# The 2013 Federal Reserve Payments Study

Recent and Long-Term Trends in the United States: 2000–2012

Detailed Report and Updated Data Release

Research Sponsored by the Federal Reserve System

July 2014

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




IPR2025-01151
Apple EX1037 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

### Sophy Min

Analyst
McKinsey & Company, Atlanta, GA

### Paul Pesek

Analyst
McKinsey & Company, Atlanta, GA

# Contents


**1 OVERVIEW ..... 12**

**1.1 Introduction ..... 12**

1.1.1 Recap of Broad Trends ..... 14

1.1.2 Key Highlights from this Detailed Report ..... 16

**1.2 General-Purpose Cards ..... 19**

1.2.1 Number of Cards in Force and with Purchase Activity ..... 20

1.2.2 Number of Payments per Active Card ..... 24

1.2.3 Distributions of General-Purpose Card Transaction Values ..... 25

1.2.4 Card-Present and Card-Not-Present Payments ..... 26

1.2.5 Growth in Debit Card Payments ..... 28

1.2.6 Third-Party Payments Fraud ..... 30

1.2.6.1 Comparison of Card Fraud to ACH and Check Fraud ..... 31

1.2.6.2 Unauthorized Third-Party Card Fraud by Transaction Type ..... 32

1.2.6.3 Microchip-Enabled Cards ..... 34

**1.3 Private-Label Cards ..... 35**

1.3.1 Distributions of Private-Label Credit and Prepaid Card Transaction Values ..... 35

1.3.2 Growth in Prepaid Card Payments ..... 36

1.3.3 Private-Label Prepaid Transportation Payments ..... 37

**1.4 Alternative Payment Initiation Methods ..... 39**

**1.5 Automated Clearinghouse (ACH) ..... 41**

**1.6 Wire Transfers ..... 43**

**1.7 Checks** ..... **46**

**1.8 Cash Withdrawals and Deposits** ..... **51**

**1.9 Payment Accounts** ..... **55**

**1.10 More Information about the Survey Data** ..... **57**

1.10.1 Revisions ..... 60

**2 DEPOSITORY AND FINANCIAL INSTITUTIONS SURVEY (DFIPS)** ..... **62**

**2.1 Introduction** ..... **62**

**2.2 General-Purpose Cards** ..... **63**

2.2.1 Credit Cards ..... 64
2.2.1.1 General-Purpose Credit Card Payments ..... 64
2.2.1.2 General-Purpose Credit Card Cash Advances ..... 65
2.2.1.3 General-Purpose Credit Card Accounts ..... 66
2.2.1.4 Number of General-Purpose Credit Cards ..... 66

2.2.2 Debit and Prepaid Cards ..... 67
2.2.2.1 General-Purpose Debit and Prepaid Card Payments ..... 68
2.2.2.2 General-Purpose Debit and Prepaid Card Cash Back ..... 68
2.2.2.3 Debit Cards ..... 69
2.2.2.4 General-Purpose Prepaid Cards ..... 70

**2.3 Automated Clearinghouse (ACH)** ..... **72**

2.3.1 ACH Payments ..... 73
2.3.1.1 ACH Credit Payments ..... 74
2.3.1.2 ACH Debit Payments ..... 74
2.3.1.3 ACH On-Us Payments ..... 74

**2.4 Wire Transfers** ..... **75**

2.4.1 Total Wire Transfers ..... 75
2.4.1.1 Consumer Wire Transfers ..... 75
2.4.1.2 Settlement/Bank Business Wire Transfers ..... 76
2.4.1.3 Other Business Wire Transfers ..... 76



IPR2025-01151
Apple EX1037 Page 5

2.4.1.4 Wire Transfers by Payer Type ..... 76
2.4.1.5 Wire transfers by Payee Location ..... 76

**2.5 Checks ..... 77**

2.5.1 Checks Paid ..... 77
2.5.1.1 Interbank Checks Paid ..... 78
2.5.1.2 On-Us Checks Paid ..... 78

2.5.2 Deposited Checks ..... 78
2.5.2.1 Image Check Deposits ..... 79
2.5.2.2 Paper Check Deposits ..... 80

2.5.3 Checks Returned Unpaid ..... 80
2.5.3.1 Interbank Checks Returned Unpaid ..... 81
2.5.3.2 On-Us Checks Returned Unpaid ..... 81

**2.6 Cash Withdrawals and Deposits ..... 81**

2.6.1 Cash Withdrawals ..... 82
2.6.1.1 Over-the-Counter Cash Withdrawals ..... 82
2.6.1.2 ATM Cash Withdrawals ..... 82
2.6.1.3 Wholesale Vault Cash Withdrawals ..... 83
2.6.1.4 Remote Currency Management Terminal Cash Withdrawals ..... 83

2.6.2 Cash Deposits ..... 83
2.6.2.1 Over-the-Counter Cash Deposits ..... 84
2.6.2.2 ATM Cash Deposits ..... 84
2.6.2.3 Wholesale Vault Cash Deposits ..... 84
2.6.2.4 Remote Currency Management Terminal Cash Deposits ..... 85

**2.7 Alternative Payment Initiation Methods at Depository Institutions ..... 85**

2.7.1 Online or Mobile Bill Payments ..... 85

2.7.2 Online or Mobile Person-to-Person Transfers ..... 86

**2.8 Third-Party Payments Fraud ..... 86**

2.8.1 Unauthorized Check Payments ..... 87

2.8.2 Unauthorized ACH Credits ..... 87



IPR2025-01151
Apple EX1037 Page 6

2.8.3 Unauthorized ACH Debits ..... 87

2.8.4 Unauthorized Debit and Prepaid Card Transactions ..... 88
2.8.4.1 Unauthorized Dual-Message Debit and Prepaid Transactions ..... 88
2.8.4.2 Unauthorized Single-Message Debit and Prepaid Transactions ..... 89

2.8.5 Unauthorized Credit Card Transactions ..... 89

2.8.6 Unauthorized ATM Cash Withdrawals ..... 89

**2.9 Methodology ..... 89**

2.9.1 Sampling ..... 90
2.9.1.1 Sample Design ..... 90
2.9.1.2 Sample Frame ..... 91
2.9.1.3 Sample Size and Allocation ..... 92
2.9.1.4 High-Priority Institutions ..... 93

2.9.2 Imputation and Estimation ..... 94

2.9.3 Reference Period ..... 95

2.9.4 Survey Instruments ..... 95

2.9.5 Survey Recruitment and Participation ..... 96
2.9.5.1 Contact List Development and Recruitment ..... 96
2.9.5.2 Registration ..... 97
2.9.5.3 Respondent Training ..... 98
2.9.5.4 Survey Response ..... 99

2.9.6 Data Collection and Data Management ..... 100

2.9.7 Data Editing ..... 100
2.9.7.1 Outlier Identification ..... 100
2.9.7.2 Tracking Outliers and Revisions ..... 101

**2.10 Tabular results ..... 102**

2.10.1 All Depository Institutions ..... 102

2.10.2 Commercial Banks ..... 107

2.10.3 Savings Institutions ..... 112



IPR2025-01151
Apple EX1037 Page 7

2.10.4 Credit Unions ..... 117

**3 NETWORKS, PROCESSORS, AND ISSUERS PAYMENTS SURVEYS (NPIPS) ..... 122**

**3.1 Introduction ..... 122**

**3.2 General-Purpose Cards ..... 123**

3.2.1 General-Purpose Credit Cards - Networks ..... 123

3.2.2 Debit Cards - Networks ..... 124

3.2.3 General-Purpose Prepaid Cards - Networks ..... 125

**3.3 Private-Label Cards ..... 126**

3.3.1 Private-Label Credit Cards ..... 126

3.3.1.1 Private-Label Credit Cards - Retail Merchant Issuers ..... 127

3.3.1.2 Private-Label Credit Cards - Processors ..... 127

3.3.2 Private-Label Prepaid Cards - Non-Transit ..... 128

3.3.3 EBT Cards ..... 128

3.3.4 Additional Categories of Prepaid Data ..... 129

3.3.4.1 General-Purpose Prepaid Cards - Processors ..... 129

3.3.4.2 Prepaid Transportation (Transit and Toll Collections) ..... 130

**3.4 Automated Clearinghouse (ACH) ..... 131**

3.4.1 Participation ..... 132

3.4.2 ACH Data Considerations ..... 132

3.4.3 SEC Codes ..... 133

**3.5 Alternative Payment Initiation Methods ..... 134**

3.5.1 Person-to-Person (P2P) and Money Transfers ..... 134

3.5.2 Bill Payments ..... 135

3.5.2.1 Online Bill Payments ..... 135

3.5.2.2 Walk-In Bill Payments ..... 136

3.5.3 Deferred Payments ..... 136

3.5.4 Private-Label ACH Debit Card Payments ..... 137

3.5.5 Secure Online Payments ..... 137

3.5.6 Mobile Wallets ..... 137

**3.6 Methodology ..... 138**

3.6.1 Survey Design ..... 138

3.6.1.1 Scope of Research ..... 138

3.6.2 Survey Recruitment ..... 139

3.6.3 Survey Participation ..... 140

**3.7 Data Collection Process ..... 140**

3.7.1 Survey Instruments ..... 141

3.7.2 Communications Plan ..... 141

3.7.2.1 Announcements to the Electronic Payments Industry ..... 141

3.7.2.2 Communications with EFT Payment Organizations ..... 141

3.7.2.3 Pre-Survey Letter ..... 142

3.7.2.4 Pre-Survey Letter Follow Up ..... 142

3.7.2.5 Survey Administration ..... 143

3.7.2.6 Survey Follow Up ..... 143

3.7.2.7 Thank You Letters and Summary of Results ..... 143

3.7.3 Data Validation ..... 144

3.7.4 Data Imputation and Estimation ..... 144

**3.8 Tabular Results ..... 145**

3.8.1 Estimates for 2012 with Shares and Response Rates ..... 145

3.8.2 Estimates for 2009 and 2012 with Growth Rates ..... 159

**4 CHECK SAMPLE SURVEY (CSS) ..... 164**

**4.1 Introduction ..... 164**



IPR2025-01151
Apple EX1037 Page 9

**4.2 Findings ..... 164**

4.2.1 Estimates for Checks Written in 2012 ..... 164
4.2.1.1 Distribution of the Number of Checks Written ..... 165
4.2.1.2 Number of Checks Written by Counterparty and Purpose ..... 166
4.2.1.3 Distribution of the Value of Checks Written ..... 167
4.2.1.4 Average Value of Checks Written by Counterparty ..... 169
4.2.1.5 Average Value of Checks Written by Counterparty and Purpose ..... 170
4.2.1.6 Distribution of the Number of Checks Written by Check Value Range ..... 171
4.2.1.7 Remotely Created Checks ..... 171
4.2.1.8 Checks Ineligible for ACH Conversion ..... 171

4.2.2 Comparison between the Estimates for Checks Written in 2009 and 2012 ..... 172
4.2.2.1 Changes in the Distribution of the Number of Checks Written ..... 172
4.2.2.2 Changes in the Number of Checks Written by Counterparty and Purpose ..... 173
4.2.2.3 Changes in the Distribution of the Value of Checks Written ..... 174
4.2.2.4 Changes in the Number of Remotely Created Checks ..... 176
4.2.2.5 Changes in the Number of Checks Ineligible for ACH Conversion ..... 177

**4.3 Methodology ..... 177**

4.3.1 Survey Design ..... 177
4.3.1.1 Sample Size and Sampling Technique ..... 178
4.3.1.2 Weighting the Final Sample ..... 178

4.3.2 Data Collection ..... 179
4.3.2.1 Metadata ..... 181
4.3.2.2 Eliminating Duplicate Checks ..... 181
4.3.2.3 Data Collection Training ..... 182

4.3.3 Categorization of Checks Written ..... 182
4.3.3.1 Payer and Payee Categories ..... 182
4.3.3.2 Purpose Categories ..... 183

4.3.4 Check Categorization Model ..... 185
4.3.4.1 Categorization of Payer ..... 186
4.3.4.2 Categorization of Payee ..... 187
4.3.4.3 Categorization of Purpose ..... 187

4.3.5 Estimation ..... 189



IPR2025-01151
Apple EX1037 Page 10

4.3.5.1 Trend Analysis ..... 189
4.3.5.2 Revisions ..... 190

4.3.6 Additional Analysis ..... 190
4.3.6.1 Demand Drafts ..... 190
4.3.6.2 Checks Ineligible for ACH Conversion ..... 191



IPR2025-01151
Apple EX1037 Page 11

# 1 Overview

## 1.1 INTRODUCTION

Underlying the net economic output of the country are billions of transactions between buyers and sellers of goods and services (such as consumers and merchants, factories and suppliers, employers and employees), as well as various financial transactions (such as transfers of balances between accounts, loan originations, and loan payments). The 2013 Federal Reserve Payments Study attempts to measure the number and value of all such transactions conducted over noncash payment systems—including general-purpose and private-label card systems, automated clearinghouse (ACH), and checks. The study builds on the triennial Federal Reserve Payments Study series, conducted since 2001, to paint a more comprehensive picture of the U.S. payments system.

This detailed report is a complement to the "Summary Report and Initial Data Release" (Summary Report), which was released in December 2013 and has been updated for consistency with revisions made during preparation of this report.[1] This report includes new information related to noncash payments based on additional estimates and analysis. For instance, this detailed report provides new insights into the use of cards by consumers and businesses, alternative payment initiation methods, consumer and business domestic and cross-border wire transfers, and an expanded view of cash deposits and withdrawals from depository institutions.[2] It also includes information about the number of and balances in

---

[1] The revised Summary Report is available at https://www.frbservices.org/assets/news/research/2013-payments-study-summary.pdf. For a discussion of the revisions, see this report's section 1.10.1.

[2] There are many innovative and emerging or established methods for initiating payments that typically settle over traditional payment systems. Several of the more visible types are tracked in the study, and are collectively called alternative payment initiation methods. Payments with transit cards and far-field radio frequency identification (RFID) devices for tolls are also tracked. The figures reported for these initiation methods are the amount reported by the respondents, and may not represent national totals. National totals were estimated, however, for several alternative payment methods being offered by depository institutions. Virtual currencies are not included or discussed in this report.



IPR2025-01151
Apple EX1037 Page 12

consumer and business credit card and transaction deposit accounts, and provides more discussion of the unauthorized third-party fraud payments reported in the Summary Report.

Findings in this detailed report are based on three separate survey data collection efforts undertaken for the 2013 Study. Accordingly, the report includes three sections detailing each of the component survey efforts:

- *The Depository and Financial Institutions Payments Survey* (DFIPS)[3]
- *The Networks, Processors, and Issuers Payments Surveys* (NPIPS)
- *The Check Sample Survey* (CSS)

The DFIPS collected information for the month of March 2013, and the NPIPS and the CSS collected information for the year 2012. For comparability with the other surveys, estimates from the DFIPS are annualized and reported as 2012 figures.[4]

The 2013 Study collected information that reflects varieties of payments behavior using the most common noncash payment methods. These payments can be framed by a simple set of counterparty transaction types or use cases:[5]

- business payments to consumers
- business payments to other businesses
- consumer payments to other consumers
- consumer payments to businesses

Where possible, this report will provide information on transaction types within this framework. For example, in CSS checks were divided into these counterparty transaction types, and checks written to businesses were further divided into point-of-sale payments and bill payments. As another example, in DFIPS and NPIPS card payments were divided into consumer and

---

[3] The survey was renamed because of the inclusion of credit card banks in the sample. From a regulatory standpoint credit card banks are considered depository institutions but they do not hold transaction deposit accounts.

[4] For more discussion on this topic, see section 1.10 and section 2.

[5] Only the counterparty types of consumer and business were generally practical in this broad and comprehensive study. The classification of data depends on the ability of survey respondents to distinguish between the two counterparty types. As a result, consumer payments measures may include some small business payments, and business payments measures may include the payments of wealthy individuals. Unless otherwise noted, business counterparties include corporations, partnerships, and sole proprietors as well as federal, state, and local government agencies.

