The 2013 Federal Reserve Payments Study

Recent and Long-Term Payment Trends in the United States: 2003 – 2012

Summary Report and Initial Data Release

Research Sponsored by the Federal Reserve System

Revised July 2014

(Original Release Date: December 2013)

Copyright 2014, Federal Reserve System

Project Team Members

FEDERAL RESERVE

Geoffrey R. Gerdes

Senior Economist, Payment System Studies Section
Division of Reserve Bank Operations and Payment Systems
Board of Governors of the Federal Reserve System

May X. Liu

Statistician, Payment System Studies Section
Division of Reserve Bank Operations and Payment Systems
Board of Governors of the Federal Reserve System

Jason P. Berkenpas

Research Assistant, Payment System Studies Section
Division of Reserve Bank Operations and Payment Systems
Board of Governors of the Federal Reserve System

Matthew C. Chen

Research Assistant, Payment System Studies Section
Division of Reserve Bank Operations and Payment Systems
Board of Governors of the Federal Reserve System

Matthew C. Hayward (until Fall 2012)

Research Assistant, Payment System Studies Section
Division of Reserve Bank Operations and Payment Systems
Board of Governors of the Federal Reserve System

James M. McKee

Senior Vice President
Retail Payments Office of the Federal Reserve System
Federal Reserve Bank of Atlanta

Scott Dake

Senior Vice President
Retail Payments Office of the Federal Reserve System
Federal Reserve Bank of Atlanta

Patrick Dyer

Assistant Vice President
Retail Payments Office of the Federal Reserve System
Federal Reserve Bank of Atlanta

Dave Brangaccio

Portfolio Director
Retail Payments Office of the Federal Reserve System
Federal Reserve Bank of Atlanta

Nancy Donahue

Lead Financial Analyst
Retail Payments Office of the Federal Reserve System
Federal Reserve Bank of Atlanta

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 2

CONSULTANTS

Edward Bachelder

Director of Research and Analytics
Blueflame Consulting, Melrose, MA

Walter Healey

Managing Director
MH Consulting Partners, Mequon, WI

Mike Ruden

Senior Consultant
MH Consulting Partners, Mequon, WI

Charles Bachelder

Research Analyst
Blueflame Consulting, Melrose, MA

David C. Stewart

Senior Expert
McKinsey & Company, Chicago, IL

Christopher A. Gill

Senior Expert
McKinsey & Company, Atlanta, GA

Michael D. Argento

Expert
McKinsey & Company, Atlanta, GA

Jessica L. Jansen

Senior Analyst
McKinsey & Company, Atlanta, GA

Trevor K. Reece

Analyst
McKinsey & Company, Atlanta, GA

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 3

Contents

1 EXECUTIVE SUMMARY 5

1.1 HIGHLIGHTS 6

1.2 DISCUSSION 7

2 SUMMARY OF FINDINGS 12

2.1 GENERAL-PURPOSE CARD PAYMENTS 13

2.2 PRIVATE-LABEL CARD PAYMENTS 21

2.3 ACH PAYMENTS 24

2.4 CHECK PAYMENTS 26

2.5 ALTERNATIVE PAYMENT INITIATION METHODS PROVIDED BY DEPOSITORY INSTITUTIONS 30

2.6 UNAUTHORIZED TRANSACTIONS (THIRD-PARTY FRAUD) 31

3 APPENDIX 37

3.1 ABOUT THE STUDY 37

3.2 UNAUTHORIZED TRANSACTIONS (THIRD-PARTY FRAUD) ESTIMATES 38

3.3 REVISIONS 39

3.4 TABULAR RESULTS 41

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 4

1 Executive Summary

The *2013 Federal Reserve Payments Study* (2013 Study) is the fifth in a series of triennial studies conducted since 2001 by the Federal Reserve System to estimate aggregate trends in noncash payments in the United States. Estimates are based on survey data gathered from depository and financial institutions, payment networks, processors, and issuers. The 2013 Study reports the total number and value of all noncash payments estimated to have been made in 2012 by consumers and businesses, including for-profit and nonprofit enterprises and federal, state, and local government agencies.[1] These payments included those initiated from accounts domiciled in the United States and typically involved the use of debit, prepaid, and credit cards; automated clearinghouse (ACH); or checks. This study does not estimate the number and value of cash payments, but it does estimate activities related to cash payments, such as debit card cash-back transactions and ATM cash withdrawals. For trend analysis, the 2013 Study compares the 2012 estimates with estimates from previous studies. Detailed tables are available in sections 3.4 and 3.4.2.

In addition to information that is compared with previous studies, this report contains new estimates of total unauthorized transactions (third-party fraud) involving checks, ACH, and cards as well as some information on the use of alternative payment initiation methods provided by depository institutions including commercial banks, savings institutions, and credit unions. Other results—such as the number and value of consumer and business accounts, number of cards issued, and the number and value of cash withdrawals and cash deposits made through various channels—are included in a detailed report released concurrently with this revised summary report.

This revised report reflects revisions to data provided in the original report released in December 2013. A discussion of the revisions is provided in section 3.3.

---

[1] Distinctions between consumer and business payments in this report are based on whether the payment was from an account identified as a business account by the survey respondent. Unless otherwise noted, business payment estimates include government payments. Some small business payments may be made from consumer accounts, and so consumer payment estimates may include some small business payments.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 5

1.1 HIGHLIGHTS

- Over the years, payments have become increasingly card-based. Card use may have replaced check use for certain payments, and the increase in the number of total card payments has far exceeded the decline in the number of check payments from 2009 to 2012.
- The number of credit card payments, after showing a slight decline from 2006 to 2009, returned to growth from 2009 to 2012.
- The number of debit card payments increased more than any other payment type from 2009 to 2012.
- Paper check writing continues to persist as a significant portion of noncash payments, but interbank processing and clearing of these checks are virtually all electronic. As in 2009, almost all checks in 2012 were either cleared by electronic image exchange or converted to ACH payments.
- Increasingly fewer checks enter the banking system as paper at all: in 2012 about one in seven checks was deposited by accountholders as an electronic image rather than paper.
- The estimated annual number of unauthorized transactions (third-party fraud) in 2012 was 32.3 million, with a value of $6.4 billion.
- In 2012, general-purpose cards had substantially higher total unauthorized transactions (third-party fraud) by number and value than ACH and checks. General-purpose card fraud rates by number and value were also substantially higher.
- Among general-purpose cards, single-message (or PIN) debit card transactions (including both purchases and ATM cash withdrawals) in 2012 had the lowest fraud rates by both number and value.
- Among general-purpose card payments in 2012, card-not-present fraud rates were estimated to be approximately 3 times card-present fraud rates. Card-not-present fraud rates by value were not, however, dramatically different from card-present fraud rates.

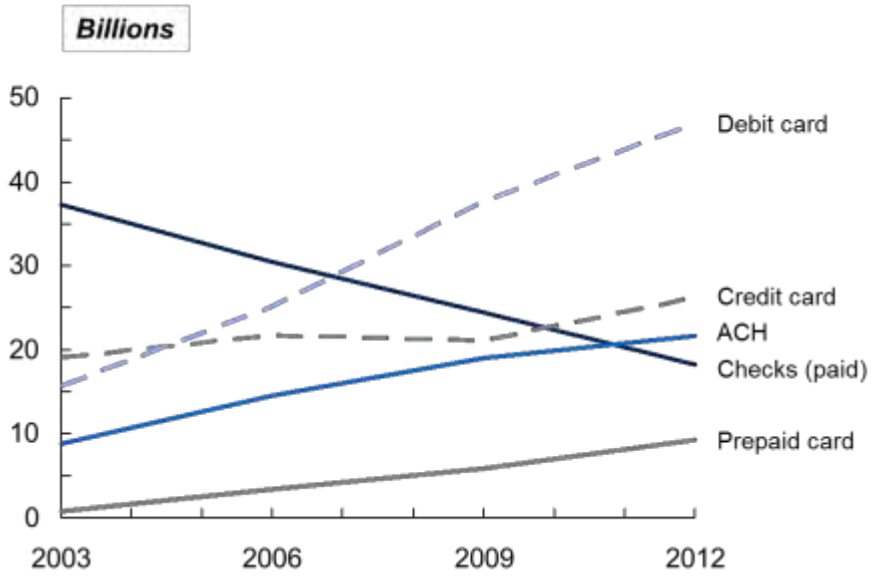
© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 6

1.2 DISCUSSION

The estimated number of noncash payments, excluding wire transfers, was 122.4 billion in 2012, with a value of $174.4 trillion.[2] The number of noncash payments in the United States increased at a compound annual rate (annual rate) of 4.2 percent from 2009—the year examined in the previous study—which was down slightly compared to the annual rate of 4.6 percent over the 10-year period from 2003 to 2012. Trends in noncash payments are influenced by many factors, including technological and financial innovations, changes in consumer and business financial behavior, the business cycle, the composition of economic activity, regulatory developments, and population growth. Many trends observed in previous studies, such as the rise in the use of debit and prepaid cards and the decline in the use of checks, continued to be observed in the current data (Exhibit 1). Other trends, such as the use of credit cards, changed markedly.

Exhibit 1: Trends in noncash payments by number and type of transaction



Debit, credit, and prepaid card trends include general-purpose and private-label payments.

Credit card payments (including both general-purpose and private-label)—which declined slightly from 2006 to 2009—returned to growth from 2009 to 2012. The number of credit

[2]The total value is revised and is substantially larger than the previous estimate because of a restatement of the value of on-us ACH payments. An explanation is provided in the detailed report. In this report, estimates of noncash payments do not include payments made using the large-value funds transfer systems, namely CHIPS and Fedwire or wire transfers on the books of depository institutions. The detailed report contains new information on wire transfers.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 7

card transactions grew at an annual rate of 7.6 percent, rising from 21.0 billion in 2009 to 26.2 billion in 2012. The number of private-label credit card transactions, which led the decline from 2006 to 2009, grew quickly from 2009 to 2012 at a 17.1 percent annual rate. The number of general-purpose credit card transactions, which were relatively flat from 2006 to 2009, increased a total of 4.2 billion or 6.8 percent annually from 2009 to 2012.

The number of debit card payments exceeded the number of credit card payments for the first time around 2004. In 2012, the number of debit card payments had reached 47.0 billion—much higher than the 26.2 billion credit card payments in the same year.

Prepaid cards are a type of debit card, but also a distinct category of noncash payments that are considered separately. Compared with credit, debit, ACH, and check, prepaid card payments (including both general-purpose and private-label) increased at the fastest rate from 2009 to 2012 (15.9 percent annually), reaching a total of 9.2 billion transactions in 2012. The number of prepaid card payments increased 3.3 billion from 2009 to 2012, which is higher growth than reported in previous studies.

The number of ACH transactions grew at an annual rate of 4.4 percent from 2009 to 2012, resulting in 21.7 billion payments in 2012. These estimates reflect an ongoing deceleration in growth in the number of ACH payments but mask some underlying trends. For example, the number of business payments to consumers and consumer online payments using ACH increased much faster than the overall number of ACH payments.[3] During most of the 2000s, growth in ACH payments was driven by conversion of checks to ACH. As check writing continued to decline (discussed below), the number of checks that could be converted declined as well, offsetting some of the gains associated with other ACH activity.

The number of checks paid continued to decline, falling to 18.3 billion in 2012—less than half the number of checks that were paid in 2003. Despite the continued decline in the use of checks, the check clearing process continued to gain efficiencies and has become virtually 100 percent electronic. Most checks continued to be deposited in paper form, but the number of checks deposited as electronic images by non-bank customers increased since 2009. In 2012, among all checks deposited at the bank of first deposit, 3.4 billion (18

[3] ACH payment types are based on the definitions of the standard entry classification (SEC) codes assigned to the payments.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 8

percent) were deposited as electronic images compared with 3.0 billion (13 percent) in 2009. The 2013 Study also collected information on the source of image deposits, finding that in 2012, 94 percent of checks deposited as images were by business depositors compared with 6 percent by consumer depositors.

Differences in the average values across payment types reflect how each payment type is typically used. The average value of check payments has continued to be significantly lower than that of ACH payments and significantly higher than the averages of the various types of card payments (Exhibit 2). Cards are typically used for point-of-sale (POS) transactions largely because of their convenience, while ACH payments tend to be used primarily for bill payment, payroll, and other large-value transactions.

