.0	12.2
<b>Debit Card</b>	<b>8.3</b>	<b>0.3</b>	<b>42</b>	<b>15.6</b>	<b>0.6</b>	<b>40</b>	<b>7.3</b>	<b>0.3</b>	<b>23.5</b>	<b>22</b>
Signature (Offline)	5.3	0.2	40	10.3	0.4	42	5.0	0.2	24.9	27
PIN (Online)	3.0	0.1	46	5.3	0.2	38	2.3	0.1	21.0	14
<b>Credit Card</b>	<b>15.6</b>	<b>1.3</b>	<b>82</b>	<b>19.0</b>	<b>1.7</b>	<b>89</b>	<b>3.4</b>	<b>0.4</b>	<b>6.7</b>	<b>10</b>
<b>EBT</b>	<b>0.5</b>	<b>0.0</b>	<b>26</b>	<b>0.8</b>	<b>0.0</b>	<b>26</b>	<b>0.3</b>	<b>0.0</b>	<b>15.4</b>	<b>16</b>
<b>ATM Cash Withdrawals</b>	n/a	n/a	n/a	6.1	0.5	85	n/a	n/a	n/a	n/a
+/-				0.3	0.0	3				
On-Ups	n/a	n/a	n/a	3.6	0.3	89	n/a	n/a	n/a	n/a
+/-				0.1	0.0	2				
<b>Note:</b>										
Nominal GDP (\$ trillion)		9.8			11.0			1.2		3.9
Real GDP (\$ trillion)		9.8			10.4			0.6		1.9
Real PCE (\$ trillion)		6.4			7.4			0.9		4.5
Population (million)		282.4			291.0			8.6		1.0

Numbers in billions. Values in trillions of USD. Differences are due to rounding.

CAGR is the compound annual growth rate.

Each estimate is +/- the number below it in parentheses, the half-width of the 95% confidence interval (which reflects the uncertainty surrounding an estimate based on a sample of 1,501 respondents rather than a census of all depository institutions).

A zero in the estimate or confidence interval half-width means the actual value is lower than can be reported in the scale used.

Confidence intervals are not available for electronic payments estimates.

Socioeconomic figures, provided for comparison, obtained from U.S. Department of Commerce, Bureau of Economic Analysis as of October 29, 2004.

## **Appendix B: How the Study Was Conducted**

The Federal Reserve Payments Study consists of two studies: a sample-based survey of depository institutions and a census-style survey of payments network operators and payments card issuers. Detailed reports of the methodology and findings of each study will be made available on [www.frbservices.org](http://www.frbservices.org).

### **Depository Institutions Payments Study**

The *Depository Institutions Payments Study* estimated the annual number and value of payments in the United States from a March and April, 2004, survey of a representative, random sample of DIs. The study estimated payments made by check, ACH, offline debit, and online debit. The study also estimated the number and value of ATM withdrawals. Global Concepts and its subcontractor, ICR, assisted the Federal Reserve with the study.

A stratified random sample of 2,700 of the 14,117 DIs in the United States was drawn. The largest DIs were sampled at a higher rate in an effort to count as many transactions as possible and estimate as few as possible. The sample included commercial banks, savings institutions, and credit unions. A total of 1,501 DIs provided data for the survey.

Although the survey period was March and April, 2004, the estimates were annualized and reported as 2003 estimates. This approach allows for comparison to the data on electronic payments. Readers may wish to consult the more detailed report of findings for additional information on the study's methods and results.

### **Electronic Payment Instruments Study**

The *Electronic Payment Instruments Study* estimated the number and value of electronic payments in the United States for calendar year 2003. Data were collected by surveying payment networks and card issuers. Of the 86 organizations asked to participate 68 provided data, accounting for the vast majority of electronic payments in the United States. Dove Consulting assisted the Federal Reserve with the study.

Survey forms were distributed to the payment organizations that process, clear and settle electronic payments in the United States to collect data for the calendar year 2003. The survey data were collected during February through June, 2004. Respondents to this voluntary study collectively accounted for an estimated 98% of the transactions and 99% of the dollar volume in the United States.