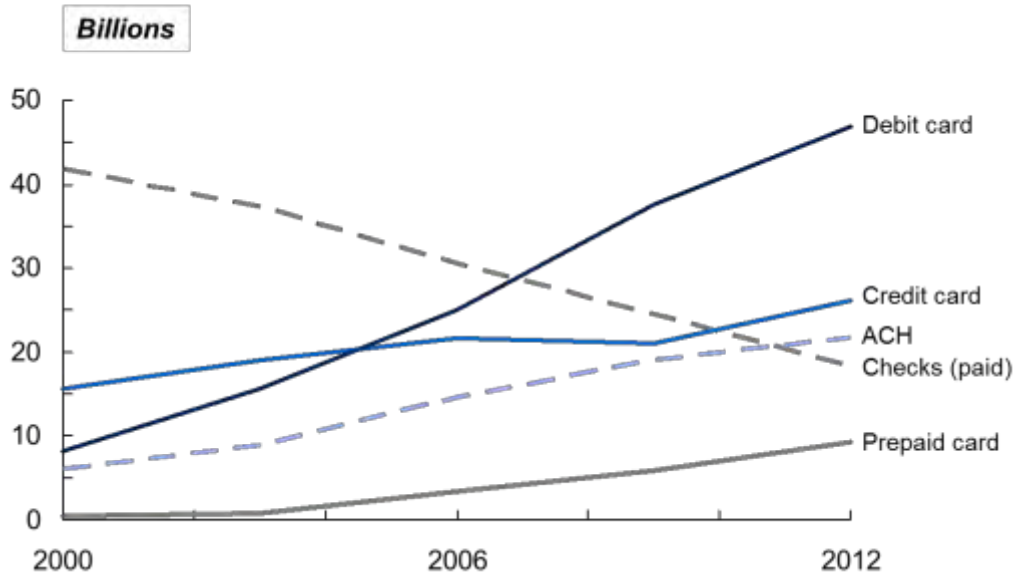
business payee transaction types, and separately divided into card-present (in-person) and card-not-present (remote purchase and bill payment) transaction types.

### 1.1.1 Recap of Broad Trends

Card and ACH payments made up 85 percent of all noncash payments (excluding wire transfers) by number and 67 percent of total value in 2012, with check payments making up the remainder. The chart and table below tell the story of noncash payments from 2000 to 2012. While the number of total noncash payments grew almost 69 percent since 2000 (from 72.4 to 122.2 billion), the composition of noncash payments also changed substantially. Exhibit 1 combines general-purpose cards and private-label cards to show the credit card and prepaid card payment trends. As shown in Exhibit 1,

- two-thirds of noncash payments made in the United States were made by card in 2012, compared with only one-third of noncash payments by card in 2000;
- the combined total number of debit and prepaid card payments was more than double the number of credit card payments in 2012, though it was less than half the number of credit card payments in 2000; and
- the number of checks paid declined more than 50 percent since 2000 (from 41.9 billion to 18.3 billion), while the non-check portion of noncash payments (card and ACH) more than tripled (from 30.5 billion to 104.1 billion)

**Exhibit 1: Trends in noncash payments 2000-2012, by number and type of transaction**




Credit, debit and prepaid card trends include general-purpose and private-label payments.

In Exhibit 2, the types of card payments are regrouped into general-purpose cards and private-label cards to highlight these trends and to be consistent with descriptions below.

**Exhibit 2: Number and growth of noncash payments 2000-2012**

| | | | | | | CAGR* | |
|---|---|---|---|---|---|---|---|
| | 2000 | 2003 | 2006 | 2009 | 2012 | 2000-12 | 2009-12 |
| **Total (billions)** | **72.4** | **81.4** | **95.2** | **108.1** | **122.4** | **4.5%** | **4.2%** |
| **General-purpose card** | **20.6** | **30.8** | **44.3** | **58.4** | **73.9** | **11.2%** | **8.2%** |
| Credit | 12.3 | 15.2 | 19.0 | 19.5 | 23.8 | 5.6% | 6.8% |
| Debit | 8.3 | 15.6 | 25.0 | 37.5 | 47.0 | 15.6% | 7.7% |
| Prepaid** | 0.0 | 0.0 | 0.3 | 1.3 | 3.1 | | 33.9% |
| **Private-label and EBT card** | **3.8** | **4.6** | **5.8** | **6.1** | **8.5** | **6.9%** | **11.6%** |
| Credit | 3.3 | 3.8 | 2.7 | 1.5 | 2.4 | -2.6% | 17.1% |
| Prepaid | | | 1.9 | 2.7 | 3.6 | | 10.8% |
| EBT | 0.5 | 0.8 | 1.1 | 2.0 | 2.5 | 13.6% | 8.1% |
| **ACH** | **6.1** | **8.8** | **14.6** | **19.1** | **21.7** | **11.1%** | **4.4%** |
| **Checks (paid)** | **41.9** | **37.3** | **30.5** | **24.5** | **18.3** | **-6.6%** | **-9.2%** |

*CAGR is compound annual growth rate. **The number of general-purpose prepaid card transactions in 2000 and 2003 was negligible. The number of ACH payments in 2012 is revised since the Summary Report. Electronic benefits transfer (EBT) cards are used to disburse funds for various government assistance programs. Figures may not sum because of rounding.

General-purpose cards as defined in this study are issued by depository institutions and processed through broadly accepted card networks that carry a recognizable network brand. Payments and cards associated with certain kinds of selective authorization card programs that are network-branded are included in the general-purpose card group and other types are included as private-label or EBT.[6] Private-label cards are typically issued by merchants or other businesses and are only for use at locations owned by the issuing business.[7] Electronic benefit transfer (EBT) cards are a type of prepaid card issued by governments to disburse benefits to specific individuals, and typically can only be used for certain types of purchases. They share some characteristics with general-purpose cards in that they are accepted at more than one merchant, but the merchant must participate in and follow the requirements of the specific card program, such as limiting purchases to specific items. EBT payments are tracked separately.

[6] General-purpose card payments under this definition include payments using cards that carry a network brand but restrict payment to specific merchant categories.

[7] Figures include some payments from selective authorization card programs that are designed to be used at a limited set of proximate merchants, such as for use near and around a town, university or mall.

### 1.1.2 Key Highlights from this Detailed Report

The following key highlights are discussed in greater detail below and are further supplemented by details on the surveys in sections 2 through 4. Section 1.10 contains an overview of the three component surveys and also provides further explanation concerning revisions to the Summary Report released in December 2013.

**General-Purpose Card Payments**

- There were 775.4 million general-purpose cards in force (meaning issued, activated, and not expired) nationally in 2012. Of this number, 333.6 million were credit cards, 282.8 million were debit cards, and 159.1 million were prepaid cards. Consumers held the majority of general-purpose credit cards—more than 10 times the number held by businesses (305.3 million and 28.3 million, respectively).
- In 2012, slightly more than half of the 775.4 million general-purpose cards in force had purchase activity (meaning they were used to make a purchase or bill payment at least once in a month), with 187.8 million credit cards with purchase activity (56 percent of credit cards in force), 182.5 million debit cards with purchase activity (65 percent of debit cards in force), and 29.4 million prepaid cards with purchase activity (18 percent of prepaid cards in force).
- Among general-purpose cards with purchase activity in 2012, transaction intensity per active card was higher for debit cards, with an average of 23 payments a month, compared with an average of 11 payments a month for general-purpose credit cards and 10 payments a month for general-purpose prepaid cards.
- Debit cards dominated general-purpose card-present transactions in 2012. There were 41.4 billion card-present debit card payments compared with 18.0 billion general-purpose credit card and 2.7 billion general-purpose prepaid card payments. Credit cards were most commonly used for general-purpose card-not present payments, with 5.8 billion transactions compared with 5.5 billion debit card and 0.4 billion general-purpose prepaid card payments.
- There were an estimated 47.1 million general-purpose cards with microchip-enabled security features (chip cards). If the cards are used in combination with merchant terminals that can read the chip, payments made with these cards can be less susceptible to fraud.



IPR2025-01151
Apple EX1037 Page 16

**Private-Label Card, Electronic Benefit Transfer, and Transportation Payments**

- The total number of private-label credit card payments has fluctuated over the years and displayed no clear trend. The number of private-label credit card payments, which led the decline in total credit card payments from 2006 to 2009, grew most quickly from 2009 to 2012, increasing at a 17.1 percent annual rate.
- Private-label credit and prepaid cards are often used as substitutes for general-purpose cards, but they are typically used in very different ways. In 2012, more than half of private-label credit card payments were for amounts greater than $50, a higher proportion than any other card type studied. On the other hand, private-label prepaid cards tended to be used for smaller-value, frequent purchases, with almost 60 percent of transactions for $5 or less.
- Most prepaid card payments in 2012 were made with private-label cards or EBT cards. Although the number of private-label prepaid card payments continued to rise from 2006 to 2012, the share of private-label prepaid card payments among all prepaid card payments declined because of the larger increase in general-purpose prepaid card payments.
- The number of private-label prepaid transportation payments exceeded all other prepaid card payments combined in 2012: Payments by prepaid transit cards and far-field radio frequency identification (RFID) transponders for auto tolls had reached a combined 9.9 billion payments.

**Payments using Alternative Payment Initiation Methods**

- The 2013 Study tracked a variety of payments using alternative payment initiation methods, which usually are settled over ACH or a general-purpose card network, and sometimes even with checks. While national estimates for these methods were not possible, the figures reported provide indicators for developments in the payments system.
- The number of online bill payments reported by major processors, which included those initiated through online banking websites and directly through billers and settled over ACH, exceeded 3 billion in 2012. As noted in the Summary Report, the number of online banking bill payments initiated through depository institutions was estimated to have been almost 2.4 billion, suggesting at least 600 million additional ACH payments through biller websites. While the total number is unknown, it is likely that



IPR2025-01151
Apple EX1037 Page 17

many more bills were paid directly to billers through a card-not-present credit, debit, or prepaid card transaction.

- Secure online payments, including methods that prompt users to enter personal identification numbers (PINs) for debit cards into the computer or that redirect users to a trusted Internet payment website to complete the payment, totaled more than 1.8 billion in 2012.
- There were more than 250.6 million mobile payments made using a mobile wallet application and 205.3 million person-to-person or money transfer payments in 2012.

**Automated Clearinghouse Payments**

- ACH payments continued to grow in traditional consumer and business categories such as payroll, prearranged bill payment, and cash concentration and disbursement. Internet-initiated ACH (WEB) payments have significantly contributed to overall ACH growth.[8]

**Wire Transfers**

- There were 287.5 million wire transfers—including those sent over large-value funds transfer systems and those made on the books of depository institutions—in 2012, with a value of $1,116.3 trillion. Consumer senders accounted for just 6 percent of all wire transfers by number and 0.14 percent by value; business customers accounted for the significant majority of both the number (86 percent) and value (74 percent) of all wire transfers. Interbank settlements accounted for approximately 8 percent of the number and 26 percent of the value of all wire transfers.

**Check Payments**

- More than 90 percent of the decline in total checks from 2009 to 2012 was from the reduction in checks for $500 or less, and 45 percent was from the reduction in checks for $50 or less.

---

[8] WEB is a type of standard entry classification code (SEC) assigned to ACH payments that are initiated online. SEC codes are defined by NACHA-The Electronic Payments Association. While during the study period WEB payments were confined to transactions in which consumers have provided authorization for a debit to their accounts, the category has since been expanded to include online-initiated ACH credit payments, which can be used to support online person-to-person (P2P) payments.

- Checks written by consumers or to consumers declined much faster than business-to-business checks from 2009 to 2012.

**Cash Withdrawals and Deposits**

- The economic value of cash withdrawn from ATMs increased, even while the frequency of ATM withdrawals declined: Although the number of ATM cash withdrawals using debit cards and general-purpose prepaid cards dropped slightly, growth in the value of ATM withdrawals continued to exceed inflation over the years. Additionally, while the number of ATM withdrawals (5.8 billion) in 2012 exceeded the number of over-the-counter cash withdrawals (2.1 billion) at depository institution branches, the average value of over-the-counter withdrawals ($715) exceeded the average value of withdrawals at ATMs ($118).
- At 1.63 billion transactions in 2012, over-the-counter cash deposit was the most common type of cash deposit, followed by ATM cash deposit, with more than 1 billion transactions.[9]

**Payment Accounts**

- As of 2012, there were 287.4 million consumer transaction accounts with an average value of $8,001, while 32.6 million business transaction accounts averaged almost $62,000. Meanwhile, there were 279.7 million consumer credit card accounts and 28.5 million business credit card accounts. Credit card balances, which included both current spending and revolving credit, averaged approximately $1,900 for both consumer and business accounts. The proportions of current spending and revolving credit were not measured, and likely differed between consumer and business accounts.

## 1.2 GENERAL-PURPOSE CARDS

General-purpose card payments are those that are processed over the major credit and debit card networks, and include general-purpose credit card, debit card and general-purpose prepaid card payments.

---

[9] While check deposits—a common type of over-the-counter or ATM deposit—were tracked in the study, they were not allocated among these categories.

General-purpose card networks can be classified as either dual-message or single-message networks.

Dual-message network: A payment card network that typically uses separate messages to authorize and clear a transaction. This type of network normally processes signature-authenticated transactions, although some transactions, such as small-value purchases, may not require a signature. In some instances, a dual-message network may use a single message to authorize and clear a given transaction and may require the entry of a PIN for cardholder authentication in that transaction. Dual-message networks were traditionally called signature networks because of the fact that, as noted above, many transactions require a signature as part of the transaction.

Single-message network: A payment card network that uses a single message to authorize and clear a transaction. This type of network normally processes PIN-authenticated transactions, although some transactions, such as small-value purchases, may not require a PIN (PIN-less PIN). Single-message networks were traditionally called PIN networks because most single-message transactions require PIN authentication of the transaction.

General-purpose credit card payments are processed over dual-message networks. Debit card and general-purpose prepaid card payments typically can be processed over either a dual-message network like a credit card, or a single-message network. General-purpose prepaid cards include not only those issued directly to individuals by depository institutions, but also cards issued by depository institutions and associated with programs sponsored by third-party providers and governments.[10]

### 1.2.1 Number of Cards in Force and with Purchase Activity

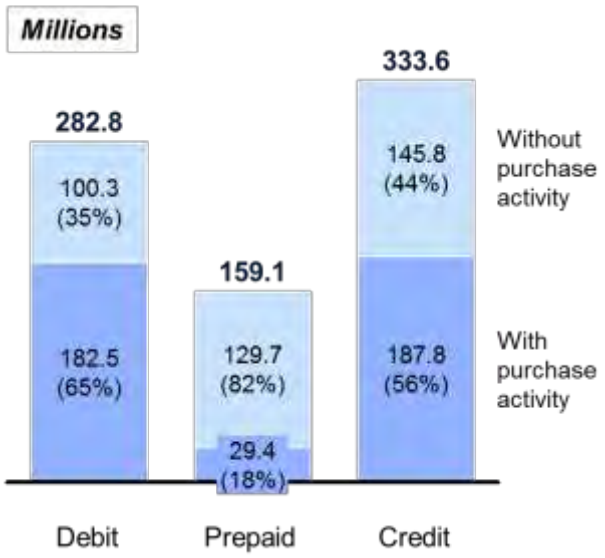
Cards issued by a depository institution, activated by the cardholder, and not expired—meaning the cardholder followed the required steps to make the card usable for its first purchase—are considered to be "in force." There were 775.4 million general-purpose cards in force in 2012

[10] A variety of banks and non-bank providers sponsor prepaid card programs for general-purpose reloadable use, employer payroll, purchase and employee incentives, health care expenditures, government disbursements, and gifts. For more information, see for example www.nbpca.com/en/What-Are-Prepaid-Cards/Types-of-Cards.aspx.

(Exhibit 3). Most cards in force were credit cards (333.6 million). There were fewer debit cards (282.8 million) or general-purpose prepaid cards in force (159.1 million).