Exhibit 2: Trends in the average values of noncash payments ($)

					CAGR*	
	2003	**2006**	**2009**	**2012**	**2003-12**	**2009-12**
Credit card	89	98	89	94	0.7%	2.1%
Debit card	40	39	37	39	-0.5%	1.1%
Prepaid card	26	23	23	24	-0.7%	1.4%
ACH (network)**	2,762	2,143	1,950	2,202	-2.5%	4.1%
Checks (paid)	1,103	1,363	1,291	1,410	2.8%	3.0%

* CAGR is compound annual growth rate.

** Includes a relatively negligible amount of direct exchange payments which are cleared directly between depository financial institutions without the use of a national network operator.

A substantial portion of checks were, like cards, also being written at the point of sale. At the same time, however, checks were also being used for large-value consumer bill payment and payroll transactions as well as large-value business-to-business (B2B) payments. The average value of checks paid increased from $1,103 in 2003 to $1,410 in 2012, likely driven by a faster replacement of POS checks with cards compared with the replacement of large-value check payments with ACH.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 9

The average value of network ACH payments, on the other hand, declined from $2,762 in 2003 to $2,202 in 2012.[4] Although large-value payments like business-to-business (B2B) payments or cash concentration, mortgage payments, and payroll initially dominated ACH use, the rise over the years in the number of small-value web-based payments and other types of ACH debits, such as the conversion of consumer checks, have lowered the average value of ACH payments.

Meanwhile, the average value of card payments (including credit, debit, and prepaid) decreased from $66 in 2003 to $55 in 2012. Although the growth in the number of card payments was driven by the replacement of both cash and checks, the long-run decline in the average value of card payments was likely primarily because of the replacement of small-value cash payments.

The share of noncash payments made by card increased dramatically, from 60 percent in 2009 to 67 percent in 2012. Card payments only represented a small share of value: 3 percent of the value of all noncash payments in 2012.

From 2009 to 2012, card payments increased by 17.9 billion, while non-card (including ACH and check) payments decreased by 3.5 billion, leading to a net increase in noncash payments of 14.3 billion.

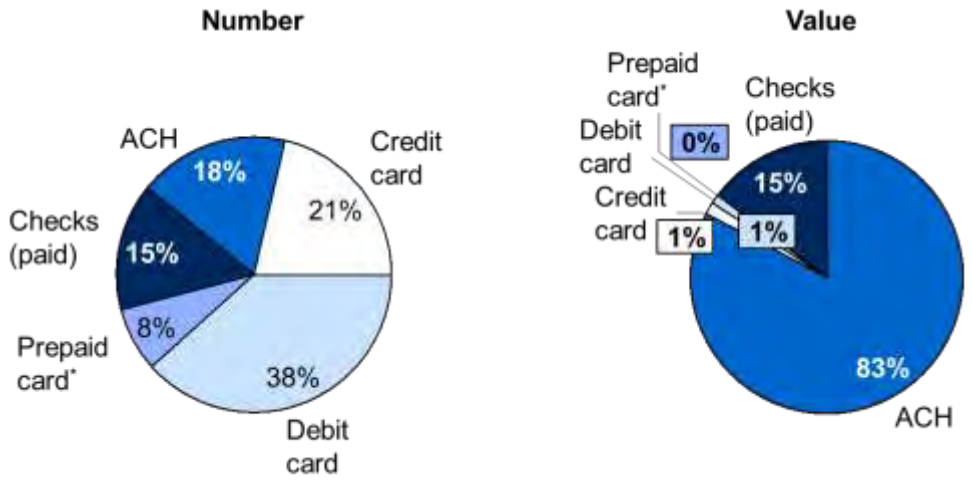
In 2012, card and ACH payments made up 85 percent of all noncash payments by both number and value, with check payments making up the remainder (Exhibit 3). The combined share of card and ACH payments in the overall number of noncash payments increased 8 percentage points by number from 2009 to 2012.

[4] The number and value of on-us ACH are revised. Total value of ACH payments in 2012 cannot be compared with estimates from previous studies because the estimates of on-us ACH value for those years are no longer considered valid. More discussions are available in section 2.3 and in the detailed report.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 10

Exhibit 3: Distribution of noncash payments in 2012



* Prepaid includes Electronic Benefit Transfer (EBT).

The 2013 Study combines information gathered in three related survey efforts. Some estimates are based on data collected in the *2013 Depository and Financial Institutions Payments Survey* (DFIPS), which was sent to a nationally representative, stratified random sample of depository and financial institutions. Other estimates are based on 2012 data collected in the *2013 Networks, Processors, and Issuers Payments Surveys* (NPIPS) through a set of 15 census-style surveys of payment networks, processors, and card issuers. Finally, some estimates are from data collected in the *2013 Check Sample Survey* (CSS), which are based on the information from a random sample of checks processed by a selected number of large commercial banks during 2012. This report summarizes highlights from and presents data from the 2013 Study, combined with results from previous studies. A detailed report, released concurrently with this revised summary report, includes a complete description of the findings and methodologies.

The Federal Reserve System appreciates the efforts of survey respondents who provided the information summarized in this report. This information enables payments system participants to better understand payment trends and informs strategies to foster further improvements in the payments infrastructure.

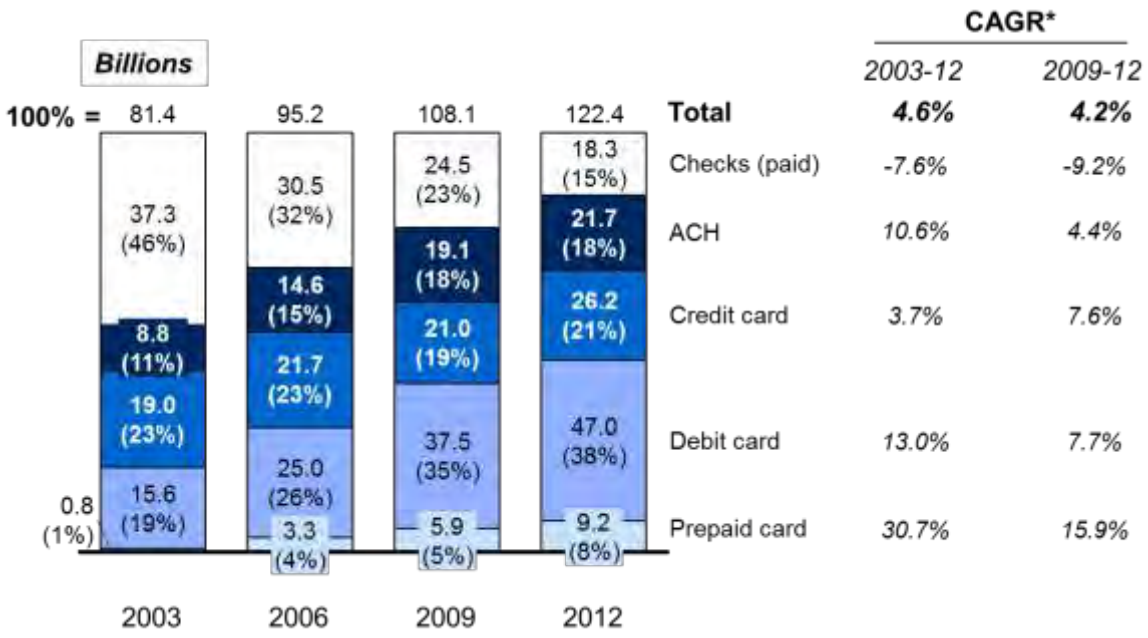
© 2013, Federal Reserve System

2 Summary of Findings

The U.S. payments system has evolved rapidly since 2003, the year the U.S. Congress passed the Check Clearing for the 21st Century Act (Check 21), which facilitated the development of widespread electronic check processing and clearing. Over the past 10 years, paper check payments, which—prior to Check 21—typically required physical processing and transporting, have been replaced by more efficient electronic processes and alternative payment methods.

By 2012, about two-thirds of consumer and business payments were made with payment cards, and the share of card payments by number has been growing. Cards increased their share from 43 percent of all noncash payments in 2003 to 67 percent in 2012, while the use of ACH grew more modestly, increasing from a share of 11 percent in 2003 to 18 percent in 2012 (Exhibit 4). Checks represented nearly half (46 percent) of all noncash payments in 2003, but only 15 percent in 2012.

Exhibit 4: Noncash payment transactions by payment type



Figures may not sum because of rounding.

* CAGR is compound annual growth rate.

IPR2025-01151
Apple EX1036 Page 12

The total number of noncash payments in the United States increased 4.2 percent per year from 2009 to 2012, which was generally consistent with the growth experienced from 2003 to 2012 (4.6 percent annually).

In the discussion above, credit cards included both general-purpose and private-label credit cards, while debit cards included only general-purpose debit cards and prepaid cards included both general-purpose and private-label prepaid cards. For the rest of this report cards are grouped into general-purpose and private-label categories (Exhibit 5). Credit and prepaid card payments are discussed in separate general-purpose and private-label subcategories, while debit card payments are discussed only in a general-purpose subcategory.

Exhibit 5: Number and growth of noncash payments

					CAGR*	
	2003	2006	2009	2012	2003-12	2009-12
Total (billions)	**81.4**	**95.2**	**108.1**	**122.4**	**4.6%**	**4.2%**
General-purpose card	**30.8**	**44.3**	**58.4**	**73.9**	**10.2%**	**8.2%**
Credit card	15.2	19.0	19.5	23.8	5.1%	6.8%
Debit card	15.6	25.0	37.5	47.0	13.0%	7.7%
Prepaid card**	0.0	0.3	1.3	3.1		33.9%
Private-label card	**4.6**	**5.8**	**6.1**	**8.5**	**7.1%**	**11.6%**
Credit card	3.8	2.7	1.5	2.4	-4.8%	17.1%
Prepaid card	0.8	3.0	4.6	6.1	24.9%	9.7%
ACH	**8.8**	**14.6**	**19.1**	**21.7**	**10.6%**	**4.4%**
Checks (paid)	**37.3**	**30.5**	**24.5**	**18.3**	**-7.6%**	**-9.2%**

Figures may not sum because of rounding.

* CAGR is compound annual growth rate.

** The number of prepaid card transactions in 2003 was negligible.

2.1 GENERAL-PURPOSE CARD PAYMENTS

Most general-purpose cards (including credit, debit, and prepaid) are processed through Visa, MasterCard, American Express, Discover, or one of more than a dozen single-message (or PIN) debit card networks. Some card networks process general-purpose

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 13

credit, debit, and prepaid card payments, while others may process only credit or only debit and prepaid card payments.[5]

Credit cards are used to access revolving credit accounts; debit cards access transaction accounts (known as checking accounts, NOW accounts, or share draft accounts); and prepaid cards access funds in special-purpose prepaid accounts designed to support various types of prepaid card programs, some of which have features that resemble a typical transaction account and others of which have features tailored to specific uses. Private-label credit and prepaid cards, by contrast, can only be used at specific retailers.

In 2012, general-purpose cards accounted for more than 60 percent of all noncash payments by number but only 2 percent by value. Debit cards were the most commonly used type of general-purpose cards, accounting for 64 percent of total general-purpose card payments by number, followed by credit cards at 32 percent and prepaid cards at 4 percent (Exhibit 6). Credit cards, on the other hand, were the leading general-purpose card type in 2012 by dollar value, accounting for 53 percent of general-purpose card payments value followed by debit cards with 44 percent and prepaid cards with 3 percent.

General-purpose cards are popular for in-person payments because of their convenience. They are also the dominant means of payment for remote transactions (that is, online, telephone, or fax) because other types of payments are generally slower or less convenient to use. In remote transactions conducted with cards (card-not-present transactions), the cardholder provides information from the card including the card number, expiration date, name of cardholder, and security codes to the merchant, but the card itself is not physically present to be seen or read by the merchant's equipment.