Cards that were used to make at least one purchase or bill payment in a month are called cards with purchase activity, or active cards.[11] The number of active cards in 2012 was highest for credit cards (187.8 million), followed by debit cards (182.5 million), and prepaid cards (29.4 million). The percentage of cards in force that were active tells a different story: The percentage of debit cards in force that were active was highest at 65 percent, followed by credit cards at 56 percent, and prepaid cards at 18 percent.

**Exhibit 3: Number of general-purpose cards in force in 2012, with or without purchase activity, by card type**



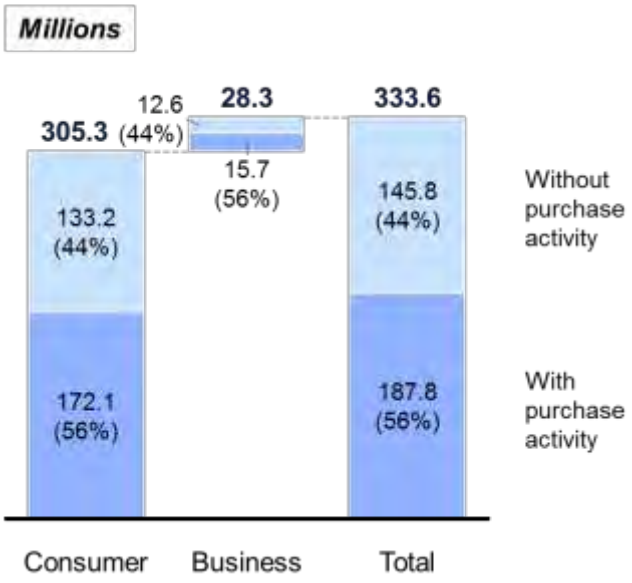

Cards in force are those that are issued, activated, and not expired, and cards with purchase activity are those used to make at least one purchase or bill payment in a month.

The number of general-purpose consumer credit cards in force (305.3 million) in 2012 was more than 10 times the number of business cards in force (28.3 million) (Exhibit 4). The percentage of active general-purpose credit cards was approximately the same for consumers and businesses (56 percent).

---

[11] Non-purchase activity, such as ATM withdrawals, account fees, deposits, and so on was not used to qualify a card as active. ATM withdrawals are discussed in section 1.8.

**Exhibit 4: Number of general-purpose credit cards in force in 2012, with or without purchase activity, by cardholder type**




Cards in force are those that are issued, activated, and not expired, and cards with purchase activity are those used to make at least one purchase or bill payment in a month.

The number of consumer general-purpose credit cards in proportion to the population 18 years of age and older in 2012 was only slightly higher than the proportion of business general-purpose credit cards to the number of businesses. For each consumer 18 and older, there were 1.3 general-purpose credit cards in force and 0.7 card active.[12] In comparison to consumers, there was approximately 1.0 general-purpose credit card in force and 0.6 card active per business.[13] Of course, individual consumers and businesses may differ considerably from these averages, because some consumers and businesses have multiple credit cards while others have none at all.

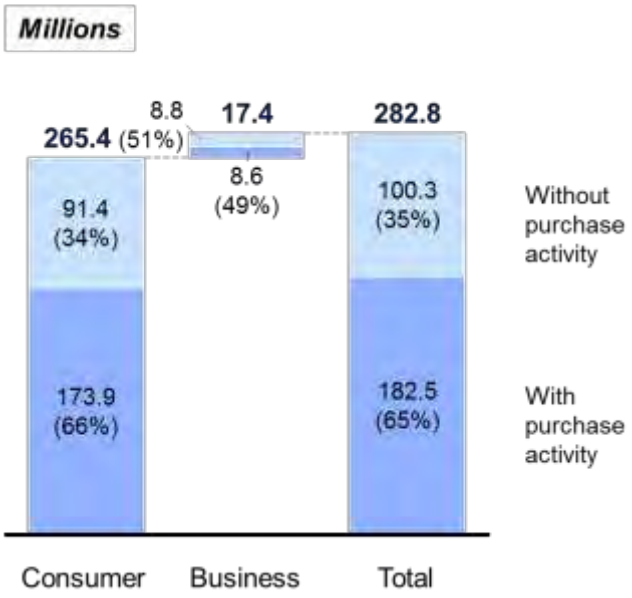
---

[12] While cards may be issued to minors, typically with a cosigner, an individual 18 and older is more likely to have a card than a minor. An unknown percentage of cards are held by minors. According to the U.S. Census Bureau, there were approximately 240 million individuals age 18 and older in the U.S. population in 2012. See http://quickfacts.census.gov/qfd/states/00000.html.

[13] There were approximately 28 million businesses in 2012 according to the Census Bureau. The averages reported here mask some major differences among businesses. Employment is very concentrated in the largest businesses. Most businesses do not have employees other than the owner. Approximately 6 million businesses had at least one employee (that is, firms with payroll). See https://census.gov/topics/business/small-business.html.

The number of consumer debit cards in force (265.4 million) in 2012 was more than 15 times the number of business debit cards in force (17.4 million) (Exhibit 5). There were 1.1 debit cards in force per consumer 18 years of age and older, compared with 0.6 debit card per business. The percentage of active debit cards was greater for consumers (66 percent) than for businesses (49 percent). There were 20 times as many active consumer debit cards as active business debit cards.

**Exhibit 5: Number of general-purpose debit cards in force in 2012, with or without purchase activity, by cardholder type**




Cards in force are those that are issued, activated, and not expired, and cards with purchase activity are those used to make at least one purchase or bill payment in a month. Figures may not sum because of rounding.

Although consumers had 15 percent more general-purpose credit cards in force than debit cards in 2012, the number of consumer general-purpose credit cards with purchase activity (172.1 million) was approximately the same as the number of consumer debit cards with purchase activity (173.9 million). Meanwhile, businesses had 63 percent more general-purpose credit cards in force than debit cards, and the number of business general-purpose credit cards with purchase activity (15.7 million) was much greater than the number of business debit cards with purchase activity (8.6 million). Several factors may contribute to businesses' greater tendency to use credit cards. For example, the typical business owner may be relatively more affluent than the typical consumer, and therefore more likely to qualify for or be able to manage

a credit card account; issuers may be more likely to tailor credit card accounts to business needs; or businesses may be less likely to have an active debit card associated with a business transaction account, preferring to make payments by invoice via checks or ACH.

### 1.2.2 Number of Payments per Active Card

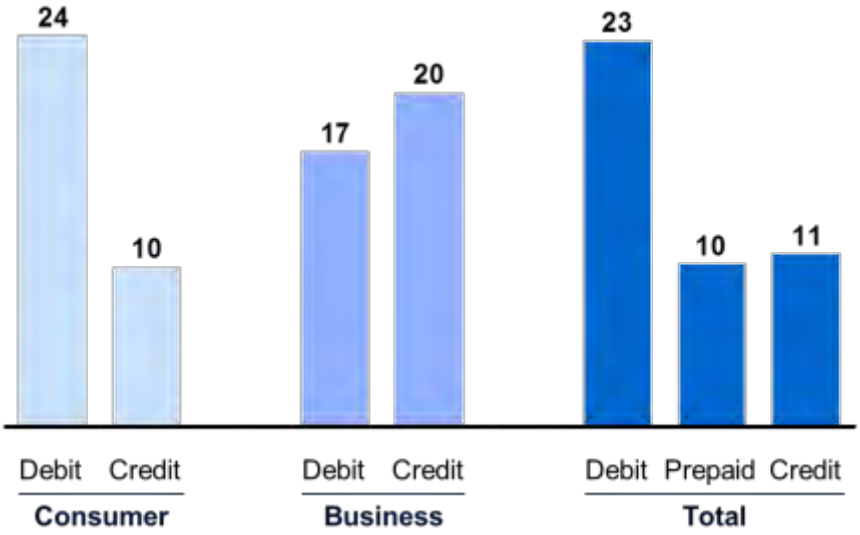
The discussion above about in-force and active cards outlines the extent of both adoption and active use of general-purpose cards. There were more credit cards in force and with purchase activity than debit or general-purpose prepaid cards in 2012, but debit cards had a higher share of cards with purchase activity. The intensity of use, measured by the number of payments a month per active card, provides another view. There was an average of 23 debit card payments a month per active card, compared with 10 payments a month per active general-purpose prepaid card and 11 payments a month per active general-purpose credit card (Exhibit 6). The average value of general-purpose credit card payments was larger ($93) than the average value of debit card payments ($39) or general-purpose prepaid card payments ($34). The high intensity in the use of debit cards combined with the relatively low average value of transactions indicates debit cards were an important substitute for cash and checks for many small-value payments.

The intensity of use for consumer general-purpose cards, which dominated both active debit and active credit cards, are similar to the overall figures for 2012. With 24 payments a month per active debit card and 10 a month per active general-purpose credit card, consumers used debit cards much more frequently than general-purpose credit cards. Businesses, on the other hand, had more similar intensity of use between debit cards (17 a month) and general-purpose credit cards (20 a month). While some consumers pay off their credit card balance at the end of each month, others do not and, instead, use the revolving credit feature available with most credit cards, which allows the balance to be paid over time. Details on the composition of credit card balances were not collected.[14]

---

[14]Other studies offer some evidence. In 2010, an estimated 40 percent of households had credit card debt. See Jesse Bricker, Arthur B. Kennickell, Kevin B. Moore, and John Sabelhaus (2012), "Changes in U.S. Family Finances from 2007 to 2010: Evidence from the Survey of Consumer Finances," *Federal Reserve Bulletin*, June 2012, Vol. 98(2), table 13, pp. 61 (www.federalreserve.gov/Pubs/Bulletin/2012/PDF/scf12.pdf). An estimated 70 percent of consumers had a credit card, and 81 percent of those who had a credit card had also used it in 2010. See Kevin Foster, Scott Schuh, and Hanbing Zhang (2013), "The 2010 Survey of Consumer Payment Choice,"

**Exhibit 6: Number of payments a month per active general-purpose card in 2012, by cardholder and card type**




Information about the allocation between business and consumer for general-purpose prepaid cards is not available. Active cards are those used to make at least one purchase or bill payment in a month.

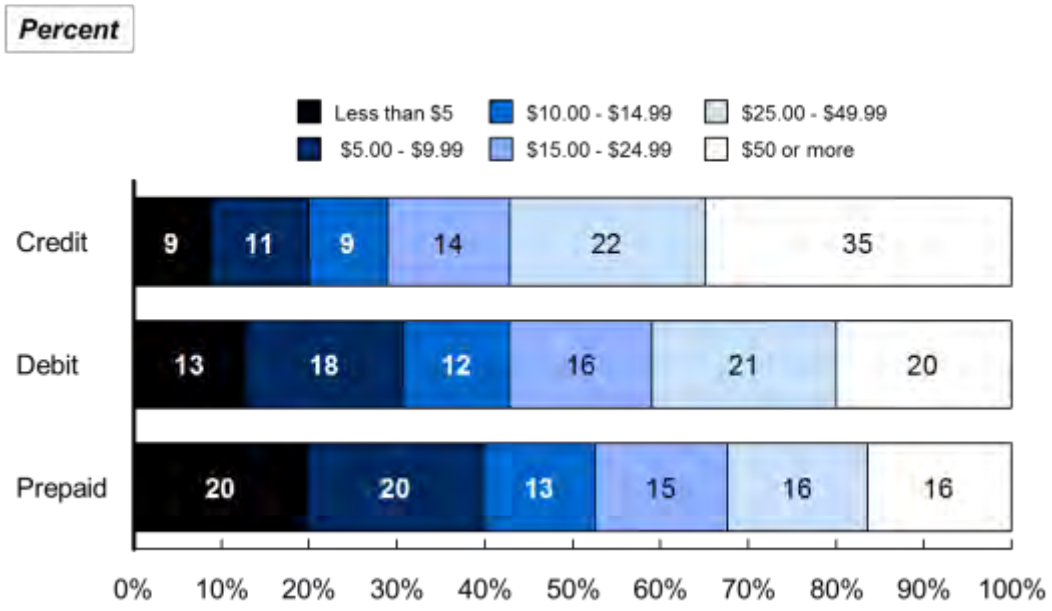
### 1.2.3 Distributions of General-Purpose Card Transaction Values

The distribution or relative frequency of transactions by value for each general-purpose card type shows that 35 percent of credit card transactions were for payments with a value of $50 or more in 2012, while only 20 percent of debit card transactions were $50 or more (Exhibit 7). General-purpose prepaid cards were most likely to be used for small-value payments, with 20 percent of transactions being less than $5 compared with 13 percent for debit cards and 9 percent for general-purpose credit cards.

---

*Research Data Reports*, Federal Reserve Bank of Boston, 13-3 Table 4, Current Adoption of Payment Instruments, and Table 14, Share of Consumers or Adopters Using Payment Instruments (www.bostonfed.org/economic/rdr/2013/rdr1302.pdf).

**Exhibit 7: Relative frequency of transaction value ranges in 2012, by general-purpose card type**



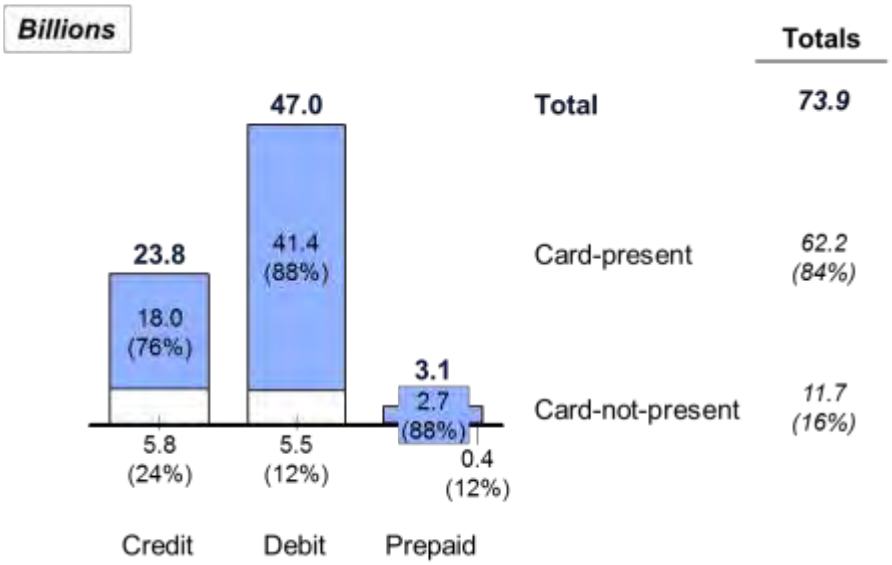

Percentage distribution is within each card type.

### 1.2.4 Card-Present and Card-Not-Present Payments

General-purpose card payments include transactions at a physical point of sale where the card information is captured electronically by a terminal, as well as transactions where the card account number and related information are provided but the card is not actually shown to the payee or read by any terminal or other equipment.

Payments initiated when the card is read by a terminal are called card-present payments. In 2012, there were far more card-present payments by debit card (41.4 billion) than by general-purpose credit card (18.0 billion) or general-purpose prepaid card (2.7 billion) (Exhibit 8). The total value of general-purpose card-present payments was $2.7 trillion.

**Exhibit 8: Number of card-present and card-not-present payments in 2012, by general-purpose card type**




Column sizes vary to reveal absolute scale. Card-not-present payments are shown on the bottom, with the number of payments and percentages printed below the axis. Prepaid card-not-present payments are too small to be visible. Figures may not sum because of rounding.

Payments initiated when the card is not read—called card-not-present payments—include payments made online, through the mail or over the telephone, and automated recurring purchases or bill payments. The total value of general-purpose card-not-present payments reported by the networks was $1.4 trillion in 2012. The total retail sales classified as e-commerce estimated by the Commerce Department reached $227 billion in 2012—much lower than card-not-present payments. A substantial part of the value of card-not-present payments clearly included some transaction types, such as bill payments, that are different from the Commerce Department's estimates.[15]

[15] The retail e-commerce estimate is revised since the Summary Report. According to the Department of Commerce's definition, e-commerce sales/revenues are sales of goods and services where the buyer places an order, or the price and terms of the sale are negotiated over an Internet, mobile device (m-commerce), Extranet, Electronic Data Interchange (EDI) network, electronic mail, or other comparable online system. *Payment may or may not be made online.* See https://www.census.gov/econ/estats/2012_e-stats_report.pdf.