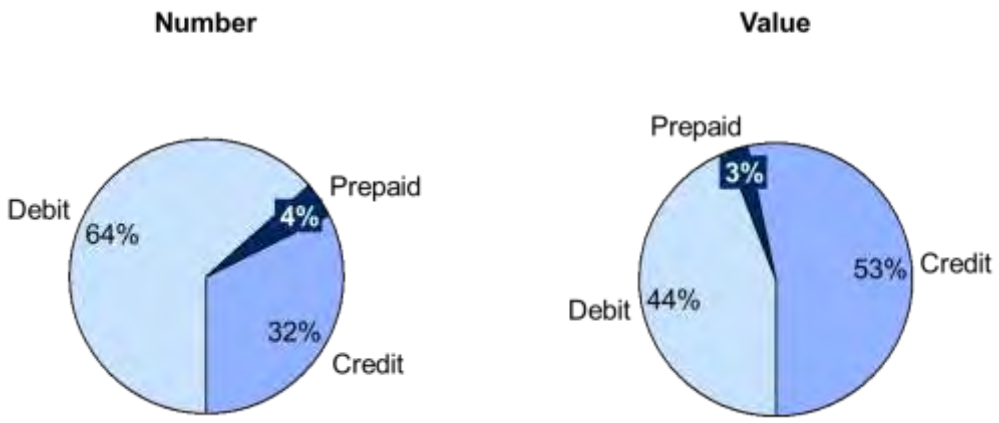
---

[5] Different laws, regulations, and card network policies have varying definitions of debit cards and prepaid cards. The Federal Reserve's Regulation II includes "general-use prepaid cards," which this study refers to as general-purpose prepaid cards, in its definition of debit cards.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 14

Exhibit 6: Distribution of general-purpose card payments in 2012



The total value of general-purpose card-not-present payments (including general-purpose credit, debit and prepaid) rose from $0.9 trillion in 2009 to $1.4 trillion in 2012: an annual growth rate of 16.6 percent. Statistical data released by the Department of Commerce show the value of retail e-commerce growing at roughly 16 percent per year, much faster than traditional "brick and mortar" retail sales in the U.S. economy.[6] The total retail sales classified as e-commerce reached $225 billion in 2012—much lower than the total value of general-purpose card-not-present payments. Although card-not-present payments clearly include some transaction types that are different from the Commerce Department's estimates, such as recurring and non-recurring bill payments arranged through provider websites, the growth rates were similar.

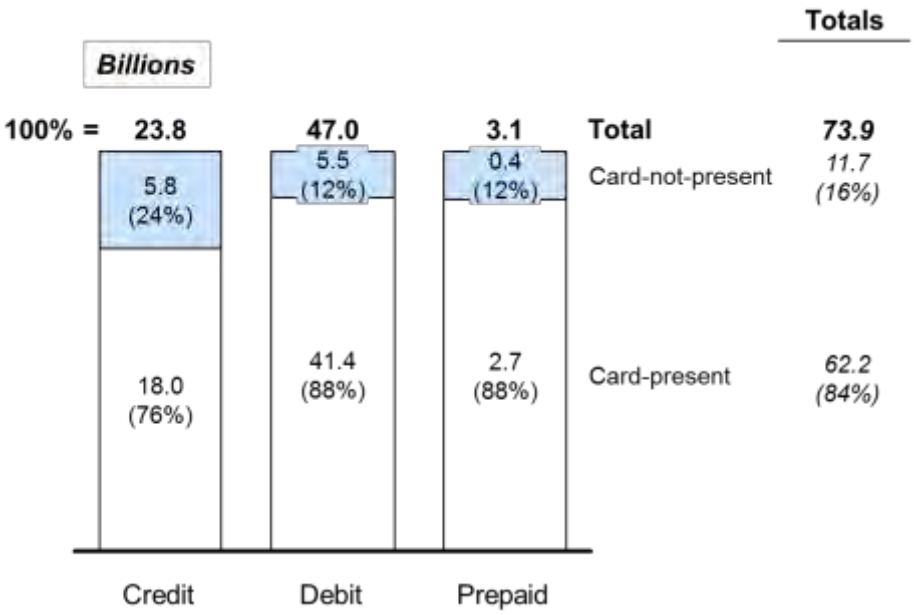
By number, the proportion of card-not-present transactions in total general-purpose card transactions reached 16 percent in 2012 (Exhibit 7).

---

[6] Based on the reported percent change from same quarter a year ago for e-commerce sales from 2012:Q1 through 2012:Q4 in the Latest Quarterly E-Commerce Report, released November 22, 2013 (see the "not adjusted sales time series" data at www.census.gov/retail/).

© 2013, Federal Reserve System

Exhibit 7: Card-present and card-not-present general-purpose card transactions in 2012



Figures may not sum because of rounding.

2.1.1 Credit Card Payments – General-Purpose

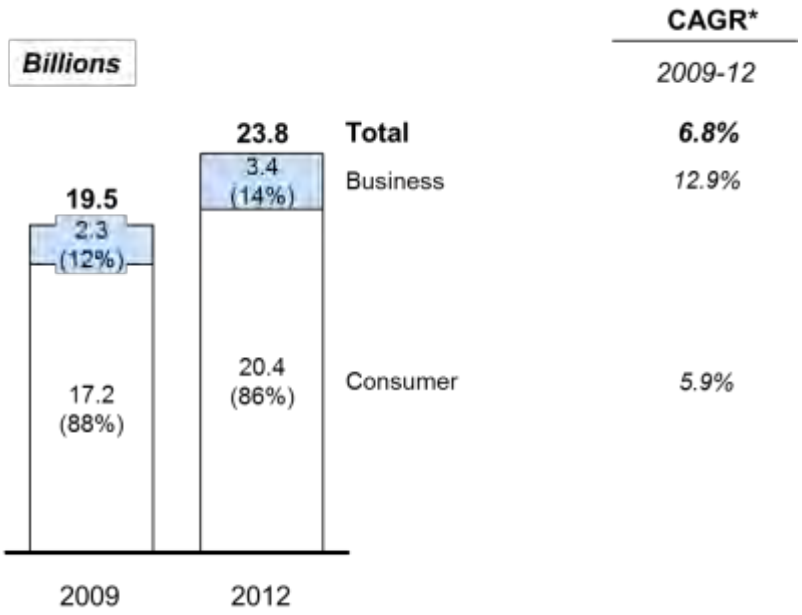
The number of general-purpose credit card transactions increased at an annual rate of 6.8 percent per year from 2009 to 2012 compared with 1.0 percent annually from 2006 to 2009 (Exhibit 8). The value of these payments increased 9.3 percent per year from 2009 to 2012. By number, business general-purpose credit card payments increased from 2.3 billion in 2009 to 3.4 billion in 2012, an increase of more than one billion payments. Businesses' use of general-purpose credit cards increased at a higher rate than consumers' use from 2009 to 2012 (12.9 percent compared with 5.9 percent per year, respectively). The share of general-purpose credit card payments that were initiated by business cardholders increased from 12 percent in 2009 to 14 percent in 2012.

The average value of general-purpose credit card transactions increased from $87 in 2009 to $93 in 2012. The average value per business transaction in 2012 was $196 compared with $76 for consumer transactions.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 16

Exhibit 8: Business and consumer general-purpose credit card payments



* CAGR is compound annual growth rate.

By value, more than two-thirds of all general-purpose card-not-present expenditures in 2012 were from credit cards. Reflecting the ongoing shift of retail sales to the Internet, the number of general-purpose credit card-not-present transactions increased at more than 3 times the annual rate of card-present transactions. General-purpose credit card-not-present transactions grew at 15.2 percent per year from 2009 to 2012 and accounted for almost one-quarter of all general-purpose credit card transactions in 2012 (Exhibit 9). Card-present transactions grew by 4.6 percent per year over the same period. The share of card-not-present payments in total general-purpose credit card- payments by number increased from 19 percent in 2009 to 24 percent in 2012.

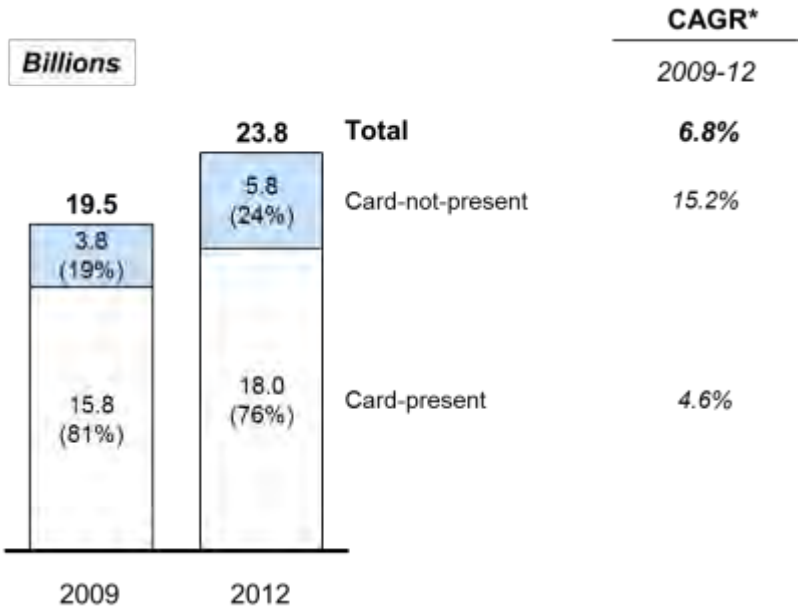
The 2013 Study specifically measured activity using microchip-enabled cards for which the chip was used to perform a card-present transaction.[7] There were about 13.4 million chip-initiated general-purpose credit card transactions, or 74 out of every 100,000 card-present general-purpose credit card transactions. In 2012, the average value for general-purpose

[7] Chip transactions are typically supported by near-field communication (NFC), allowing a quick touch or wave of the card instead of a swipe of the magnetic stripe.

IPR2025-01151
Apple EX1036 Page 17

card-present credit card chip transactions was $47 compared with $68 for non-chip transactions.

Exhibit 9: Card-present and card-not-present general-purpose credit card transactions



Figures may not sum because of rounding.

* CAGR is compound annual growth rate.

2.1.2 Debit Card Payments – General-Purpose

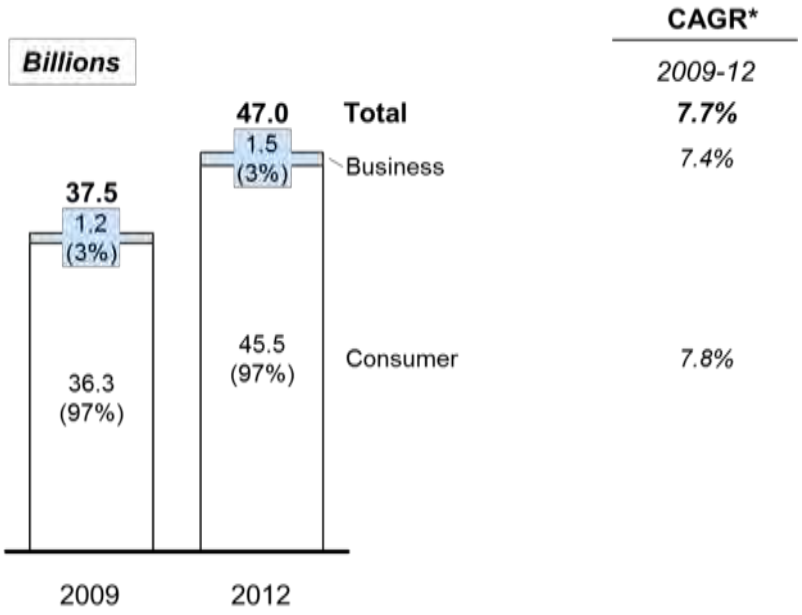
General-purpose debit cards, as defined in this report, are associated with multipurpose transaction accounts (variously called transaction, checking, share draft, or NOW accounts) and exclude prepaid card payments, which are discussed separately in the next section. General-purpose debit card payments grew by about 9.4 billion, or 7.7 percent per year, from 2009 to 2012—the largest growth among all types of payment. The estimated number of single-message (PIN) debit card transactions accounted for 36 percent of all general-purpose debit card transactions, similar to estimates in previous studies.

The number of business debit card transactions did not grow not as quickly as consumer transactions from 2009 to 2012 (7.4 percent compared with 7.8 percent per year,

IPR2025-01151
Apple EX1036 Page 18

respectively). The share of business in total general-purpose debit card payments by number remained flat at 3.2 percent in 2009 and in 2012 (Exhibit 10).

Exhibit 10: Business and consumer general-purpose debit card payments



* CAGR is compound annual growth rate.

From 2009 to 2012, the number of general-purpose card-present debit card payments increased at a faster rate than card-not-present transactions: 8.6 percent per year compared with 2.4 percent, respectively (Exhibit 11). As a result, the share of general-purpose debit card-not-present payments by number decreased from 14 percent in 2009 to 12 percent in 2012.

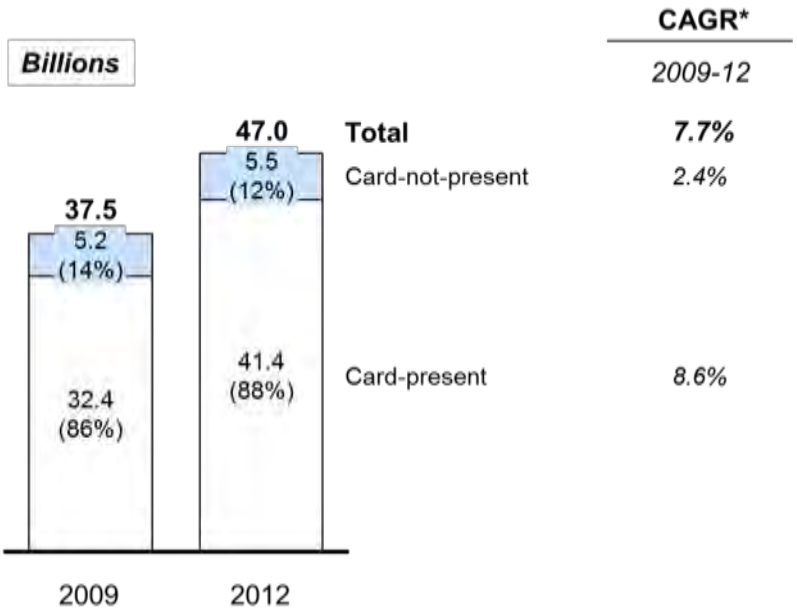
There were 27.0 million chip-based debit card payments in 2012. Slightly less than general-purpose credit cards, 58 out of every 100,000 general-purpose debit card-present debit card transactions were chip based. At $14, the average value of chip-based debit card payments in 2012 was less than half that of non-chip debit card payments ($34).

In 2012, the number of debit card cash-back transactions totaled 1.4 billion with an average value of $33, compared with 5.8 billion ATM cash withdrawals with an average value of $118. The total value of cash back from debit card transactions was $46.4 billion, while the total value of ATM cash withdrawals was $687.0 billion.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 19

Exhibit 11: Card-present and card-not-present general-purpose debit card transactions



Figures may not sum because of rounding.

* CAGR is compound annual growth rate.

2.1.3 Prepaid Card Payments – General-Purpose

General-purpose prepaid cards are processed by the same networks as general-purpose debit cards but are generally not linked to the types of multipurpose transaction accounts discussed above in the general-purpose debit card section. Accounts associated with general-purpose prepaid cards typically have maximum balance limits and limited deposit and withdrawal options compared to multipurpose transaction accounts with debit cards. Prepaid cards are used both for special purposes by individuals who also have a traditional debit card or by individuals who want the convenience of a debit card but are unwilling or unable to maintain a traditional transaction account at a depository institution. Many prepaid cards are issued for fixed amounts as rebate or gift cards, while others are issued as payroll cards by employers or purchased by the user and may be reloaded with value multiple times.

General-purpose prepaid card payments continued to be the fastest growing noncash payment type, increasing at a 33.9 percent annual rate by number from 2009 to 2012.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 20

There were 3.1 billion general-purpose prepaid card transactions, 1.8 billion more than in 2009.

The share of general-purpose prepaid card payments that were card-not-present transactions was 12 percent in 2012, the same as for debit card transactions. The 2013 Study did not attempt to classify prepaid card payments by business and consumer accountholders.

In 2012, the number of general-purpose prepaid cash-back transactions totaled 51 million with an average value of $19. The total value of cash back from prepaid card transactions was $977 million.

There were approximately 46,000 chip-based general-purpose prepaid transactions in 2012.

2.2 PRIVATE-LABEL CARD PAYMENTS

With more than a century of history, private-label credit cards were the first type of payment card. But they are no longer the predominant card type, in part because of the advent of the general-purpose credit card. Private-label credit card transactions are those that involve a card issued by and used to make purchases at the retailer. Private-label cards cannot be used on a general-purpose card network.[8] In 2012, private-label credit cards accounted for 28 percent of total private-label card payments by number and 69 percent of total value (Exhibit 12).

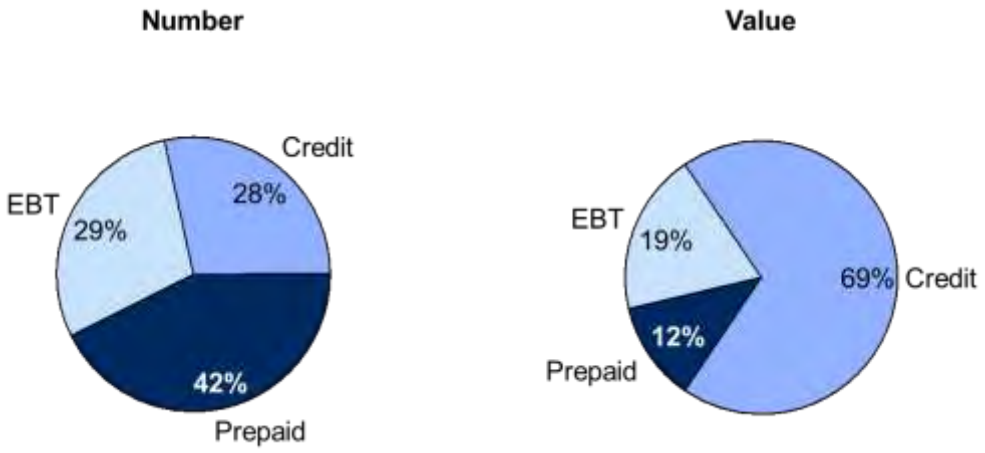
As with credit cards, private-label prepaid cards, a relatively recent innovation, were established before general-purpose prepaid cards and continued to be the most widely used prepaid card type. EBT cards, a type of private-label prepaid card, are issued to facilitate the distribution of government benefits and usually involve restrictions that limit purchase categories. These cards accounted for 29 percent of the number of all private-label card payments and 19 percent of the value in 2012. About 42 percent of private-label card payments were made with non-EBT prepaid cards in 2012. Although used the most

[8] Some major retailers co-brand cards in partnership with a general-purpose card issuer. Co-branded card transactions are included in general-purpose totals.

IPR2025-01151
Apple EX1036 Page 21

by number, non-EBT private-label prepaid cards were the smallest private-label card by value (12 percent). Many private-label prepaid cards were purchased by the user as a replacement for paying cash for smaller-value frequent purchases. They were also often purchased as gift cards or issued as store credit for returned items.

Exhibit 12: Distribution of private-label card payments in 2012



Figures may not sum because of rounding.

* Private-label prepaid payments do not include transactions related to public transportation and auto tolls.

2.2.1 Credit Card Payments – Private-Label

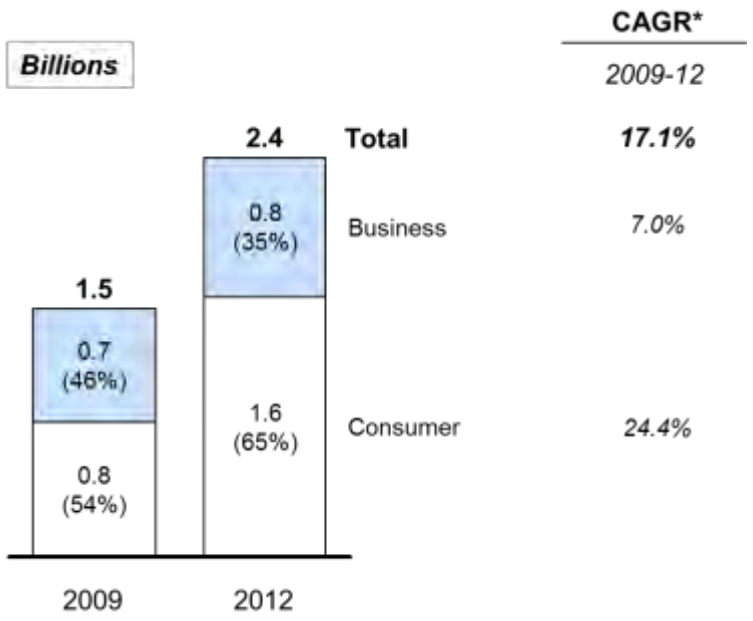
The use of private-label credit card rebounded relative to the decline in number of transactions observed from 2006 to 2009 of 18.3 percent per year. From 2009 to 2012, private-label credit card payments increased 0.9 billion in number, or approximately 17.1 percent per year. Value increased 14.6 percent per year during the same period.

From 2009 to 2012, the number of consumer private-label credit card payments increased more rapidly than business transactions, at 24.4 percent compared with 7.0 percent per year, respectively (Exhibit 13). Businesses had a much lower share of private-label credit card payments compared with consumers. Even so, businesses still had a much larger share of private-label credit card payments compared with businesses' share of general-purpose credit card and debit card payments in 2012. A leading example of a business use for private-label credit cards has been for fleet fuel purchases by vehicle operators.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 22

Exhibit 13: Business and consumer private-label credit card payments



* CAGR is compound annual growth rate.

2.2.2 Prepaid Card Payments – Private-Label

By number, private-label prepaid card payments, including EBT, increased from 4.6 billion transactions in 2009 to 6.1 billion in 2012, a 9.7 percent increase per year. This represented a deceleration in growth compared with an average growth of almost 25 percent per year from 2003 to 2012. Of these private-label prepaid card payments in 2009 and 2012, EBT accounted for 2.0 billion and 2.5 billion, respectively. Payments with private-label prepaid cards, which were dominated by payments with store gift cards, continued to grow at roughly half a billion transactions per year.

Private-label prepaid transit card payments and far-field RFID toll collections, collectively called private-label prepaid transportation payments in this study, are processed over specialized private-label payment systems and were not included in the total private-label prepaid payments discussed above. Private-label transit payments have become a significant replacement for cash transit payments over the last decade. In 2009 and 2012, private-label transit payments exceeded the combined payments for general-purpose and private-label prepaid cards discussed above. By 2012, the number of private-label transit

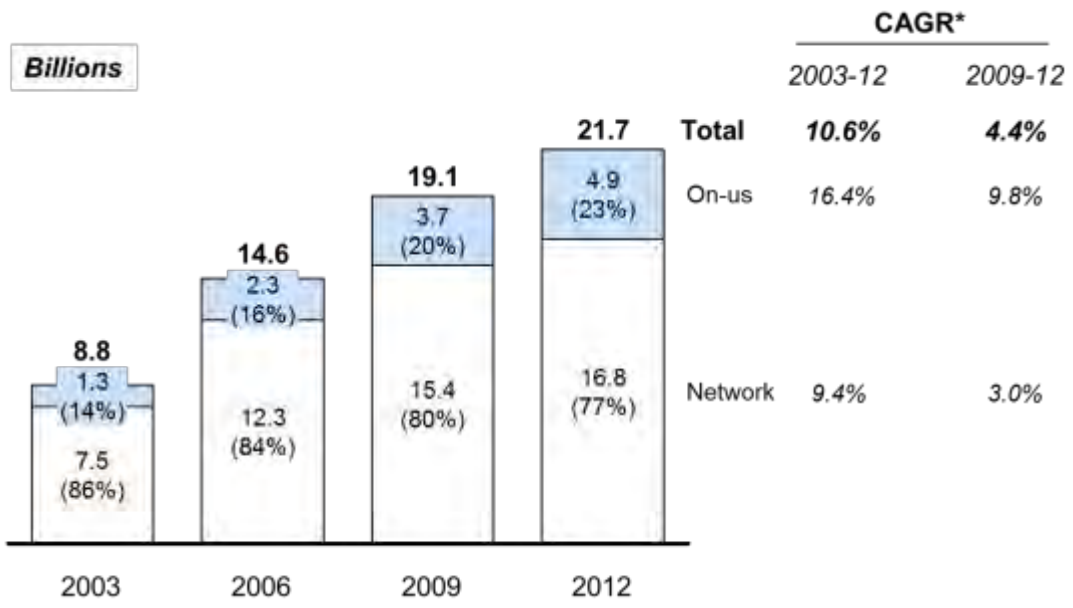
© 2013, Federal Reserve System

payments had totaled at least 9.9 billion. The average values of these payments were less than $2 in both years.