There were almost as many card-not-present payments by debit card (5.5 billion) as by general-purpose credit card (5.8 billion) in 2012, but the percentage of card-not-present payments made with general-purpose credit cards (24 percent) was twice as large as the percentages for debit cards and general-purpose prepaid cards (12 percent). There were only 0.4 billion card-not-present payments by general-purpose prepaid card.

For the first time, the 2013 NPIPS tracked payment activity based on payment initiation and authorization methods, including methods of cardholder authentication. For example, the number of card-present payments initiated with an embedded microchip was tracked, but was found to be very small.[16] The data collected are not sufficient to provide a complete picture of the authentication methods used but reveal some additional information about authentication methods used for debit cards. Of the 41.4 billion non-chip-based debit card-present transactions, 22.2 billion payments were authenticated with a signature, 16.9 billion payments were authenticated with a PIN, and 2.3 billion payments were authenticated using another method. Of the 5.5 billion card-not present debit card transactions, 4.6 billion were authenticated using only static card data, while almost 1.0 billion were so-called PIN-less PIN transactions, meaning they were single-message transactions that were processed without PIN authentication.[17] At least 1.5 billion card-not-present payments—primarily credit card payments—were redirected from an e-commerce website to a secure online payments processor for authentication.[18]

### 1.2.5 Growth in Debit Card Payments

Overall, debit card payments grew from 8.3 billion payments in 2000 to 47.0 billion in 2012, increasing more than 3 billion payments per year, on average, during the period (Exhibit 9). While the rate of growth in debit card payments from 2000 to 2012 averaged 15.6 percent a year, the rate of growth from 2009 to 2012 dropped to 7.7 percent. The rise in debit card payments from 2009 to 2012, however, was also more than 3 billion payments per year. The diminished rate of growth in debit card payments during the latter period is thus not an indicator

---

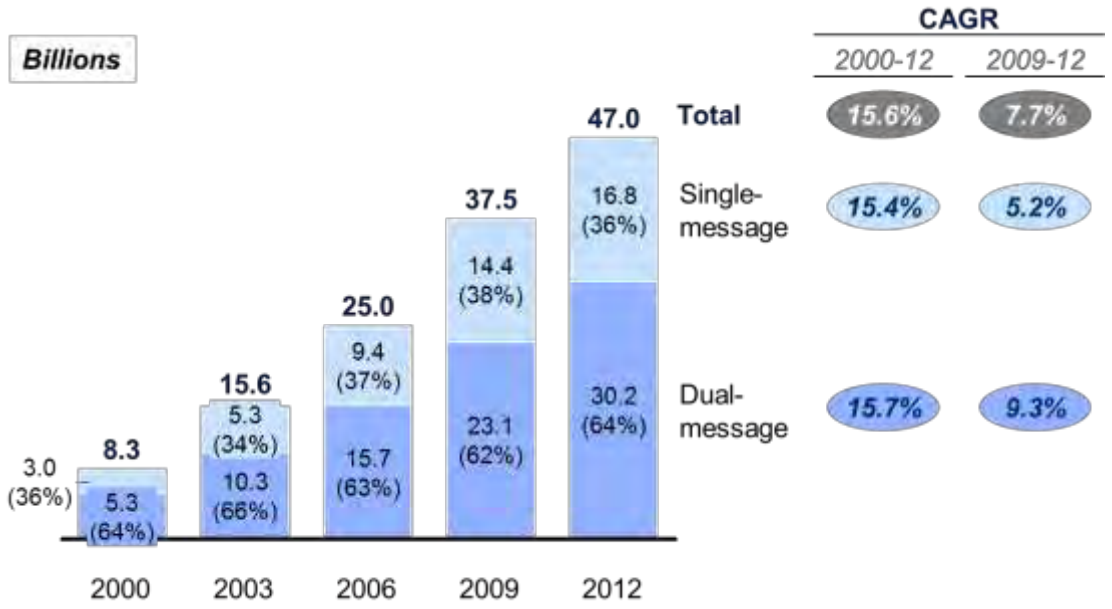
[16] Payments by cards with microchips are discussed in section 1.2.6.3.

[17] Figures do not sum because of rounding. A negligible number of card-not-present transactions were authenticated using a network-sponsored online verification system.

[18] This type of alternative payment initiation method is discussed in sections 1.4 and 3.5.5.

of diminished growth, but rather the result of debit card growth rates being calculated from a far larger base of payments in 2009 (37.5 billion) than in 2000 (8.3 billion).

**Exhibit 9: Number of debit card payments 2000-2012, by network type**




Single-message networks were traditionally called PIN networks because most single-message transactions require a PIN as part of the transaction. Dual-message networks were traditionally called signature networks because many dual-message transactions require a signature as part of the transaction. CAGR is compound annual growth rate.

As discussed above, debit card networks can be divided into single-message networks and dual-message networks. Of total debit card payments from 2003 to 2009, the share of single-message debit card networks increased from 34 percent to 38 percent, while the share of dual-message networks dropped from 66 percent to 62 percent.[19] Because of the substantially greater growth rate in dual-message networks' transactions from 2009 to 2012 (9.3 percent) compared with the growth rate in single-message transactions (5.2 percent), however, the share of dual-message networks increased to 64 percent (30.2 billion transactions) while the share of single-message networks dropped to 36 percent (16.8 billion transactions).

[19] General-purpose prepaid cards are excluded for a consistent time series.

As discussed in the Summary Report, most debit card growth from 2009 to 2012 was from card-present transactions, which grew 9 billion while card-not-present transactions only grew 0.3 billion. In light of the dominance of debit card-present payments growth, most debit card-present payments growth from 2009 to 2012 was in payments over dual-message networks.

### 1.2.6 Third-Party Payments Fraud

The 2013 Federal Reserve Payments Study was the first in the triennial series that collected data related to payments fraud. In the 2013 DFIPS, depository institutions were asked to report the number and value of unauthorized third-party fraud transactions. Although some fraud studies track the number of cases—where multiple transactions could be contained in one case—or prevention expenditures and losses, the definitions for this study were designed to measure the number and value of gross transactions processed by depository institutions and later identified to have been unauthorized third-party fraud—meaning someone other than the authorized user of the account or card fraudulently made the transaction. All types of third-party fraud payments are covered regardless of how the depository institution learned of the fraud. Third-party payments fraud estimates from the study were described in the Summary Report, and are further described in section 2 of this report.

The gross amount of unauthorized third-party fraud payments reported does not cover all types of potential fraud, and includes only the amount of fraudulent unauthorized payments that were actually processed. For example, first-party payments fraud, while important, is an account-relationship type of fraud and would typically not be included as unauthorized third-party fraud payments because the card or accountholder is by definition authorized to make payments. So long as a user is authorized, first-party fraud can occur no matter how secure the payment method. As another example, data breaches can be related to payments fraud if data within the system is accessed by a third party and used in a fraudulent way. While data breaches are *not* directly measured, unauthorized third-party fraud transactions that are facilitated by such data breaches *are* included in the estimates. No information was collected, however, that would attribute such transactions to any specific breach or to data breaches in general.

The 2013 DFIPS made no attempt to collect data on any unauthorized transactions that were not fraudulent. For example, some unauthorized payments are unrelated to fraud but can result from clerical errors, accidentally replicated files, or computer glitches.



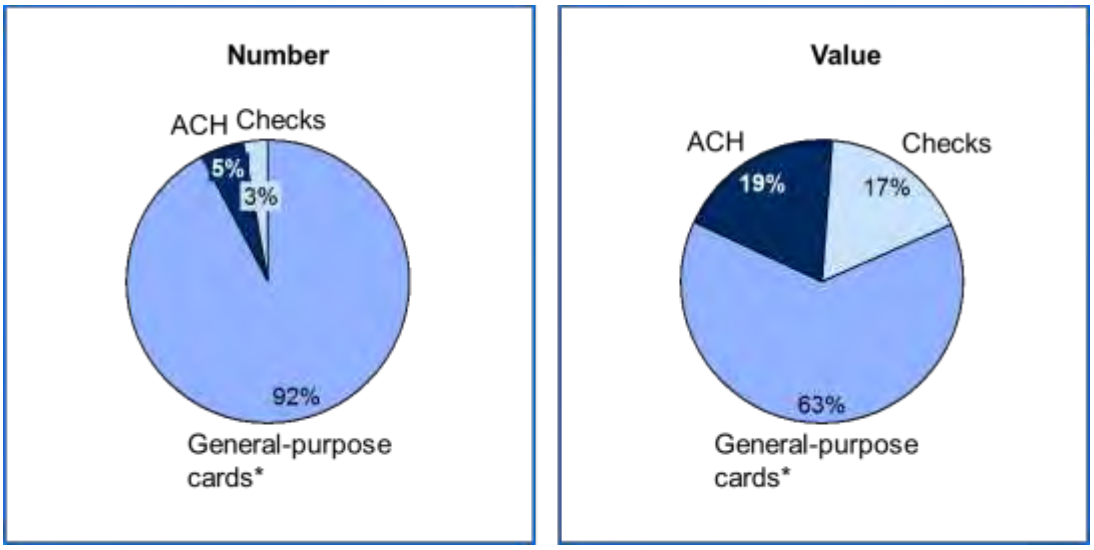
IPR2025-01151
Apple EX1037 Page 30

Different types of payments may involve different loss risks to the various parties involved, including the payer, the payee, and their depository institutions. Payers may face very little risk of loss, so long as they take precautions such as keeping their PIN, checks, and wallet safe; reporting to the issuer if cards are lost or stolen; and monitoring account statements for unauthorized activity. Different payment channels may have different opportunities for fraud, and not every fraud attempt leads to a loss.

#### 1.2.6.1 Comparison of Card Fraud to ACH and Check Fraud

In 2012, general-purpose cards—including general-purpose credit cards, debit cards, and general-purpose prepaid cards—represented 92 percent of the number of unauthorized transactions identified as third-party fraud and 63 percent of the value of these unauthorized transactions (Exhibit 10). The values of unauthorized third-party fraud payments by check ($1.1 billion) and ACH ($1.2 billion) were extremely small relative to the total authorized values for check and ACH, respectively.

**Exhibit 10: Distribution of unauthorized third-party fraud transactions in 2012 among general-purpose cards, checks, and ACH**




*General-purpose cards include credit, debit, and prepaid payments as well as ATM withdrawals. Figures may not sum because of rounding.

#### 1.2.6.2 Unauthorized Third-Party Card Fraud by Transaction Type

Among cards, information on unauthorized third-party fraud was collected for general-purpose credit card transactions, combined debit and general-purpose prepaid card transactions, and, separately, ATM withdrawals made with debit or general-purpose prepaid cards. In 2012, there were 13.7 million fraud transactions by credit card, 14.9 million fraud transactions by debit or general-purpose prepaid card and 1.3 million fraudulent ATM withdrawals.[20] By value, there was $2.3 billion in fraud by credit card, $1.5 billion in fraud by debit or general-purpose prepaid card, and $0.3 billion in fraudulent ATM withdrawals. With respect to the total value of unauthorized third-party fraud card payments, card-present, which totaled $2.4 billion, was greater than card-not-present, which totaled $1.6 billion.[21]

Within general-purpose cards, details on unauthorized third-party fraud payments allow comparisons of fraud rates by card transaction type (Exhibit 11). For both general-purpose credit cards and debit cards, card-not-present fraud rates by number were approximately 3 times card-present fraud rates in 2012. The card-not-present fraud rate for general-purpose credit cards was 11.4 basis points, the highest fraud rate among all types of unauthorized third-party card fraud transactions measured in the study. That is equivalent to more than 1.1 unauthorized third-party fraud payments for every 1,000 card-not-present general-purpose credit card payments. Within card-present fraud rates by number, unauthorized third-party debit and prepaid fraud transactions (including ATM withdrawals) involving a single-message network, at 0.9 basis point, were less than one-third of the fraud transactions that used a dual-message network (3.1 basis points). The credit card fraud rate by number was the highest among the card-present transactions (3.9 basis points).

Measured by value, card-not-present fraud rates were similar to card-present fraud rates, in contrast to the much higher card-not-present rates by number (Exhibit 12). The rate of card-present dual-message debit and prepaid card fraud by value was 12.4 basis points, the highest among all types of card transactions. For credit cards, the fraud rate by value for card-not-present transactions was higher than for card-present transactions, but the difference was a comparatively small 2.4 basis points. By value, the rate of single-message debit and prepaid

---

[20] See the Summary Report table in section 3.3.3.

[21] Both totals include transactions with general-purpose credit, debit, and prepaid cards. Card-present unauthorized third-party fraud payments include ATM withdrawals.

fraud (including ATM withdrawals) was 2.7 basis points, substantially lower than the other fraud rates.

**Exhibit 11: Rate of unauthorized third-party fraud transactions (number) in 2012, by type of general-purpose card transaction**

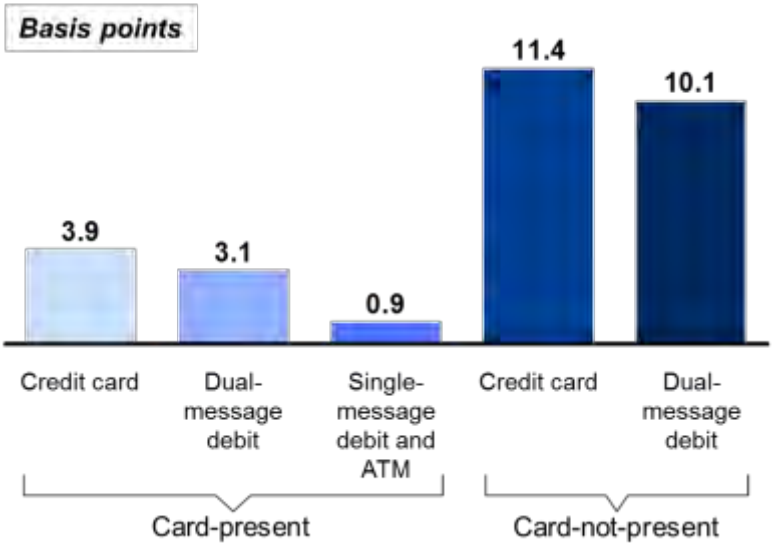
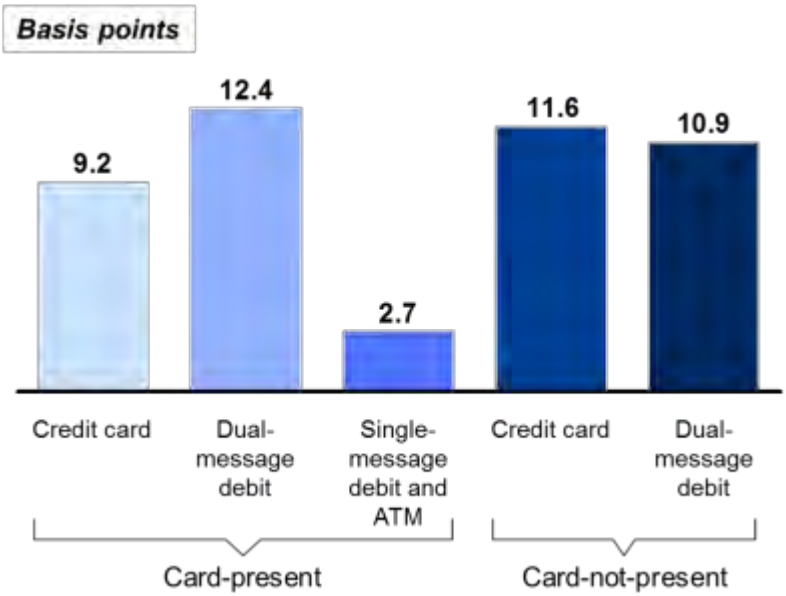



**Exhibit 12: Rate of unauthorized third-party fraud transactions (value) in 2012, by type of general-purpose card transaction**



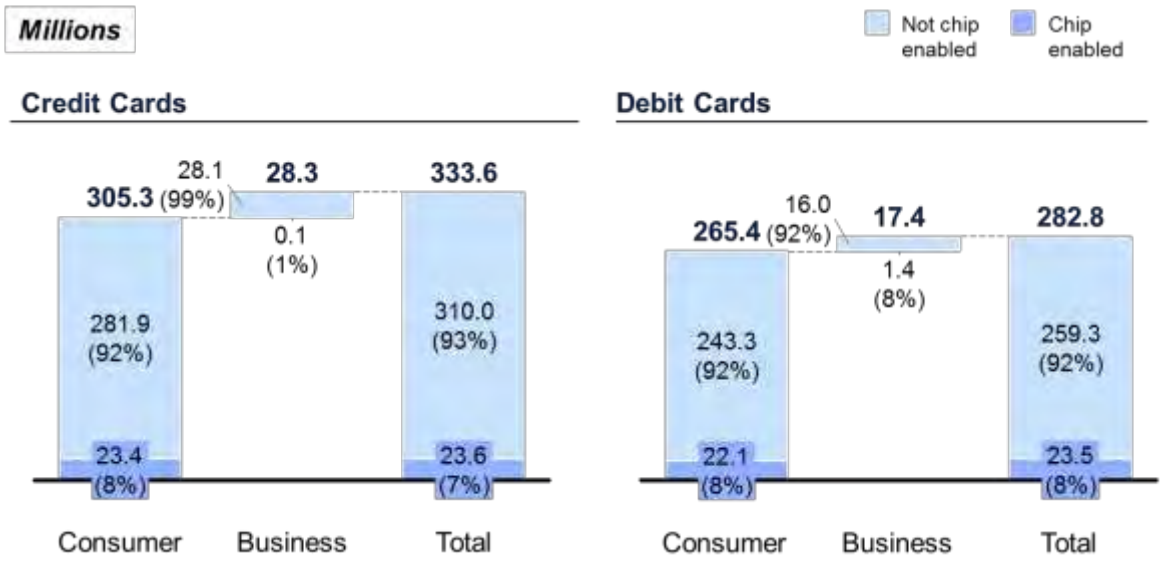

Includes general-purpose cards only. Debit includes prepaid. Basis points are the number or value of unauthorized third-party fraud transactions per 10,000 transactions or $10,000 spent, respectively. One hundred basis points equals 1 percent.

#### 1.2.6.3 Microchip-Enabled Cards

Microchips embedded in cards offer greater security in card-present transactions because the chip is difficult to counterfeit.[22] Chip transactions can be supported by motorized card readers that pull the card in through a slot and make contact with the chip, or by card readers that use near-field communication (NFC), which allows information to be transmitted with a quick touch or wave of the card. Both types are in use in the United States, but the use of NFC is typical at the point of sale because of its convenience, while the motorized card readers are more typical in countries that adopted chip cards earlier.

While some countries have widely adopted such cards, only a small fraction of general-purpose cards in force and issued in the United States use chip technology. As of 2012, 7 percent of general-purpose credit cards in force and 8 percent of debit cards in force had chips (Exhibit 13). The availability of terminals that accept chips is also an important factor in making chip-based payments but was not estimated in the study.

**Exhibit 13: Number of general-purpose credit and debit cards in force in 2012, with or without microchips, by cardholder type**




[22] Payments that use a chip are more secure than payments that use a magnetic stripe because the chip has security features, such as dynamic data and encryption capabilities, that are not possible using a magnetic stripe.

Cards in force are those that are issued, activated, and not expired. Figures may not sum because of rounding.

While the use of chips for payment is relatively new in the United States and has likely been growing, the number of chip-based payments compared with total card payments was very small in 2012. There were approximately 13.4 million chip-based general-purpose credit card transactions, or 74 out of every 100,000 card-present general-purpose credit card transactions in 2012. There were 27.0 million chip-based debit card payments in 2012.[23] Slightly rarer than general-purpose credit cards, 65 out of every 100,000 card-present debit card transactions were chip based. There were an estimated 46,000 chip-based prepaid card payments in 2012. Only 17 out of every 100,000 card-present general-purpose prepaid card payments were chip-based, a considerably lower rate than for credit or debit cards.

Payments using the chip tended to be smaller in value than other card-present payments. The average value for chip-based card-present general-purpose credit card payments was $47 in 2012, compared with $68 for overall general-purpose credit card-present payments. At $14, the average value of chip-based card-present general-purpose debit card payments was less than half that of overall debit card-present payments ($34), while the average value of chip-based card-present general-purpose prepaid card payments was only $9, compared with an overall general-purpose prepaid card-present average value of $30.

## 1.3 PRIVATE-LABEL CARDS

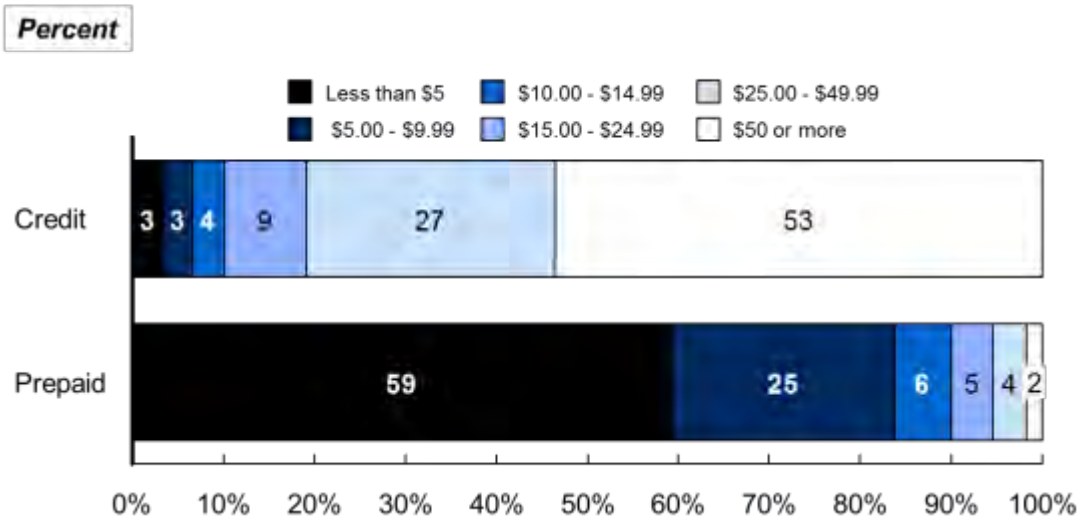
### 1.3.1 Distributions of Private-Label Credit and Prepaid Card Transaction Values

Private-label credit and prepaid cards are often used as substitutes for general-purpose cards, usually because such cards offer incentives to users. More than half of transactions for which private-label credit cards were used had a value of $50 or more in 2012 (Exhibit 14). Merchants often use store-issued credit cards to provide credit to consumers for larger purchases. On the other hand, private-label prepaid cards tended to be used for much smaller-value, more frequent purchases: Almost 60 percent of private-label prepaid card transactions were for amounts less than $5.

---

[23] Estimate is revised based on new information.

**Exhibit 14: Relative frequency of transaction value ranges in 2012, by private-label card type**




Percentage distribution is within each card type. Figures may not sum because of rounding.

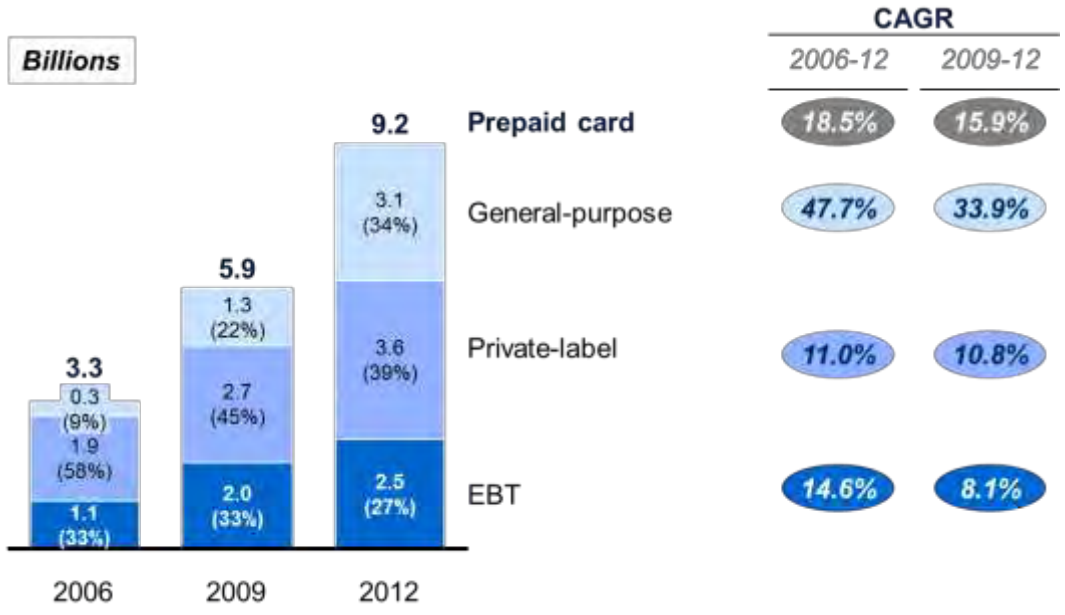
### 1.3.2 Growth in Prepaid Card Payments

Various types of prepaid cards have been tracked consistently since 2006. Prepaid cards, including private-label (except prepaid transportation), general-purpose, and EBT, collectively increased at the fastest rates among all types of payments from 2006 to 2012 (18.5 percent per year) and from 2009 to 2012 (15.9 percent per year) (Exhibit 15). Over the years, private-label prepaid cards, typically issued by retailers, had the highest number of payments among the three types of prepaid cards.



IPR2025-01151
Apple EX1037 Page 36

**Exhibit 15: Growth in the number of prepaid card payments 2006-2012, by card type**




Excludes payments by private-label prepaid transit cards and far-field RFID toll collections, which are reported below. Figures may not sum because of rounding. CAGR is compound annual growth rate.

EBT payments were grouped with private-label prepaid cards for the Summary Report, but are broken out in this report. EBT programs, sponsored by federal, state, and local governments, are used to disburse funds for a range of government assistance programs, including the Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program. Use of these cards generally involves restrictions on purchases as well as participation only by limited retailers. From 2006 to 2012 EBT payments were growing at a rate of 14.6 percent, although like other prepaid card types, growth rates slowed after 2009.

### 1.3.3 Private-Label Prepaid Transportation Payments

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 (Exhibit 16). For decades, innovations in automated payments technology have been replacing cash payments at local transit systems (rail and bus) and automobile toll roads and bridges. Many local transit systems have used paper-based magnetic-stripe stored-value tickets that are capable of supporting multiple rides. More recently, these types of systems are being replaced with magnetic-stripe plastic cards and, in



IPR2025-01151
Apple EX1037 Page 37

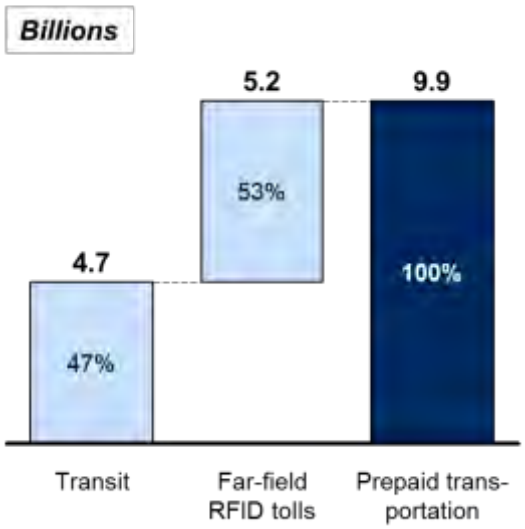
some cases, with chip-based cards. Most toll roads and bridges accept cash payments, and in some cases have expanded acceptance to general-purpose cards. In addition, far-field RFID payments reported here, which generally allow for faster passage around toll collection locations, have grown substantially. Some high occupancy/toll (HOT) lanes, where single-occupancy vehicles can pay for access, only accept payment by far-field RFID.

**Exhibit 16: Types of private-label prepaid transportation payments**

| | |
|---|---|
| Private-label prepaid transit card payments | Payments by electronic fare cards issued by transportation authorities for use on local public bus and rail transportation systems |
| Far-field radio frequency identification (RFID) transponder toll collections | Payments by a device, usually mounted on a vehicle windshield, that debits a special-purpose account when the vehicle passes through a toll lane at the entrance or exit of a toll road or bridge |

The 2013 NPIPS surveyed major transit organizations and far-field RFID toll-collection processors to understand the scale of such payments. In 2012, the number of private-label prepaid transportation payments totaled at least 9.9 billion, with transit reaching at least 4.7 billion payments and far-field RFID tolls exceeding 5.2 billion (Exhibit 17). The surveys included the largest known firms and processors, but there was no attempt to estimate the number of such payments that were not reported.

**Exhibit 17: Number of private-label prepaid transportation payments in 2012**



## 1.4 ALTERNATIVE PAYMENT INITIATION METHODS

Payments using alternative payment initiation methods typically are cleared and settled over the usual card and ACH processing systems and, as a result, adding them to total payments would result in double-counting. Exhibit 18 lists the various types of alternative payment initiation methods examined in this report.

**Exhibit 18: Alternative payment initiation methods**

| | |
|---|---|
| Person-to-person (P2P) and money transfer | Products that specialize in transferring funds between two individuals, usually featuring an online or email based system |
| Online bill payment | Bill payments initiated over the Internet via a bank or biller website and processed by bill payment aggregators and consolidators |
| Walk-in bill payment | In-person bill payments made at convenience stores, kiosks, and other locations and processed by large walk-in bill payment aggregators |
| Deferred payment | Online and telephone purchases using an intermediary that allows an immediate purchase with a bill to follow |
| Private-label ACH debit card | Cards, typically issued by merchants, which use point-of-sale debit terminals but route transactions through the ACH system rather than a card network |
| Secure online payment | Enhancements to online purchases that, for example, allow the entry of a PIN at the computer terminal, or redirect the purchaser to allow them to use an existing Internet payment account |
| Mobile wallet | Payments using the cell phone short message service (SMS), a mobile application, a virtual cloud based account, or near field RFID connected to a mobile device |

Online bill payments reported by bill-payment processors, which are settled mostly through ACH, had reached significant volume, at 3.1 billion in number in 2012 (Exhibit 19).[24] Other prearranged bill payments not reported here are also processed through ACH. Some processors also offer walk-in bill pay services, for example at convenience stores that enable

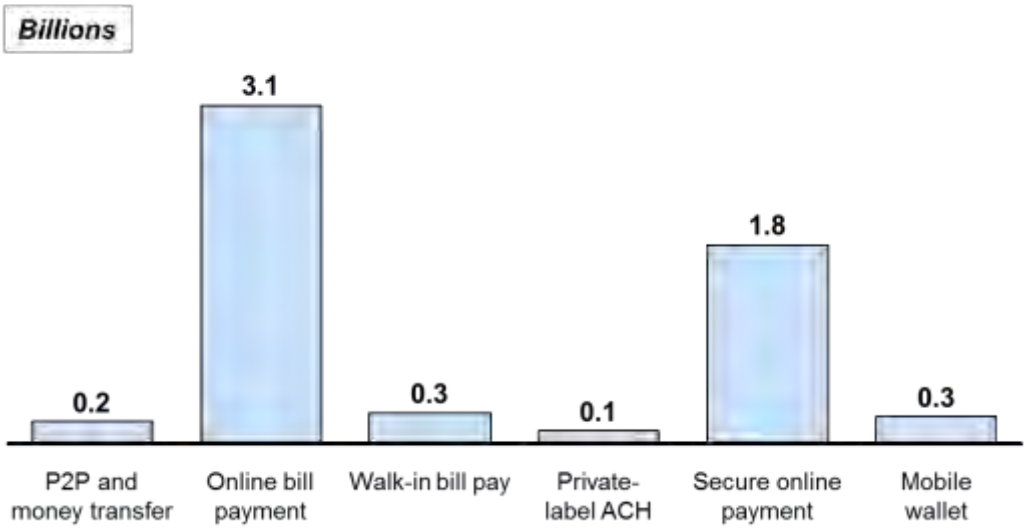
[24] As noted in the Summary Report, the number of bill payments initiated through depository institution websites is estimated to have been 2.5 billion. While that estimate is taken from a different survey, it is consistent with the figures provided by the processors



IPR2025-01151
Apple EX1037 Page 39

consumers to make a payment, usually funded with cash, without traveling to a specific billing office. The number of these payments reached 0.3 billion in 2012. As discussed above, some online bill payments are also processed over card systems.