2.3 ACH PAYMENTS

From 2009 to 2012, the number of ACH payments grew at an annual rate of 4.4 percent, slower than the long-term growth of 10.6 percent per year from 2003 to 2012 (Exhibit 14). The share of ACH payments that were "on-us," meaning the originating depository financial institution (ODFI) was also the receiving depository financial institution (RDFI), increased from 20 percent by number in 2009 to 23 percent in 2012.[9] A new method of estimating on-us ACH payments that accounts for offset entries, which mainly affects the value of ACH, is presented in the detailed report.

Exhibit 14: ACH payments by clearing method



Figures may not sum because of rounding.

* CAGR is compound annual growth rate.

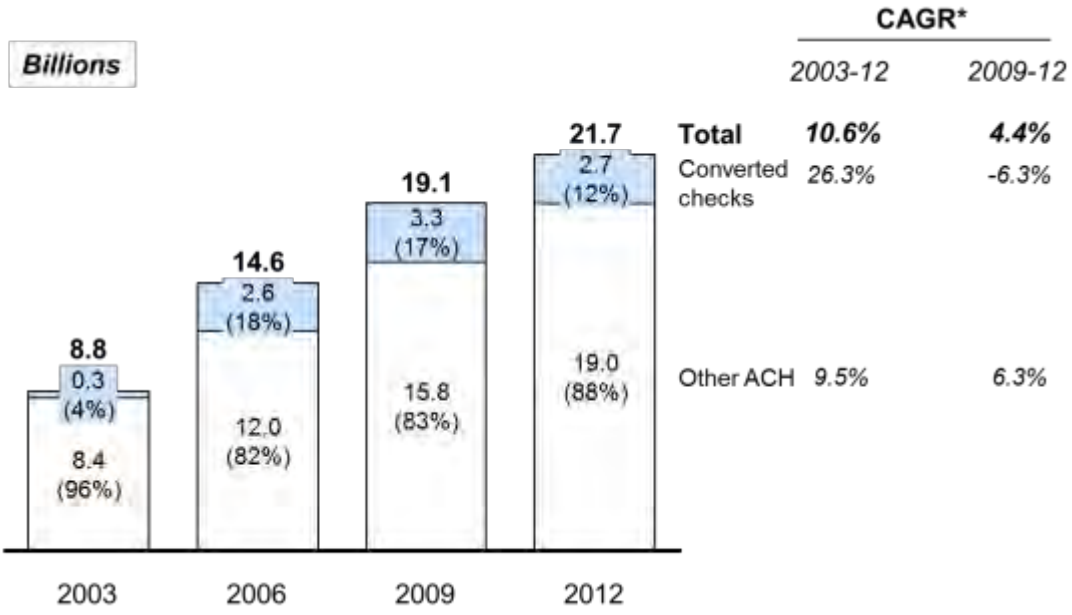
[9] ODFI and RDFI are terms defined by NACHA—The Electronic Payments Association (www.nacha.org). Direct exchange ACH payments—those cleared directly between depository financial institutions without the use of a national network operator—were found to be negligible and are included in estimates of network volumes. For more information on the national ACH network operators—namely, the Federal Reserve Banks and Electronic Payments Network (EPN)—see www.federalreserve.gov/paymentsystems/fedach_about.htm.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 24

The number of ACH payments originated as checks (ACH check conversion) decreased from 3.3 billion ACH entries in 2009 to 2.7 billion in 2012.[10] These payments included checks converted at a so-called "lockbox" on behalf of large billers and checks converted by depository institutions.[11] These payments were included in the estimates of checks written, but not in the estimates of checks paid because in check conversion, the check becomes a "source document" for the ACH payment and is no longer considered a check payment. Converted-check ACH's share of total ACH payments decreased from 17 percent by number in 2009 to 12 percent in 2012 (Exhibit 15).

Exhibit 15: ACH payments by number and type



Figures may not sum because of rounding.

* CAGR is compound annual growth rate.

[10] By agreement, consumer checks can be converted into electronic payments by merchants at the POS or by billers that receive bill payments by check. Some checks counted as written may have been used only as source documents to initiate electronic payments.

[11] Most checks converted into ACH payments are done so by large billers using large-scale operations known as lockboxes that remove and scan information from bills and checks included in business reply mail sent to a post office box. The scanned information is delivered to the biller's depository institution in an electronic file containing information used to process multiple ACH payments. Consumers whose checks are converted in this way must first be notified by the biller.

© 2013, Federal Reserve System

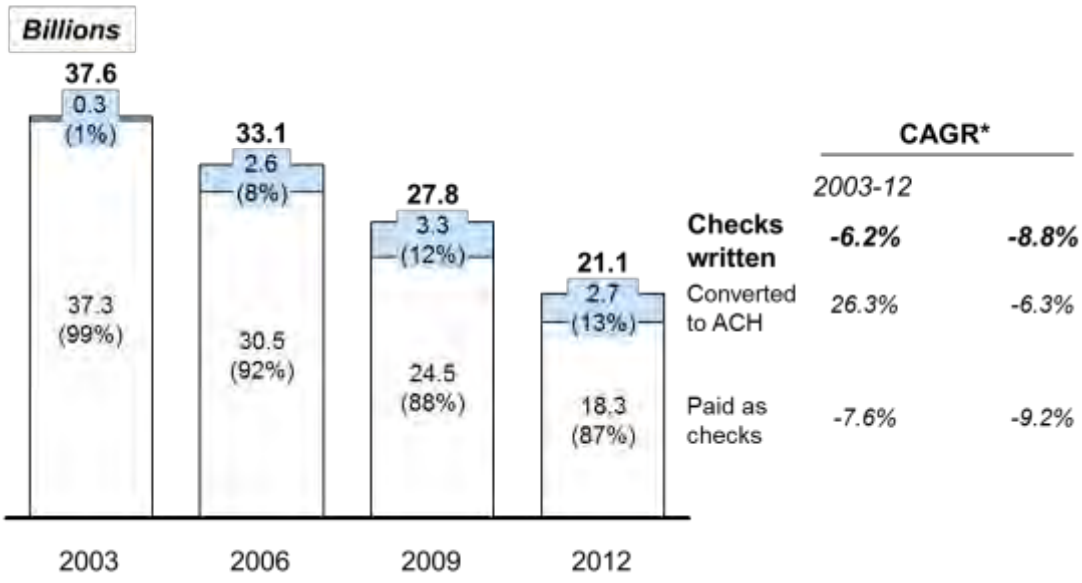
IPR2025-01151
Apple EX1036 Page 25

2.4 CHECK PAYMENTS

An estimated 18.3 billion checks were paid in 2012, with a value of $25.9 trillion.[12] There was a 9.2 percent annual decline in the number of checks paid from 2009 to 2012, while the value of checks paid declined 6.5 percent per year during the same period (Exhibit 16). As a result, the average value per check paid increased from $1,291 in 2009 to $1,410 in 2012.

As discussed above, some consumer checks were converted to ACH transactions by billers and merchants. Therefore, the estimated number of checks paid differed from the estimated number of checks written. The share of checks written that were converted to ACH increased slightly from 12 percent by number in 2009 to 13 percent in 2012.

Exhibit 16: Number of checks written, paid, or converted to ACH



Figures may not sum because of rounding.

* CAGR is compound annual growth rate.

[12] Checks paid include those presented in paper or electronic form, but exclude checks converted to other forms of payment, such as ACH.

IPR2025-01151
Apple EX1036 Page 26

2.4.1 Checks Written by Counterparty and Purpose

The *2013 Check Sample Survey* (CSS) estimated the proportion of checks in various counterparty and purpose categories from a random sample of checks processed by a small number of very large commercial banks. Because many of the sampled checks were interbank checks, they could also have been processed by any other depository institution in the United States either as the paying bank or the collecting bank. The estimated total number of checks written (from the DFIPS) was allocated to each category under the assumption that the estimated proportions (from the CSS) represented the true proportions among checks processed by all depository institutions in the United States.

From 2009 to 2012, the number of business-to-consumer (B2C) checks written experienced the steepest decline, at 15.2 percent per year (Exhibit 17). By number, the B2C checks accounted for 15 percent of all checks written in 2012 compared with 19 percent in 2009.

In 2012, consumer-to-consumer (C2C) checks represented 10 percent of all checks written: the same percentage as in 2009. The decline in the number of consumer-to-business (C2B) checks written slowed to rate of 9.6 percent per year from 2009 to 2012, compared with 10.0 percent per year from 2006 to 2012.

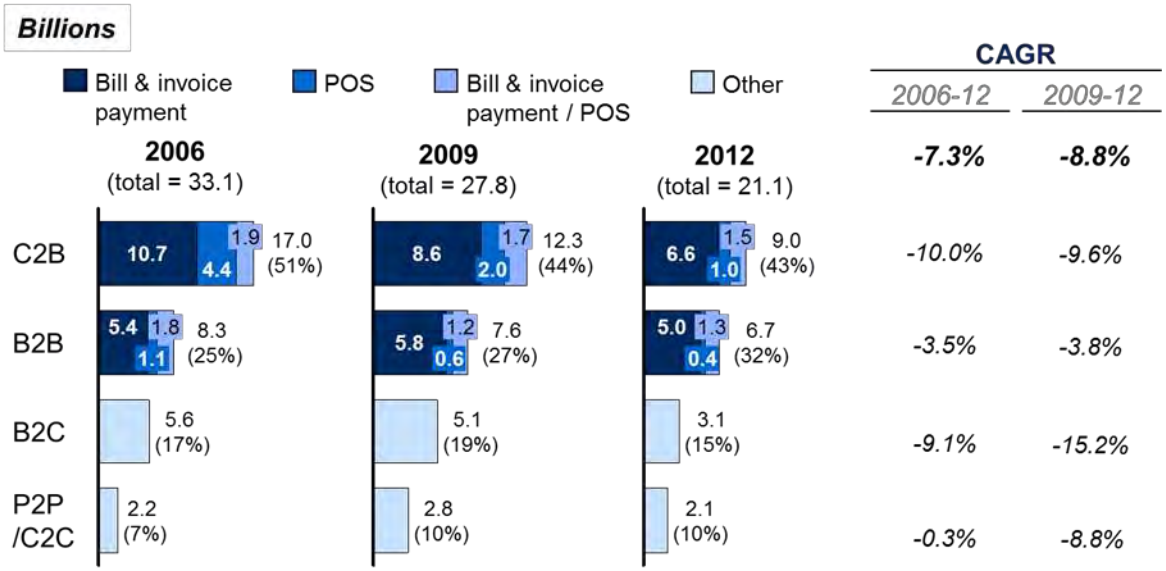
The numbers for all purpose categories of C2B checks experienced declines from 2006 to 2012, including checks written for bill and invoice payment, POS transactions, and those that could not be categorized (that is, Bill & invoice payment, POS). The decline in C2B check writing reflected, among other things, the replacement of consumer checks by other payment types, such as online bill payments through the ACH or card-based POS purchases.

From 2009 to 2012, the rate of decline for the number of business-to-business (B2B) checks accelerated to 3.8 percent per year compared with a decline of 3.5 percent per year from 2006 to 2012.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 27

Exhibit 17: Number of checks written by counterparty



Figures may not sum because of rounding.

* CAGR is compound annual growth rate.