**Exhibit 19: Number of payments using alternative payment initiation methods in 2012, by method type**




All figures represent lower bound estimates of the number of payments of each type in 2012.

Secure online payments, which include methods that allow users to enter PINs for debit cards into the computer while making an online purchase, as well as methods that redirect users to an Internet payment account, totaled 1.8 billion in 2012.[25] Mobile wallet payments, although still a relatively small portion of payments using alternative payment initiation methods at 0.3 billion, were greater than person-to-person (P2P) and money transfer payments (0.2 billion), which combined relatively small-value Internet P2P with relatively large-value domestic and cross-border remittances sent from domestic accounts.

[25] A common type of Internet payment account in the United States would be with an escrow service, such as PayPal, which interposes a third party between the buyer and seller in an e-commerce transaction and ensures the delivery versus payment of the goods or services. See Committee for Payment and Settlement Systems (2012) "Innovations in retail payments: Report of the Working Group on Innovations in Retail Payments," Bank for International Settlements, May 2012 for a definition of Internet payments. (www.bis.org/publ/cpss102.pdf)

The lower-bound estimates of alternative payment initiation methods are discussed in further detail in section 3.5. Estimates from 2009 and 2012 for many of these methods are available in section 3.8.2 and can be compared to get a sense of their growth.

### 1.5 AUTOMATED CLEARINGHOUSE (ACH)

Based on network volume breakouts, the largest number of ACH payments are categorized as prearranged payment and deposit entries (PPDs), which include direct deposit of payroll (ACH credits, meaning that the payer initiates the payment) and automatic bill payment (ACH debits, meaning that the payee initiates the payment).[26] These types of payments are mainly associated with consumers. A major category of business ACH payments are corporate cash concentration and disbursement entries (CCDs), which include ACH debits used to consolidate funds held by one corporation across multiple accounts into one, as well as ACH credits used for business-to-business payments.

ACH payments continued to grow, although one of the main drivers of growth during the past decade—check conversion—has begun to decline because fewer checks are being written overall.[27] Growth in ACH payments is not only because of the sustained growth in major consumer and business categories of payments discussed above (PPDs and CCDs), but also because of the emergence of new types of payments, particularly WEB payments, a category of ACH in which a consumer has authorized a one-time debit to their account over the Internet. Such payments are often initiated by a biller or e-commerce retailer based on a consumer authorization of the payment on their website. As of 2012, WEB payments represented one of the fastest growing categories of ACH payments by number (Exhibit 20). New developments may add to future ACH growth. For example, new ACH rules provide for consumer person-to-person ACH credits to be identified as WEB payments.[28]

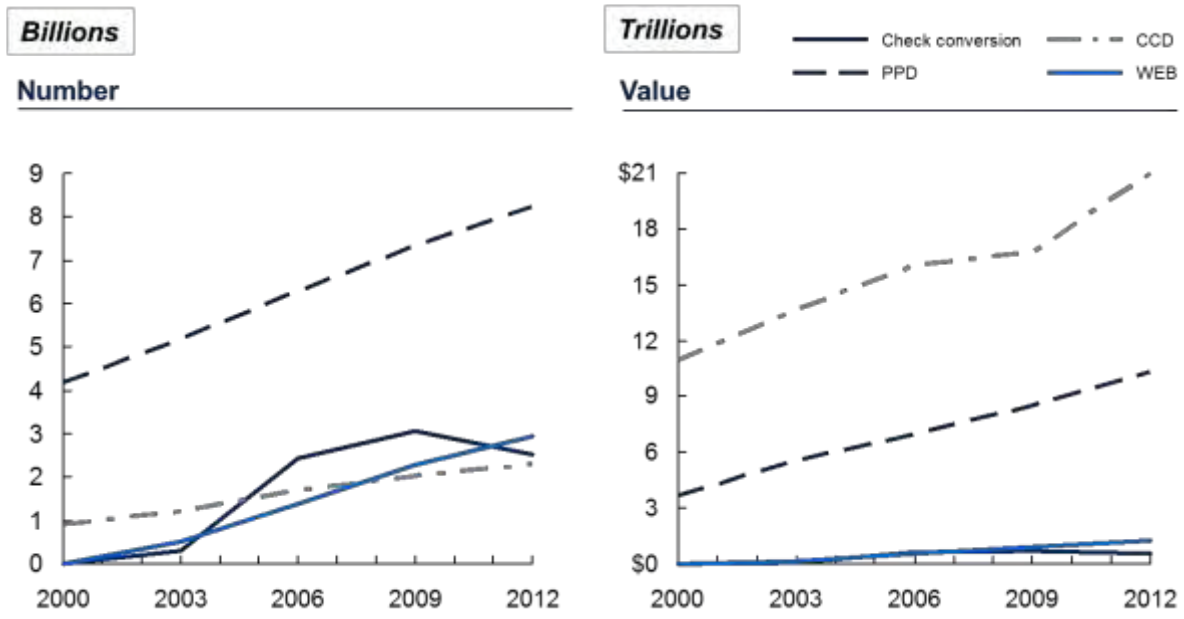
---

[26] Details on categories of ACH payments are reported in section 2.

[27] Check conversion categories include ARC, POP, and BOC.

[28] The new rules took effect in late March 2013. Rules that govern depository institutions' use of ACH are promulgated by NACHA-The Electronic Payments Association.

**Exhibit 20: Trends in selected types of ACH payments 2000-2012, by type**




ACH payment types are based on the definitions of the standard entry classification (SEC) codes assigned to the payments (obtained from NACHA-The Electronic Payments Association). Check conversion categories include ARC, POP, and BOC.

Since the Summary Report was released in December 2013, analysis of new data allowing the estimation of a type of ACH payment called an offset entry has led to revised estimates for ACH payments. Data revisions from several large commercial banks also contributed to changes in the total number and value of ACH payments reported in the on-us category.

Offset entries are used internally by some depository institutions to bundle several ACH payments, such as a collection of consumer bill payments to a single payee, into one ACH payment. Processing each offset entry may increase the number of payments in a bundle by one and double the amount of value. Offset entries can be processed in house or over the network. Offset entries represented 7.5 percent of the number and 8.8 percent of the value of ACH payments in 2012. Details on the offset entry estimates are available in section 2.3.1.

In this report, the revised total number of ACH payments for 2012, including offset entries, is estimated to be 21.7 billion, slightly smaller than the previous ACH number estimate in the Summary Report released in December 2013. However, the revised total value of ACH payments in 2012 is estimated to be $144.1 trillion, almost triple the previous ACH value estimate. The revised average value of an ACH payment is $6,638 while the revised average

value of an in-house on-us ACH payment is $21,653 and the average value of a network ACH payment is $2,202.

A substantial portion of this value can be explained by unusually high ACH on-us values at a handful of very large depository institutions. Previously, the high on-us value was thought to be overstated because these institutions were believed to have included internal account-balancing and settlement transactions, called offset entries, in their reported ACH values.[29] Because of this, as with estimates for previous years, the on-us value estimates in the Summary Report release in December 2013 were adjusted to exclude a portion of on-us value thought to be offset entries.[30] However, with the additional analysis since December 2013, it is evident that much of the value of on-us ACH payments reported by those large depository institutions is not because of offset entries. Therefore, the revised estimates of the total value of ACH payments in this report do not include any adjustments.[31]

### 1.6 WIRE TRANSFERS

Approximately 230 million payments—called wires or wire transfers—with a value of around $964 trillion passed over the U.S. domestic large-value funds transfer systems (that is, CHIPS and Fedwire) in 2012.[32] Compared with card, check, or ACH payments, the number of wire transfers is very small but the value is very large. Even though many of these payments are for very large interbank payments, a large fraction of payments are for relatively small dollar amounts. Exhibit 21 shows the estimated value distribution of wire transfers over these large-value funds transfer systems in 2012. Although some of the smaller amounts represent interest payments on overnight loans, many other smaller-value payments represent payments by nonbanks (consumers or businesses).

---

[29] See, for example, the discussion of on-us ACH payments in Geoffrey R. Gerdes (2008), "Recent Payment Trends in the United States," Federal Reserve Bulletin, October 2008, Vol. 94, page A96 (www.federalreserve.gov/pubs/bulletin/2008/pdf/payments08.pdf).

[30] All past estimates of ACH on-us value were adjusted so that the average value of an in-house on-us payment would be equal to the average value of the ACH payments reported by the operators to NACHA.

[31] More details and discussion of the ACH data and estimates are in sections 2.3 and 3.4.

[32] For statistics on CHIPS payments see www.chips.org/docs/000652.pdf?statistics and for statistics on Fedwire see www.federalreserve.gov/paymentsystems/fedfunds_ann.htm.

**Exhibit 21: Relative frequency of network wire transfer value ranges in 2012**

Includes only wire transfers sent over CHIPS and Fedwire. Figures may not sum because of rounding.

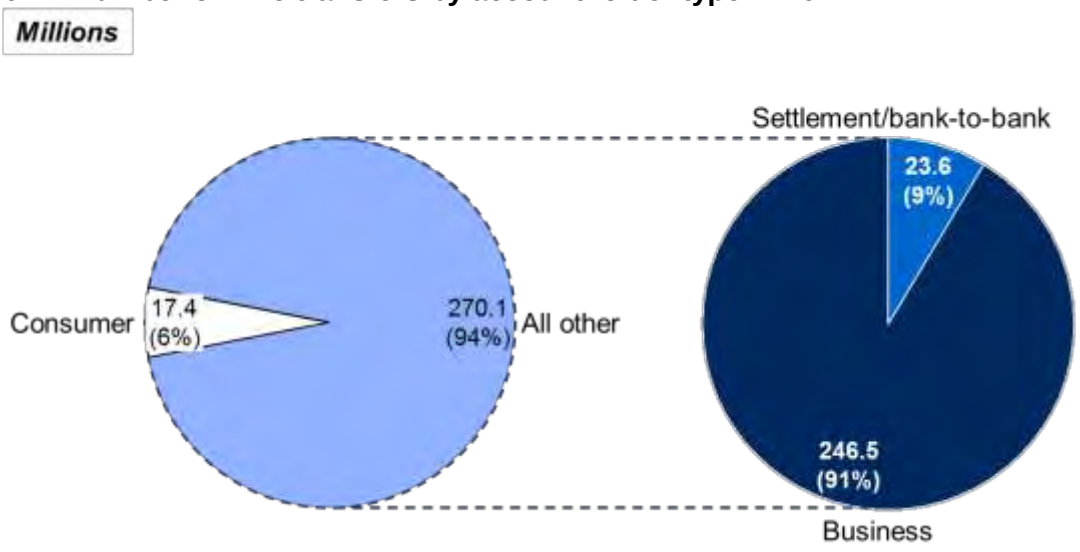
In an effort to better understand the use of large-value funds transfer systems the 2013 Study collected information on wire transfers for the first time. There were an estimated total of 287.5 million wires with a value of $1,116.3 trillion in 2012. The estimated total number of wires was 57.5 million higher than the estimated number that passed over the large-value funds transfer systems in 2012, suggesting that approximately 20 percent of wire transfers were on-us transfers conducted on the books of depository institutions without passing over a large-value transfer system.

By number, approximately 6 percent of wires in 2012 were sent from consumer customer accounts, and the remaining 94 percent were sent from business accounts (including for settlement/bank-to-bank transfers) (Exhibit 22, pie on the left). Of the wires sent from business accounts, 91 percent were from business customer accounts, and 9 percent were for bank-to-bank settlement (pie on the right).



IPR2025-01151
Apple EX1037 Page 44

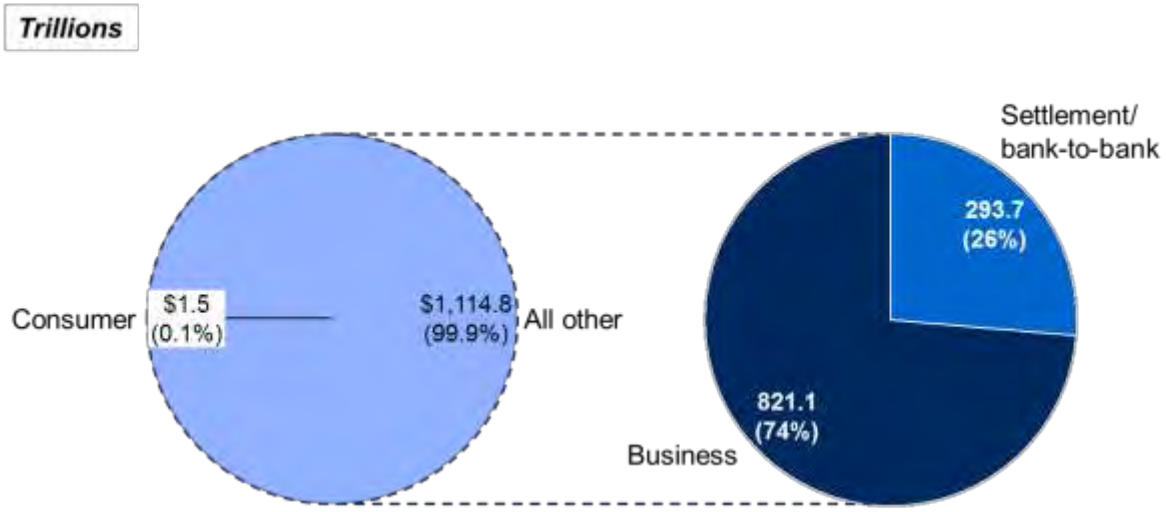
**Exhibit 22: Number of wire transfers by accountholder type in 2012**




Total wire transfers reported in the survey includes both network volumes (CHIPS and Fedwire) as well as book transfers.

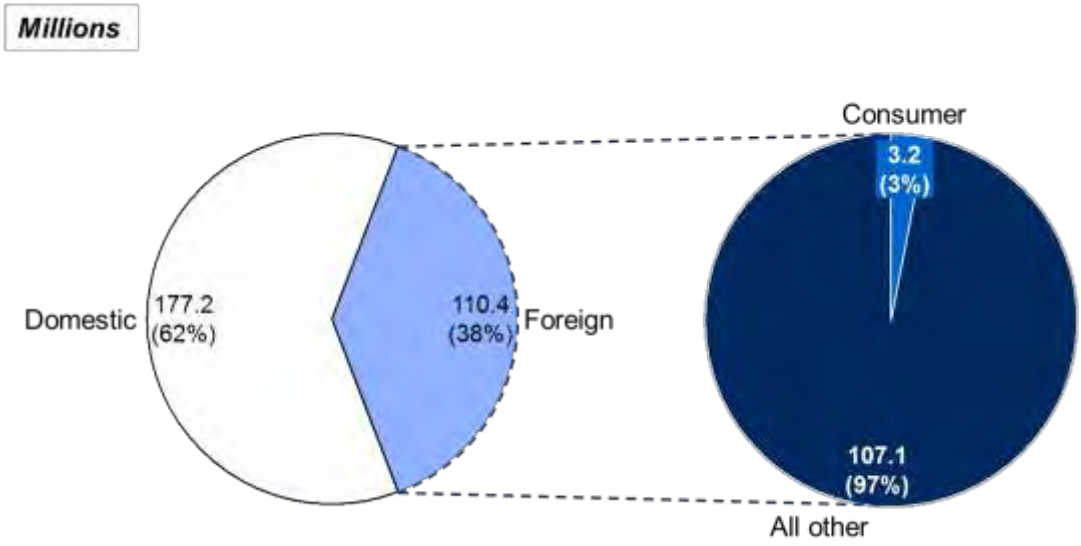
By value, wires from consumer accountholders only represented 0.1 percent of total wire transfer value in 2012 (Exhibit 23). Of the remaining wire transfer value, 74 percent were sent by business accountholders, and 26 percent were for settlement/bank-to-bank transfers.