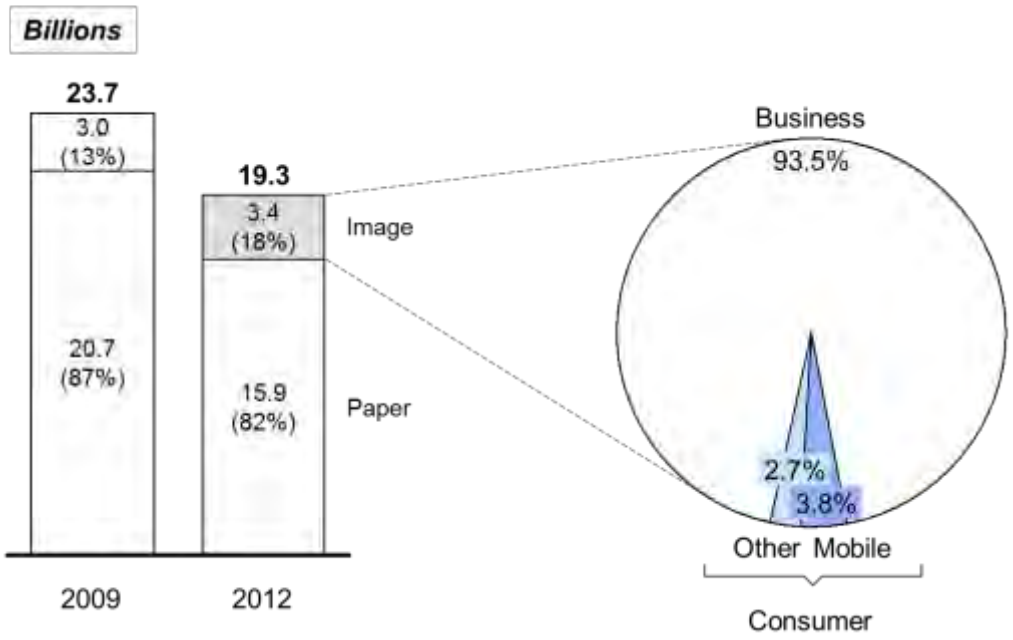
2.4.2 Checks Deposited by Format

The estimated number of checks deposited at the bank of first deposit (less correspondent deposits) in 2012 was 19.3 billion, a decline from 23.7 billion in 2009 (Exhibit 18). The number of checks deposited exceeded the number of checks paid by 1.0 billion in 2012. This estimate reflected checks deposited at the "bank of first deposit" and excluded checks deposited with an intermediary collecting bank. There are various reasons the estimated number of checks deposited did not equal the estimated number of checks paid. Checks deposited included checks converted to ACH, checks deposited in the United States but drawn on a foreign institution, and checks returned unpaid. Checks paid included some checks deposited abroad but drawn on U.S. accounts.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 28

Exhibit 18: Checks deposited by format and type of accountholder



Figures may not sum because of rounding.

Despite the overall decline in checks, the number of checks deposited as images at the bank of first deposit increased from 3.0 billion checks in 2009 to 3.4 billion checks in 2012—an increase of 4.0 percent per year. By number, image deposits represented 18 percent of total checks deposited in 2012.

Of checks deposited at the bank of first deposit as images, 94 percent were deposited by businesses and 6 percent were deposited by consumers. Over half (58 percent) of checks deposited as images by consumers were deposited using a mobile device (or 0.7 percent of total checks deposited), and the rest were deposited using some other method, such as via a personal computer with a scanner attached.

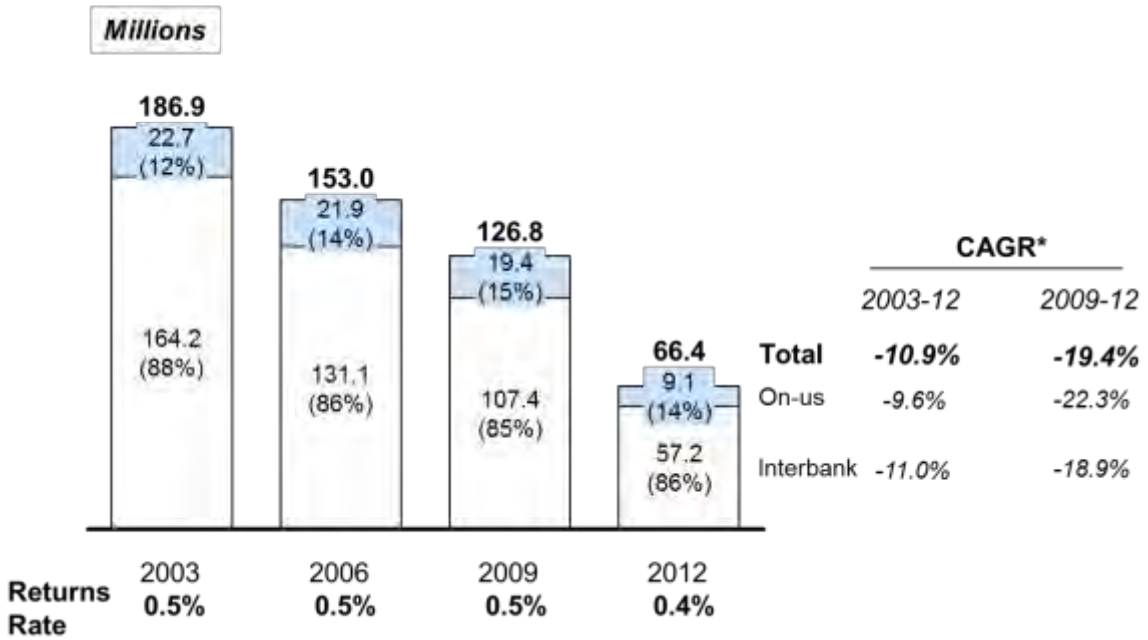
2.4.3 Checks Returned Unpaid

From 2009 to 2012, the number of checks returned unpaid declined at an annual rate of 19.4 percent (Exhibit 19). This rate of decline was more than double that of the number of checks paid, which declined at an annual rate of 9.2 percent during the same period. As a result, the annual rate at which checks were returned unpaid decreased from 0.5 percent in 2009 to 0.4 percent in 2012. This amounted to 5 out of every 1,000 checks being

IPR2025-01151
Apple EX1036 Page 29

returned unpaid in 2009, and 4 out of every 1,000 checks being returned unpaid in 2012. The average value of checks returned unpaid increased from $1,001 in 2009 to $1,252 in 2012.

Exhibit 19: Checks returned unpaid by number and type



Figures may not sum because of rounding.

* CAGR is compound annual growth rate.

2.5 ALTERNATIVE PAYMENT INITIATION METHODS PROVIDED BY DEPOSITORY INSTITUTIONS

Consumer bill payments were the single largest use of checks in the United States, but the estimated number of these checks declined approximately 2 billion from 2009 to 2012 (see Exhibit 17). The decline reflected consumers' replacement of check writing with alternative bill payment methods. One such alternative was direct payment to the biller with a number of options, such as ACH or general-purpose cards.[13] Another alternative, typically supported by ACH, was online bill payment offered by an accountholder's depository institution. There were an annualized 2.5 billion bill-payment transactions initiated by

[13] While these alternative methods are believed to have been significant, volumes are unknown.

IPR2025-01151
Apple EX1036 Page 30

accountholders through online banking websites or mobile bill-payment applications in 2012. The vast majority of these bill payments (93 percent by number) were made through the online banking website of the accountholders' depository institution. (An unknown number of these bill payments could have been initiated using a web browser on a mobile device.) The remaining 7 percent, or 169.3 million bill-payment transactions, were initiated through a mobile application, or "app," provided by an accountholder's depository institution and designed to run on a mobile telephone or tablet computer. These transactions also included those initiated via an SMS/text message.

Accountholders used person-to-person applications offered by depository institutions as an alternative to check writing. By number, there were an annualized 138.0 million electronic person-to-person transactions being initiated through depository institutions.[14] Approximately 32 percent of these transactions were initiated through a mobile application provided to the accountholders by a depository institution or via an SMS/text message, and the remaining 68 percent were initiated through a depository institution's website.

The detailed report is expected to include more results on the use of mobile and other emerging payments.

2.6 UNAUTHORIZED TRANSACTIONS (THIRD-PARTY FRAUD)

An unauthorized transaction (third-party fraud) is a transaction made or attempted by an individual who is not authorized by the accountholder or cardholder to use a payment instrument (including ACH, check, credit card, or debit/ATM card) to purchase goods and services, initiate funds transfers, or withdraw cash from an ATM. In the DFIPS survey, depository institutions were asked to report the number and value of unauthorized transactions that were identified as third-party fraud regardless of whether or not the accountholder, the payee, or the depository institution itself incurred a loss or whether any loss was recovered at a later time.

Data related to unauthorized transactions using general-purpose debit and prepaid cards were collected on a combined basis and will be referred to collectively as general-purpose

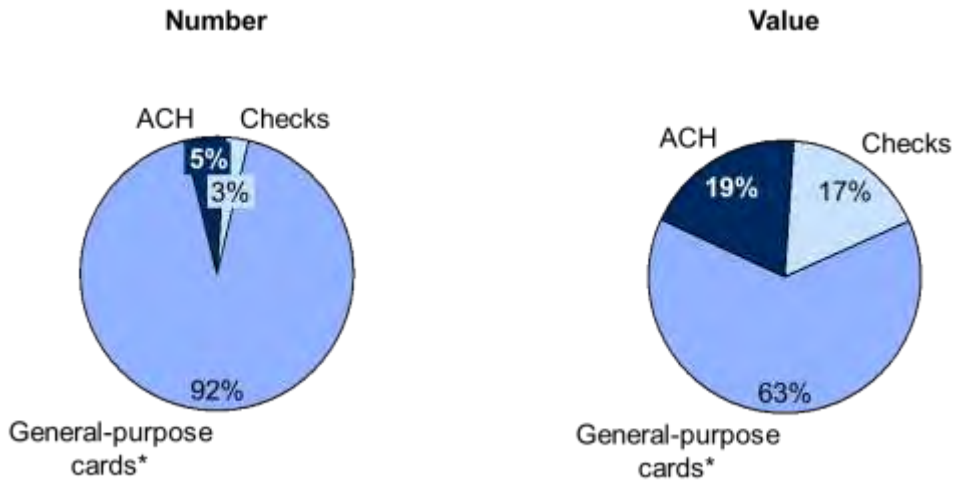
[14] Person-to-person transfers (P2P) excluded transactions between consumers using a depository institution's online bill payment platform.

IPR2025-01151
Apple EX1036 Page 31

debit card transactions in this section. (Unauthorized private-label card transactions were not collected.) Unauthorized credit and signature debit card transactions were reported in separate card-present and card-not-present subcategories. Unauthorized PIN debit card transactions were reported in separate purchase and ATM cash withdrawal categories. Unauthorized check payments and unauthorized ACH payments (credits and debits) were also reported separately.

In 2012, the annual number of unauthorized transactions (third-party fraud) was 32.3 million, with a value of $6.4 billion. (See table on page 43, section 3.4.3.) Among the categories measured, 92 percent of the number and 63 percent of the value of total unauthorized transactions were made using general-purpose cards (Exhibit 20). By comparison, only 5 percent of the number and 19 percent of the value of total unauthorized transactions were made using ACH. Checks had the lowest portion of unauthorized transactions by number (3 percent) and by value (17 percent).

Exhibit 20: Distribution of unauthorized transactions (third-party fraud) in 2012



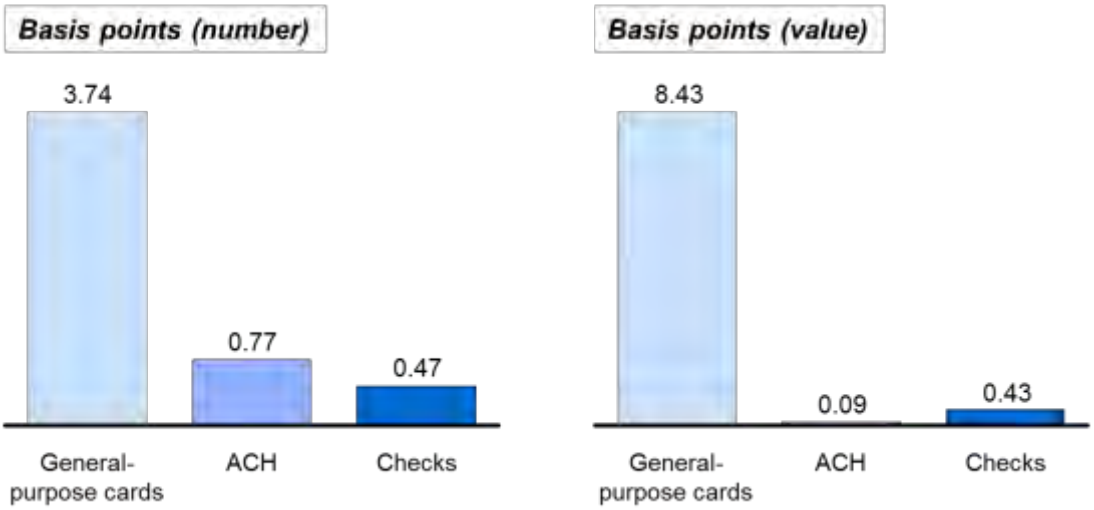
Figures may not sum because of rounding.

* General-purpose cards include credit, debit, and prepaid purchases as well as ATM withdrawals.

In 2012, general-purpose card payments had by far the highest third-party fraud rates compared with ACH and check payments (Exhibit 21).