**Exhibit 23: Value of wire transfers by accountholder type in 2012**



In terms of payee location, 62 percent of wires in 2012 were sent to domestic payees, and the remaining 38 percent of wires were sent to foreign payees (Exhibit 24). Of the wires sent to foreign payees, 3 percent were originated by consumer accountholders.

**Exhibit 24: Number of wire transfers by payee location in 2012**




Figures may not sum because of rounding.

## 1.7 CHECKS

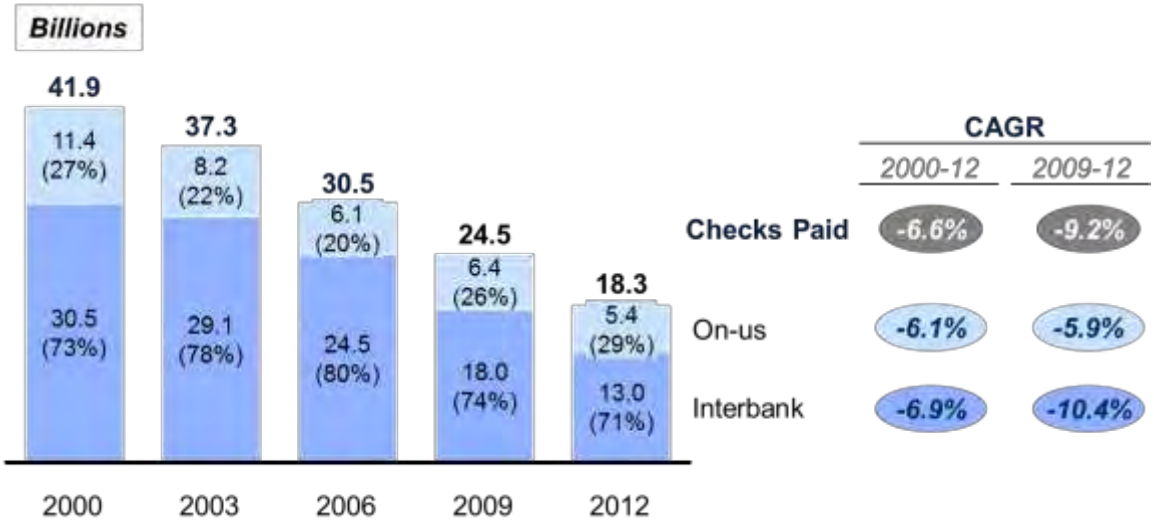
The estimated number of checks paid has declined 6.6 percent per year since 2000, from 41.9 billion in 2000 to 18.3 billion in 2012, or approximately 2 billion checks per year. The rate of decline was greater in the last three years, decreasing 9.2 percent per year since 2009, or slightly more than 2 billion checks per year. The greater rate of decline in recent years was primarily because of the declining base of checks. In fact, the measured decline in checks has been so steady that the decline in total paid checks can be roughly approximated by a straight line from 2000 to 2012.

The number of on-us checks—the portion of checks for which the paying bank and the bank of first deposit are the same depository institution—has declined 6.1 percent per year since 2000, from 11.4 billion in 2000 to 5.4 billion in 2012, or approximately 500 million on-us checks per year from 2000 to 2012 (Exhibit 25). The decline rate was smaller in the last three years, dropping 5.9 percent per year since 2009, or approximately 360 million on-us checks per year.

In the case of on-us checks, therefore, the decline is not well approximated by a straight line. The reduction in the decline rate of on-us checks was likely caused in part by mergers of depository institutions which, all else equal, tended to increase the number of on-us checks with an offsetting decrease in the number of interbank checks.[33]

The number of interbank checks has declined 6.9 percent per year since 2000, from 30.5 billion in 2000 to 13.0 billion in 2012, slightly less than 1.5 billion interbank checks per year. The decline in interbank checks was slightly larger than 1.5 billion per year from 2009 to 2012, offsetting the reduction in the decline in on-us checks during the same period. Virtually all interbank checks are now processed as images rather than paper.

**Exhibit 25: Trends in on-us and interbank checks paid 2000-2012**




Figures may not sum because of rounding. An on-us check is a check paid by the depository institution at which it was first deposited. An interbank check is a check paid at one depository institution but deposited at another.

The CSS, described in detail in section 4 of this report, estimated the proportion of checks in various counterparty and purpose categories from a random sample of checks processed by a

[33] Approximately 85 percent of checks were processed by commercial banks in both 2009 and 2012, but the number of commercial bank holding companies with nonzero transaction deposits declined by more than 300 over the period (a total decline of approximately 5 percent of the number of institutions). Subsequent to a merger, some on-us checks may continue to be processed through a clearinghouse until the operations of the institutions are consolidated.



IPR2025-01151
Apple EX1037 Page 47

small number of very large commercial banks. Because many of the sampled checks were interbank checks, they could also have involved any other depository institution in the United States, either as the paying bank or as the collecting bank. The estimated total number of checks written (from the DFIPS survey) was allocated to each category under the assumption that the estimated proportions, detailed in the CSS, represented the true proportions among checks processed by all depository institutions in the United States.

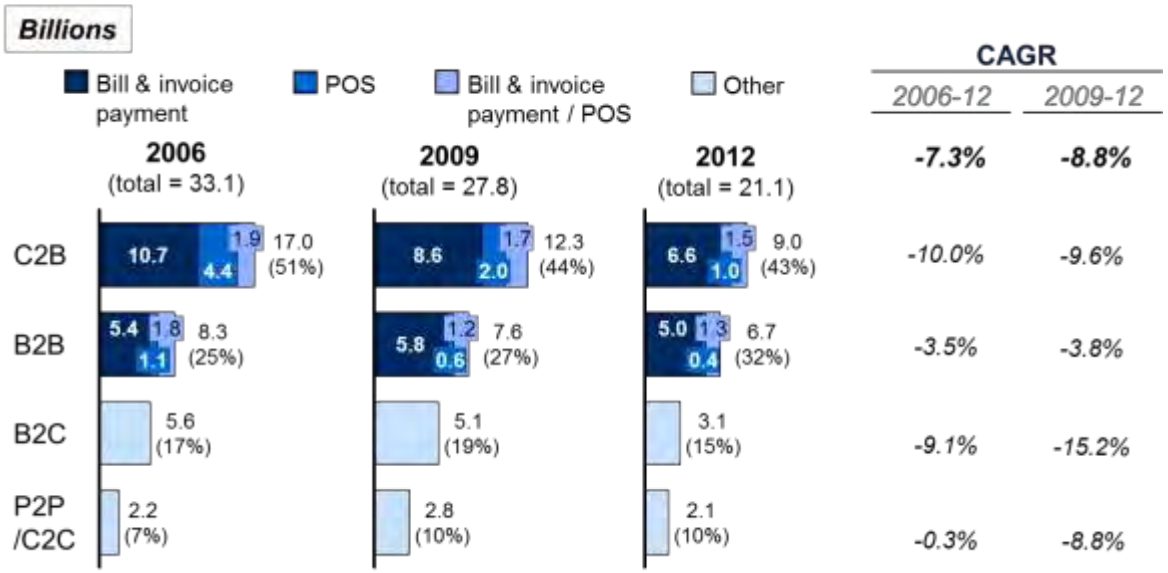
New information came to light during preparation of this report which necessitated an adjustment to the sampling probabilities for the 2009 and 2012 data. The revision mainly affected the number of business-to-business (B2B) checks, which declined less from 2009 to 2012 than previously reported, and the number of checks written by consumers (including both consumer-to-consumer (C2C) and consumer-to-business (C2B) checks), which declined more than previously reported. The 2006 estimates are not revised. Compared with 2006, the 2009 and 2012 data included responding banks that collectively held accounts for a larger portion of consumer customers. Thus, the rise in the number of consumer checks from 2006 to 2009 may be explained in part by the greater number of consumers represented in the check data. Because a consistent set of banks reported in 2009 and 2012, the trend estimates for that period should be more reliable than trend estimates starting from 2006.

The number of checks written, estimated from the 2013 DFIPS, declined from 33.1 billion in 2006 to 21.1 billion in 2012. Newly revised allocations of checks written from CSS show the changes in the number of checks written by payer, payee, and purpose categories (Exhibit 26).



IPR2025-01151
Apple EX1037 Page 48

**Exhibit 26: Checks written by counterparty 2006-2012**




Estimates are based on a large sample of checks from a small number of very large commercial banks. "C" refers to consumers. "B" refers to businesses, nonprofits, or government organizations. The rise in the number of C2C checks from 2006 to 2009 may have, in part, been because of a change in the composition of the sample from 2006 to 2009 (explained in the text). CAGR is compound annual growth rate. Figures may not sum because of rounding.

The number of business-to-consumer (B2C) checks had the fastest decline of 15.2 percent per year since 2009, and had reached 3.1 billion by 2012. The decline in C2B checks, at 9.6 percent annually since 2009, was slower than B2C but faster than the other categories. At 9.0 billion checks, C2B checks remained by far the largest portion of checks written. 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 point-of-sale purchases.

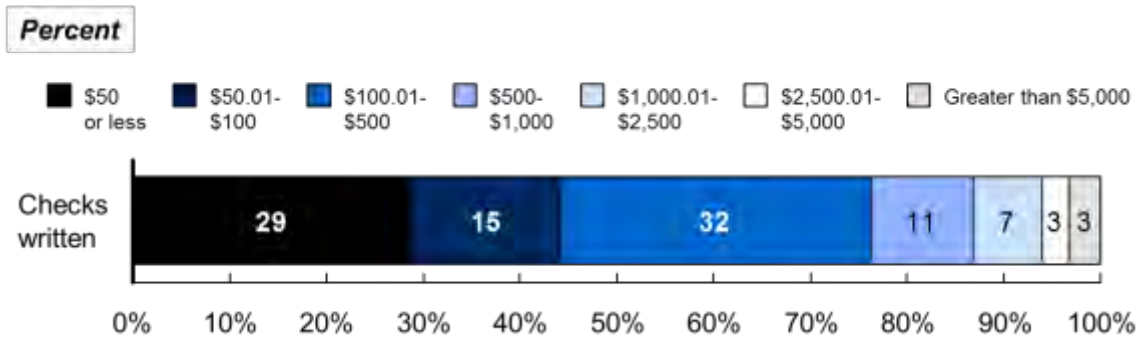
Declining by 3.8 percent per year since 2009, business-to-business (B2B) checks had the slowest decline of any category of checks. At 6.7 billion in 2012, B2B checks were the second largest category of checks. Although businesses have rapidly replaced checks being written to consumers, the same does not hold true with check payments to other businesses.

Consumer-to-consumer (C2C) checks (also sometimes called person-to-person (P2P) checks) have remained the smallest category of checks written over the years and have not shown a consistent decline like other counterparty types, in part because of the change in responding banks from 2006 to 2009 described above. C2C checks dropped from 2.8 billion in 2009 to 2.1

billion in 2012, leading to a slight decline from 2006 to 2012. C2C checks declined 8.8 percent from 2009 to 2012, the same rate as total checks written, suggesting that some alternative C2C payment initiation methods could be taking hold.

In 2012, approximately 76 percent of checks were written for $500 or less and 29 percent were written for $50 or less (Exhibit 27).

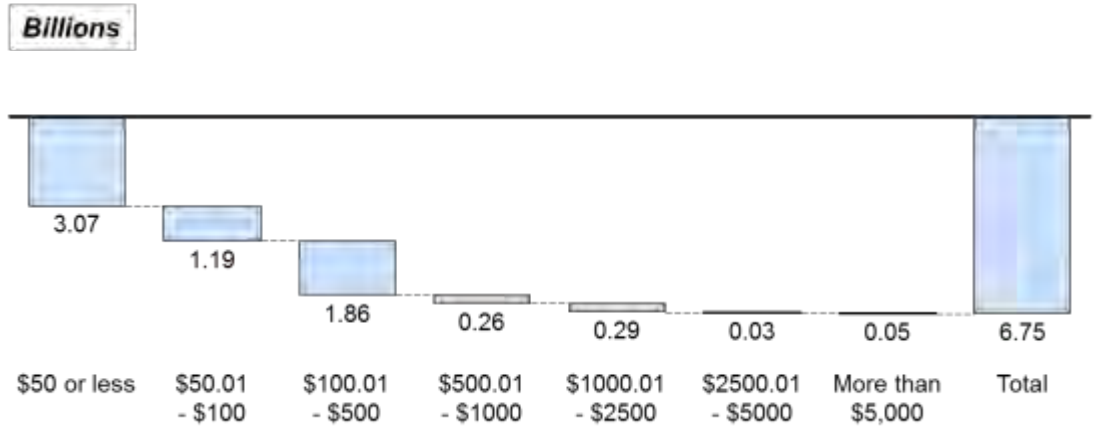
**Exhibit 27: Relative frequency of transaction value ranges in 2012, checks written**




Estimates are based on a large sample of checks from 11 large commercial banks.

Most of the decline in checks written (6.75 billion) from 2009 to 2012 can be attributed to a decline in checks less than $50 (3.08 billion), followed by checks between $100.01-$500 (1.86 billion) and checks between $50.01 and $100 (1.19 billion) (Exhibit 28).

**Exhibit 28: Change in transaction value ranges 2009-2012, checks written**




Estimates are based on checks sampled from 11 large banks.

Much of the decline in checks written may have been because of the replacement of checks by card payments which are most often C2B payments, and, as shown above, most card payments are for amounts less than $50.

A complete discussion of the counterparty and purpose allocations of checks is available in section 4.3.3 of this report.

## 1.8 CASH WITHDRAWALS AND DEPOSITS

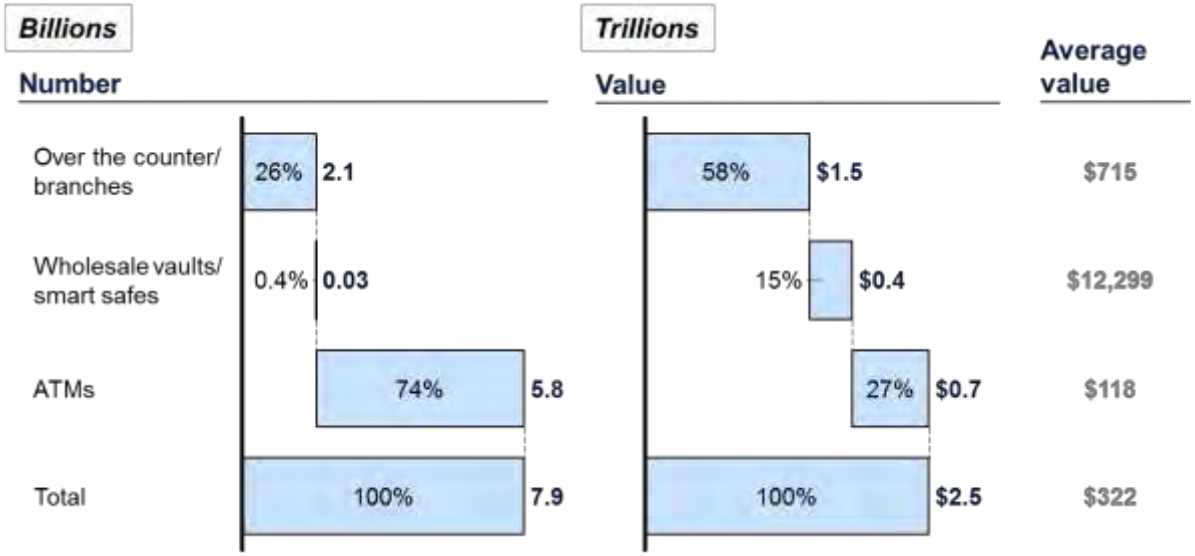
Although the Federal Reserve has been collecting data on ATM cash withdrawals through the surveys of depository institutions since 2003, the 2013 Study was expanded to collect more-comprehensive information about depository institution customers' domestic cash (currency and coin) withdrawals and deposits that were made over the counter at branches and at wholesale vaults and smart safes. Over-the-counter cash withdrawals and deposits involve the help of a branch teller, either inside the branch or at a drive-up window. In a wholesale vault cash transaction, a business accountholder, usually with the aid of an armored courier service, deposits cash received from sales and withdraws cash straps and/or coin rolls for the purpose of making change in retail stores. Smart safes, also referred to as remote currency management terminals (RCMTs) or "cash recyclers," allow businesses to deposit cash on premises as a substitute for visiting a bank branch or a wholesale vault. Some smart safes also allow limited withdrawals.