Exhibit 21: Rate of third-party fraud in 2012

IPR2025-01151
Apple EX1036 Page 32



Basis points are the number of unauthorized transactions per 10,000 transactions or the value of unauthorized transactions per $10,000 spent. One hundred basis points equal 1 percent.

By number, the fraud rate for general-purpose cards was 3.74 basis points (3.74 unauthorized transactions per 10,000 transactions) and by value the fraud rate was 8.43 basis points ($8.43 per $10,000 spent). By comparison, ACH had a much lower fraud rate by number (0.77 basis point) and the lowest fraud rate by value (0.09 basis point). Checks had the lowest fraud rate by number (0.47 basis point) and a fraud rate by value of 0.43 basis point, which was higher than ACH but still much lower than general-purpose cards.

The substantial differences in third-party fraud rates between cards and ACH or check payments may seem surprising. The risk controls that some businesses employed, such as debit blocking and positive pay, may have helped prevent fraudulent ACH and check payments. Furthermore, many ACH and check payments involved regular payments, such as mortgage, insurance, utility, and payroll payments, where fraud risk was minimal.

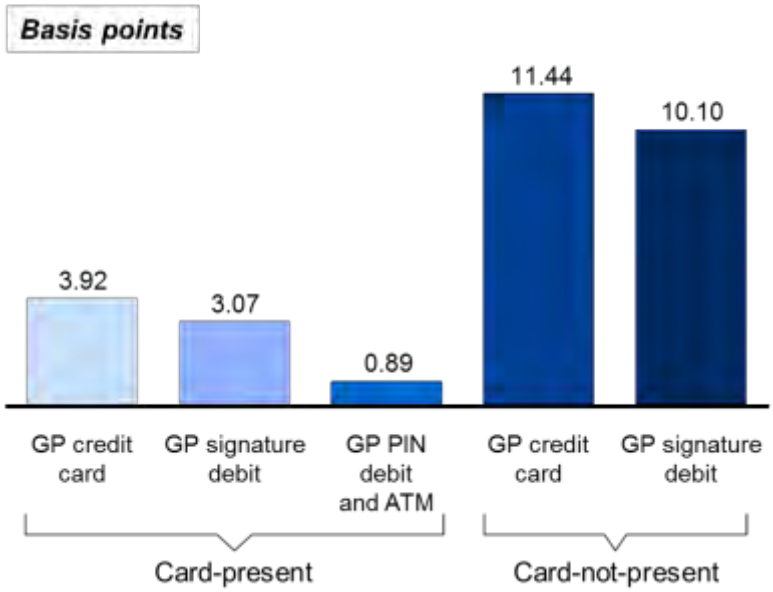
For the purposes of fraud analysis for 2012, we assume that all general-purpose single-message (or PIN) debit card purchase transactions and ATM withdrawals were card-present transactions.[15] Considered independently from ATM cash withdrawals, single-message (or PIN) debit card purchase transactions, with a fraud rate by number of 0.47 basis point, had a rate as low as checks, a rate lower than for ACH, and a rate far lower than any other category of card payment. By value, however, the rate was 1.70 basis

[15] Some emerging payment methods allow the use of PIN authentication in a card-no-present transaction. Such payments were a very small fraction of total PIN transactions and will be discussed in the detailed report.

IPR2025-01151
Apple EX1036 Page 33

points—considerably higher than checks and ACH. By number and value, the fraud rates for general-purpose single-message (or PIN) debit transactions (including ATM withdrawals) were still lower than other types of card payments (Exhibit 22 and Exhibit 23).

Exhibit 22: Rate of unauthorized general-purpose card transactions (number) in 2012

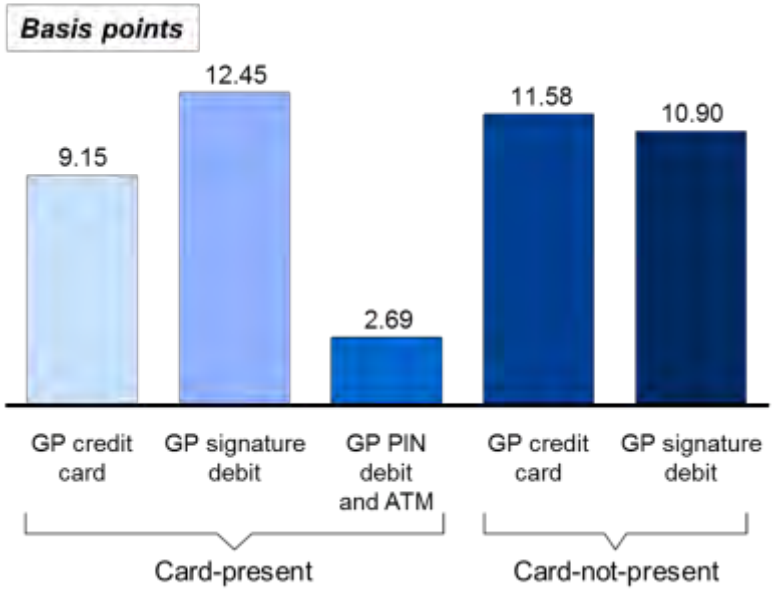


GP denotes general-purpose.

Basis points are the number of unauthorized transactions per 10,000 transactions or the value of unauthorized transactions per $10,000 spent. One hundred basis points equal 1 percent.

IPR2025-01151
Apple EX1036 Page 34

Exhibit 23: Rate of unauthorized general-purpose card transactions (value) in 2012



GP denotes general-purpose.

Basis points are the number of unauthorized transactions per 10,000 transactions or the value of unauthorized transactions per $10,000 spent. One hundred basis points equal 1 percent.

Card-not-present third-party fraud rates for debit and general-purpose credit cards were estimated to have been approximately three times as likely to be unauthorized as their card-present counterparts: for credit cards, the estimated card-not-present fraud rate by number was 11.44 basis points compared with 3.92 basis points for card-present; for debit cards, the estimated card-not-present fraud rate by number was 10.10 basis points compared with 3.07 basis points for card-present. By value, however, with the exception of combined single-message (or PIN) debit and ATM transactions, the differences between card-present and card-not-present fraud rates were not as dramatically different: for credit cards, the estimated card-not-present fraud rate by value was 11.58 basis points compared with 9.15 basis points for card-present; for debit cards, the estimated card-not-present fraud rate by value was 11.58 basis points, actually smaller when compared with 12.45 basis points for card-present. As a result, card-not-present third-party fraud was characterized by relatively frequent but relatively smaller unauthorized transactions, while unauthorized card-present transactions were characterized by generally larger but less frequent unauthorized card-present transactions.

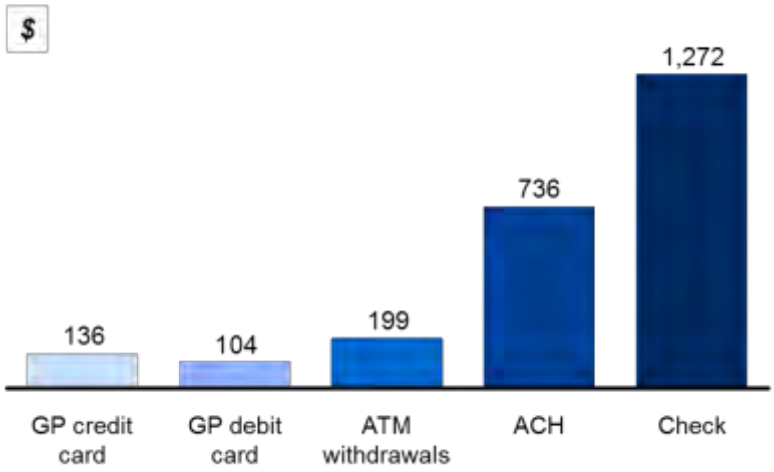
© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 35

In contrast, the average values of unauthorized ACH and check payments were lower than the average values of all ACH and check payments, respectively. In particular, the average value of unauthorized ACH transactions ($736) was approximately one-third the average value of total network ACH payments ($2,202).

For each card type, the average value of fraudulent card transactions in 2012 was generally higher than the average value of corresponding total card transations (Exhibit 24). For example, the average value of fraudulent ATM cash withdrawals ($199) was substantially larger than the value of ATM cash withdrawals ($118), and unauthorized general-purpose debit card purchase transactions had an average value nearly 3 times the average value of all general-purpose debit card purchase transactions. The average value of unauthorized general-purpose credit card transactions was also higher than that of all general-purpose credit card payments, but the difference was much smaller than with debit cards.

Exhibit 24: Average value of unauthorized transactions in 2012



GP denotes general-purpose.
Debit card includes prepaid card.

IPR2025-01151
Apple EX1036 Page 36

3 Appendix

3.1 ABOUT THE STUDY

As in the previous studies, estimates reported in the 2013 Study are based on information gathered in three survey efforts: the *2013 Depository and Financial Institutions Payments Survey;* the *2013 Networks, Processors, and Issuers Payments Surveys;* and the *2013 Check Sample Survey*.

Brief descriptions of these survey efforts are provided below. Readers may wish to consult a more detailed report of the methodologies and findings of the study and each survey effort that will be made available on www.frbservices.org sometime in spring 2014.

3.1.1 Depository and Financial Institutions Payments Survey

The *2013 Depository and Financial Institutions Payments Survey* (DFIPS) collected the number and value of noncash payments, cash withdrawals and deposits that posted to customer accounts, and unauthorized transactions (third-party fraud) that took place during March 2013. Noncash payments include transactions by check, ACH, wire transfers, debit and prepaid card, and credit card. McKinsey & Company was the contractor and worked with Lieberman Research Group as a subcontractor for this effort.

A nationally representative, stratified random sample of 2,700 depository institutions, including some credit card banks, in the United States was drawn. The largest depository institutions were sampled at a higher rate in an effort to count as many transactions as possible and reduce the error introduced by the estimation process. The sample included commercial banks, savings institutions, and credit unions. A total of 1,182 depository institutions provided data for the survey.

Although the survey reference period was March 2013, unless otherwise noted, the national aggregate estimates were annualized and reported as 2012 estimates.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 37

3.1.2 Networks, Processors, and Issuers Payments Surveys

The *2013 Networks, Processors, and Issuers Payments Surveys* (NPIPS) estimated the number and value of electronic payments in the United States for calendar year 2012. Blueflame Consulting was the contractor and worked with MH Consulting Partners as a subcontractor for this effort.

Survey forms were distributed to the payment organizations that process, clear, or settle payments. Of the 257 organizations asked to participate, 196 of the organizations provided data, including 92 of the largest payment organizations that process core transactions of ACH, credit card, debit card, and prepaid card. Among the organizations contacted, 43 were disqualified from the NPIPS because they reported using another organization for the authorization and settlement of their payments.

3.1.3 Check Sample Survey

The *2013 Check Sample Survey* (CSS) estimated the distribution of checks by counterparty and purpose for calendar year 2012. Study data are based on a random sample of checks processed in 2012 by 11 commercial banks that use the Viewpointe archive.

3.2 UNAUTHORIZED TRANSACTIONS (THIRD-PARTY FRAUD) ESTIMATES

The unauthorized transactions (third-party fraud) estimates are new in the 2013 Study, and patterns of fraud are less well-understood than other payment statistics in this report.[16] The fraud data were collected as part of the DFIPS described above. More than 750 depository institutions responded to the third-party payment fraud (unauthorized transactions) section of the survey, smaller than the overall response of 1,182. As in DFIPS, the survey reference period was March 2013, and the national aggregate estimates were annualized and reported as 2012 estimates. For each fraud type, fraud rates were computed by dividing the total third-party fraud estimates by the corresponding total 2012 transaction estimates.

---

[16] More information is provided in the detailed report.

IPR2025-01151
Apple EX1036 Page 38

We are aware of no study with as broad a set of consistently defined aggregate estimates of third-party payment fraud for the United States. There are a few prominent studies, however, that estimated and reported payment fraud statistics from survey data that can be compared to figures from the 2013 Study. In general, the results reported here are consistent with results from those studies. Any differences found in comparisons are likely to be primarily because of variation in definitions, sample size, national representativeness, and survey reference period. Other payment fraud studies typically collected data for a survey reference period of one year rather than one month (as are ours). Most other payment fraud studies, on the other hand, had far fewer participating institutions.

3.3 REVISIONS

Additional analysis and new information contributed to a variety of revisions outlined in this section.

Checks written by counterparty allocations are revised to reflect an adjustment to a particular bank's internal sampling rates affecting 2006, 2009, and 2012 allocations of checks. With these revisions, the data show that:

- B2B checks were falling slower than any other category, confirming industry assessments that B2B checks have been challenging to replace.
- C2C checks were falling at approximately the same rate as overall.
- The fastest decline was in B2C checks.
- The revised distributions show a substantial increase in consumer checks from 2006 to 2009. Although consumer checks may have risen during that time period, the increase was also, in part, because of the addition of several banks to the 2009 and 2012 sample that have a larger proportion of consumer customers.

New data from the detailed report allowed more accurate estimates of the number and value of in-house on-us ACH.[17] Estimates of the number and value of network ACH payments are unchanged. Because of the change in the in-house on-us estimates, the

[17] Some on-us ACH is processed through the network operators, and is not included in the estimates of in-house on-us ACH.

IPR2025-01151
Apple EX1036 Page 39

previously reported estimates of the total number and value of ACH for 2012 have been revised.

The new ACH estimation method creates a break in series in the measurement of total ACH, particularly by value. Therefore, comparison of total ACH volume trends by number will be retained but the value trends will not.

- The total number of ACH payments previously reported has been revised downward slightly to 21.7 billion.
- The new estimate of the value of in-house on-us ACH payments of $144.1 trillion is approximately triple the size as the previously reported value.
- The average value of a network ACH is estimated to have been $2,202, the overall average value of an ACH in 2012 is now estimated to have been $6,638.
- The third-party fraud rates by number and value for ACH are revised to reflect the revised number and value figures for ACH.

All unauthorized third-party fraud transaction estimates and, consequently, the fraud rates in the fraud section have changed. While the figures are quantitatively slightly different, the qualitative conclusions have not changed. There are a variety of other revisions including:

- Number of checks written
- Value of general-purpose prepaid card
- Value of checks paid
- Value of returned checks, which also affected the value of checks written
- Value of ATM cash withdrawals
- Transit payments
- Various totals, subtotals, average values, and growth rates affected by the above

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 40

3.4 TABULAR RESULTS

3.4.1 Short-Run View

Numbers in billions. Values in trillions of USD.	2009[a]			2012			Total change 2009-12		CAGR(%)	
	Number	Value	Average	Number	Value	Average	Number	Value	Number	Value
Total noncash payments	**108.1**			**122.4**	**174.44**	**1,425**	**14.3**	**The**	**4.2**	
Card payments	**64.5**	**3.41**	**53**	**82.4**	**4.52**	**55**	**17.9**	**1.10**	**8.5**	**9.8**
General-purpose cards	**58.4**	**3.14**	**54**	**73.9**	**4.13**	**56**	**15.5**	**0.99**	**8.2**	**9.6**
Credit cards	19.5	1.69	87	23.8	2.21	93	4.2	0.51	6.8	9.3
Debit cards	37.5	1.40	37	47.0	1.82	39	9.4	0.41	7.7	9.0
Prepaid cards	1.3	0.04	32	3.1	0.10	34	1.8	0.06	33.9	36.6
Private-label cards	**6.1**	**0.28**	**45**	**8.5**	**0.39**	**46**	**2.4**	**0.11**	**11.6**	**12.1**
Credit cards	1.5	0.18	119	2.4	0.27	111	0.9	0.09	17.1	14.6
Prepaid cards	4.6	0.10	21	6.1	0.12	20	1.5	0.02	9.7	7.3
ACH payments	**19.1**			**21.7**	**144.08**	**6,638**	**2.6**		**4.4**	
Network[b]	15.4	29.94	1,950	16.8	36.90	2,202	1.4	6.96	3.0	7.2
Credit	6.2	17.91	2,893	7.0	22.7	3,258	0.8	4.75	3.9	8.2
Offset				0.7	2.7	3,575				
Other				6.2	20.0	3,220				
Debit	9.2	12.04	1,313	9.8	14.2	1,454	0.6	2.21	2.3	5.8
Offset				0.4	1.3	3,207				
Other				9.4	12.99	1,380				
On-us	3.7			4.9	107.17	21,653	1.2		9.8	
Credit	1.5			1.8	54.77	29,663	0.4		8.1	
Offset				0.2	6.61	29,452				
Other				1.6	48.16	29,693				
Debit	2.3			3.1	52.40	16,886	0.8		10.9	
Offset				0.3	1.93	6,555				
Other				2.8	50.47	17,972				
Checks (paid)	**24.5**	**31.60**	**1,291**	**18.3**	**25.85**	**1,410**	**-6.1**	**-5.75**	**-9.2**	**-6.5**
Returns	0.1	0.13	1,001	0.1	0.08	1,252	-0.1	-0.04	-19.4	-13.2
ATM cash withdrawals	**6.0**	**0.65**	**108**	**5.8**	**0.69**	**118**	**-0.2**	**0.04**	**-0.9**	**2.0**
Additional estimates										
Checks (written)[c]	27.8	32.35	1,165	21.1	26.47	1,257	-6.7	-5.88	-8.8	-6.5
Checks converted to ACH	3.3	0.75	227	2.7	0.62	227	-0.6	-0.13	-6.3	-6.3
Transit payments (not included in totals)	7.6	0.01	1.5	9.9	0.02	1.8	2.3	0.01	9.4	15.6
Prepaid transit cards	4.0	0.01	1.3	4.7	0.01	1.7	0.7	0.00	5.2	16.2
Auto tolls	3.5	0.01	1.8	5.2	0.01	1.9	1.7	0.00	13.9	15.1
Memo[d]										
Nominal GDP[e]	14.42			16.24			1.83		4.1	
Nominal PCE[f]	9.84			11.15			1.31		4.2	
Population[g]	306.8			313.9			7.1		0.8	
Relative prices										
GDP implicit price deflator	0.95			1.00			0.05		1.6	
CPI	0.93			1.00			0.07		2.3	

Figures may not sum because of rounding. CAGR is compound annual growth rate. a. Some figures are revised because of new information. b. Includes direct exchange payments which are cleared directly between depository financial institutions without the use of a national network operator. c. Includes the use of checks as source documents to initiate electronic payments. d. These figures were obtained from the Bureau of Economic Analysis (BEA), U.S. Department of Commerce, as of November 22, 2013. e. Nominal Gross Domestic Product in trillions of USD. f. Nominal Personal Consumption Expenditures in trillions of USD. g. U.S. population in millions.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 41

3.4.2 Long-Run View

Numbers in billions. Values in trillions of USD.	2003[a]			2012			Total change 2003-12		CAGR(%)	
	Number	Value	Average	Number	Value	Average	Number	Value	Number	Value
Total noncash payments	**81.4**			**122.4**	**174.44**	**1,425**	**41.0**		**4.6**	
Card payments	**35.4**	**2.33**	**66**	**82.4**	**4.52**	**55**	**47.0**	**2.18**	**9.8**	**7.6**
General-purpose cards	**30.8**	**2.04**	**66**	**73.9**	**4.13**	**56**	**43.1**	**2.09**	**10.2**	**8.1**
Credit cards	15.2	1.41	93	23.8	2.21	93	8.6	0.80	5.1	5.1
Debit cards	15.6	0.63	40	47.0	1.82	39	31.4	1.19	13.0	12.5
Prepaid cards	0.0	0.00	0	3.1	0.10	34	3.1	0.10		
Private-label cards	**4.6**	**0.29**	**63**	**8.5**	**0.39**	**46**	**3.9**	**0.10**	**7.1**	**3.3**
Credit cards	3.8	0.27	72	2.4	0.27	111	-1.3	0.00	-4.8	-0.1
Prepaid cards	0.8	0.02	26	6.1	0.12	20	5.3	0.10	**24.9**	**21.1**
ACH payments	**8.8**			**21.7**	**144.08**	**6,638**	**13.0**		**10.6**	
Network[b]	7.5	20.69	2,762	16.8	36.90	2,202	9.3	16.21	30.8	21.3
Credit	4.1	10.85	2,651	7.0	22.7	3,258	2.9	11.81	19.3	27.8
Offset				0.7	2.7	3,575				
Other				6.2	20.0	3,220				
Debit	3.4	9.85	2,896	9.8	14.2	1,454	6.4	4.40	42.3	13.1
Offset				0.4	1.3	3,207				
Other				9.4	12.99	1,380				
On-us	1.3			4.9	107.17	21,653	3.7		57.7	
Credit	0.5			1.8	54.77	29,663	1.4		55.3	
Offset				0.2	6.61	29,452				
Other				1.6	48.16	29,693				
Debit	0.8			3.1	52.40	16,886	2.3		59.3	
Offset				0.3	1.93	6,555				
Other				2.8	50.47	17,972				
Checks (paid)	**37.3**	**41.15**	**1,103**	**18.3**	**25.85**	**1,410**	**-19.0**	**-15.29**	**-7.6**	**-5.0**
Returns	0.2	0.14	731	0.1	0.08	1,252	-0.1	-0.05	-10.9	-5.4
ATM cash withdrawals	**5.9**	**0.50**	**85**	**5.8**	**0.69**	**118**	**-0.1**	**0.19**	**-0.2**	**3.6**
Additional estimates										
Checks (written)[c]	37.6	41.21	1,095	21.1	26.47	1,257	-16.6	-14.74	**-6.2**	**-4.8**
Checks converted to ACH	0.3	0.06	187	2.7	0.62	227	2.4	0.55	26.3	29.0
Transit payments (not included in totals)				9.9	0.02	1.8				
Prepaid transit cards				4.7	0.01	1.7				
Auto tolls				5.2	0.01	1.9				
Memo[d]										
Nominal GDP[e]		11.51			16.24		4.73		3.9	
Nominal PCE[f]		7.76			11.15		3.39		4.1	
Population[g]		290.1			313.9		23.8		0.9	
Relative prices										
GDP implicit price deflator		0.83			1.00		0.17		2.1	
CPI		0.80			1.00		0.20		2.5	

Figures may not sum because of rounding. CAGR is compound annual growth rate. Figures of prepaid card transactions in 2003 were negligible. More detailed categories for ACH payments were added for 2012. a. Some figures revised because of new information. b. Includes direct exchange payments which are cleared directly between depository financial institutions without the use of a national network operator. c. Includes the use of checks as source documents to initiate electronic payments. d. These figures were obtained from the Bureau of Economic Analysis (BEA), U.S. Department of Commerce, as of November 22, 2013. e. Nominal Gross Domestic Product in trillions of USD. f. Nominal Personal Consumption Expenditures in trillions of USD. g. U.S. population in millions.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 42

3.4.3 Unauthorized Transactions (Third-Party Fraud) in 2012

Instrument/method	Number			Value		
	Unauthorized (million)	Total (billion)	Rate (bps)	Unauthorized ($ billion)	Total ($ trillion)	Rate (bps)
All fraud types	**32.3**	**119.7**	**2.70**	**6.4**	**174.7**	**0.37**
All GP cards	**29.8**	**79.7**	**3.74**	**4.1**	**4.8**	**8.43**
GP credit card	**13.7**	**23.8**	**5.74**	**2.3**	**2.2**	**10.23**
Card-present	7.1	18.0	3.92	1.1	1.2	9.15
Card-not-present	6.6	5.8	11.44	1.1	1.0	11.58
GP debit, prepaid, and ATM	**16.1**	**55.9**	**2.89**	**1.8**	**2.6**	**6.91**
GP debit and prepaid	14.9	50.1	2.97	1.5	1.9	8.04
Signature	14.0	32.2	4.36	1.4	1.2	11.91
Card-present	8.0	26.2	3.07	1.0	0.8	12.45
Card-not-present	6.0	5.9	10.10	0.5	0.4	10.90
PIN	0.8	17.9	0.47	0.1	0.7	1.70
ATM withdrawals	1.3	5.8	2.21	0.3	0.7	3.74
ACH	**1.7**	**21.7**	**0.77**	**1.2**	**144.1**	**0.09**
ACH credits	0.5	8.8	0.59	0.4	77.4	0.05
ACH debits	1.2	12.9	0.89	0.8	66.7	0.13
Check	**0.9**	**18.3**	**0.47**	**1.1**	**25.9**	**0.43**

Figures may not sum because of rounding. GP denotes general-purpose. Some figures are revised. See detailed report. Bps denotes basis points and are the number of unauthorized transactions per 10,000 transactions or the value of unauthorized transactions per $10,000 spent. One hundred basis points equal 1 percent.

© 2013, Federal Reserve System

IPR2025-01151
Apple EX1036 Page 43