In 2012, there were 5.8 billion ATM cash withdrawals; more than twice as many as over-the-counter withdrawals at branches (2.1 billion) (Exhibit 29). However, the value of over-the-counter withdrawals at branches was $1.5 trillion, more than twice as much as the value of ATM withdrawals ($0.7 trillion). Withdrawals from wholesale vaults/smart safes were smallest by both number and value. The average value of cash withdrawals ranged from $118 for ATMs to $715 for over-the-counter cash withdrawals at branches and $12,299 from wholesale vaults/smart safes.



IPR2025-01151
Apple EX1037 Page 51

**Exhibit 29: Number and value of cash withdrawals at depository institutions in 2012**

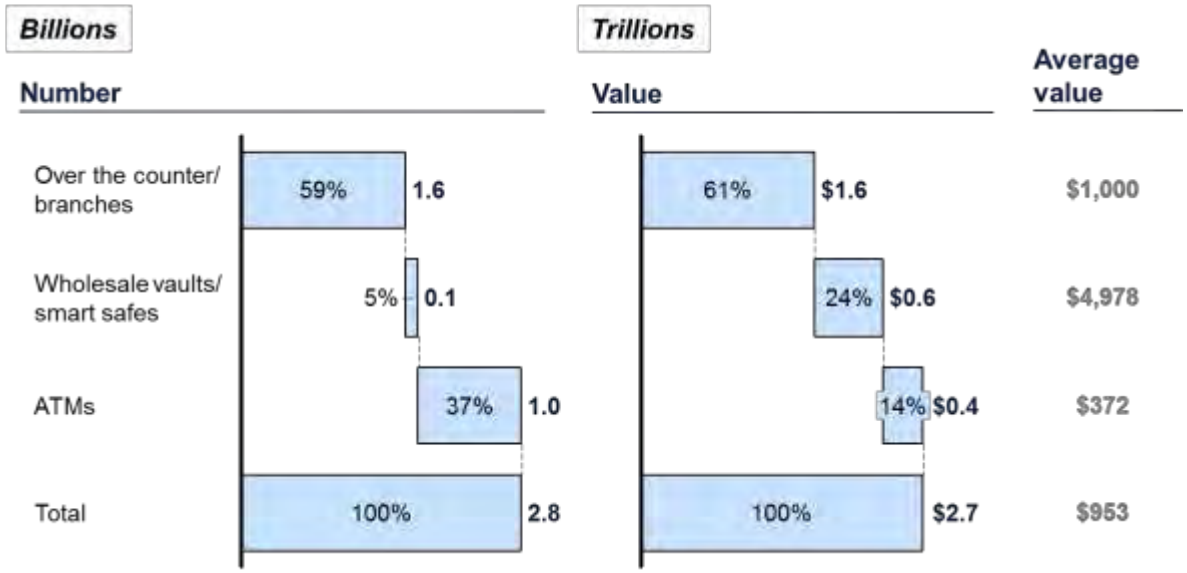



Includes cash (currency and coin) withdrawals from domestic deposit accounts only. Does not include credit card cash advances (measured separately). May include withdrawals made with checks written for "cash" at the counter. Figures may not sum because of rounding.

On the other hand, the number of cash deposits over the counter at branches (1.6 billion) was greater than the number of deposits at ATMs (1.0 billion) and at wholesale vaults/smart safes (0.1 billion) in 2012 (Exhibit 30).[34] By value, cash deposits over-the-counter at branches was also greatest ($1.6 trillion) followed by wholesale vaults/smart safes ($0.6 trillion). Over-the-counter deposits averaged $1,000 while ATM deposits averaged $372, and deposits at wholesale vaults/smart safes averaged $4,978.

[34] Deposit figures include only currency deposits and not deposits of checks.

**Exhibit 30: Number and value of cash deposits at depository institutions in 2012**




Includes cash (currency and coin) deposits to domestic deposit accounts only. Check deposits are not included. Figures may not sum because of rounding.

The estimated total domestic cash deposits ($2.7 trillion) somewhat exceeded domestic cash withdrawals ($2.5 trillion) in 2012, but given the estimation precision, these figures are not statistically different from each other. By comparison, worldwide U.S. currency in circulation reached more than $1.1 trillion at the end of 2012, and continued to grow.[35] With currency in circulation growing, overall deposits should be less than withdrawals, but as the survey only covers the domestic share, cross-border flows could influence the domestic totals. Although the amount held abroad is difficult to estimate with precision, evidence and analysis suggests that the domestic share of the value of U.S. currency could have ranged between 50 percent ($550 billion) and one-third ($367 billion) of the total.[36] With that estimated range of total domestic value and with deposits and withdrawals approximately $2.6 trillion, the average number of times each dollar of domestic cash would have passed through the banking system in 2012 ranged between 4.7 and 7.1.

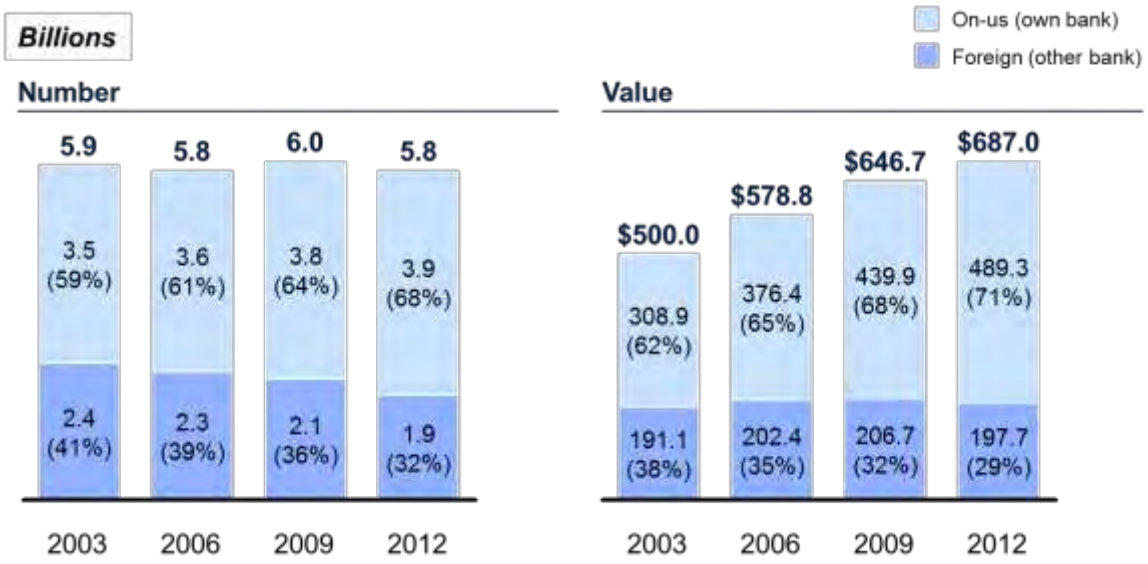
---

[35] See http://www.federalreserve.gov/faqs/currency_12773.htm.

[36] See Ruth Judson (2012) "Crisis and Calm: Demand for U.S. Currency at Home and Abroad from the Fall of the Berlin Wall to 2011," *Board of Governors of the Federal Reserve System*, International Finance Discussion Papers, IFDP 1058, Nov. 2012 (http://www.federalreserve.gov/pubs/ifdp/2012/1058/ifdp1058.pdf).

As noted above, ATM cash withdrawals have been tracked since 2003. The overall number of ATM withdrawals from 2003 to 2012 showed no clear upward or downward trend over the period, although the total peaked in 2009 at 6.0 billion—around the end of an economic contraction that began with the financial crisis—and was down slightly in 2012 (5.8 billion) compared with 2003 (5.9 billion) (Exhibit 31).[37] The value of ATM cash withdrawals increased from $500 billion in 2003 to $685.1 billion in 2012, and the rate of increase (3.59 percent per year) was higher than the rate of inflation over the same period (approximately 2.14 percent per year), implying a real economic increase in value of 1.45 percent per year.[38]

**Exhibit 31: Trends in ATM cash withdrawals 2003-2012, by on-us (own bank) and foreign (other bank)**




ATM withdrawal data was not collected for 2000. Figures may not sum because of rounding.

---

[37] The National Bureau of Economic Research (NBER) reports that the business cycle peaked in December 2007, about the time a financial crisis began to emerge, and reached a trough (the end of an economic contraction or recession) in June 2009. See http://www.nber.org/cycles.html.

[38] Calculations based on the implicit price deflator for U.S. gross domestic product (GDP) available at http://research.stlouisfed.org/fred2/series/USAGDPDEFAISMEI.

The number and value of on-us (own bank) ATM withdrawals increased consistently throughout the period, rising from 3.5 billion in number and $308.9 billion in value in 2003 to 3.9 billion in number and $489.3 billion in value in 2012. Meanwhile, withdrawals from foreign (other bank) ATMs experienced an offsetting decline as a result. The value of foreign ATM withdrawals increased slightly, but by an amount much less than inflation.

Debit and ATM cards as well as general-purpose prepaid cards are used to withdraw cash from an ATM. The number of debit and ATM cards with ATM withdrawals in 2012 was estimated to be 114.1 million, 68.4 million fewer than the number of debit cards with purchase activity. The number of general-purpose prepaid cards with ATM withdrawals, at 23.5 million, was approximately 5.9 million fewer than those with purchase activity.

Debit card and general-purpose prepaid card users also have the opportunity to withdraw cash at the point of sale. While the number of ATM withdrawals has been relatively flat since 2003, the number of debit and general-purpose prepaid card transactions at the point of sale involving cash back increased from approximately 0.6 billion in 2003 to approximately 1.5 billion in 2012. Compared with the average value of an ATM cash withdrawal ($118) in 2012, the average amount of debit and general-purpose prepaid card cash back was small ($33).

### 1.9 PAYMENT ACCOUNTS

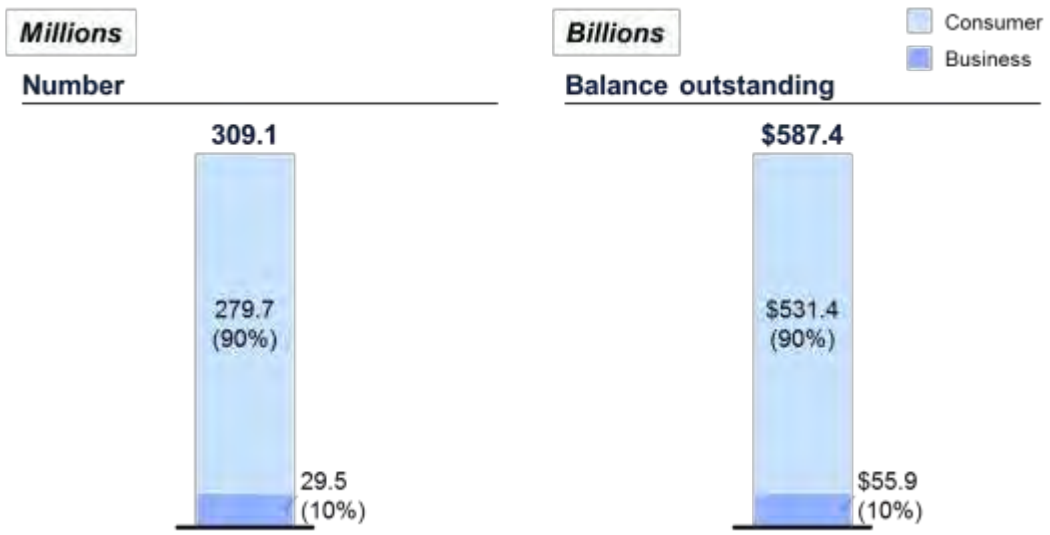
For the first time, the DFIPS collected information on the number and total balances in consumer and business general-purpose credit card accounts. The survey estimated that there were 309.1 million general-purpose credit card accounts as of 2012, with 279.7 million consumer accounts and 29.5 million business accounts (Exhibit 32). Total balances outstanding of these credit card accounts were estimated to have been $587.4 billion, with $531.4 billion outstanding in consumer accounts and $55.9 billion in business accounts. The average balance outstanding of consumer accounts was $1,900. The average balance in business accounts was estimated to have been extremely close to that of consumers ($1,899), but the equivalence of the averages masks considerable underlying diversity in reported averages between consumer and business accounts across depository institution type and size. Average calculations include accounts with a zero balance. Balances include revolving debt and current charges. Although the survey did not ask depository institutions to separately report



IPR2025-01151
Apple EX1037 Page 55

these amounts, there could be significant differences between these two types of accountholders.

**Exhibit 32: Number and balance outstanding of credit card accounts in 2012, by accountholder type**



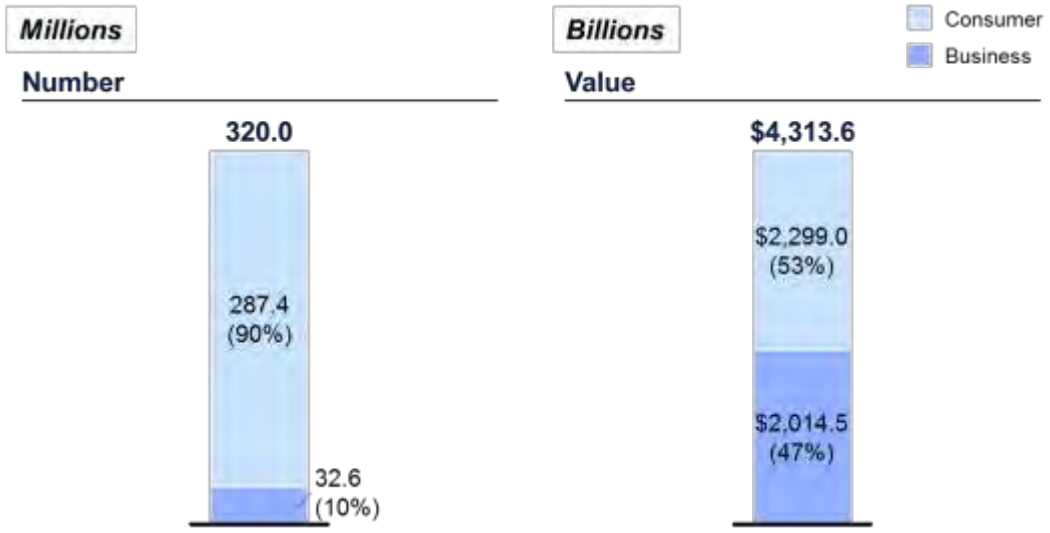

Figures may not sum because of rounding.

At 320 million, the number of transaction deposit accounts in 2012 exceeded general-purpose credit card accounts by approximately 10 million, but at $4.3 trillion, the total value of transaction deposits far exceeded the value of outstanding credit card balances (Exhibit 33). There were 287.4 million consumer transaction deposit accounts with a total value of $2.3 trillion, and an average value of $8,001. The number of business transaction deposit accounts was 32.6 million with a total value of $2.0 trillion, and an average value of $61,706.



IPR2025-01151
Apple EX1037 Page 56

**Exhibit 33: Number and value of transaction deposit accounts in 2012, by accountholder type**




Includes deposits of individuals, partnerships, and corporations at commercial banks, savings institutions, and credit unions, and excludes deposits of other banks or foreign governments. Figures may not sum because of rounding.

## 1.10 MORE INFORMATION ABOUT THE SURVEY DATA

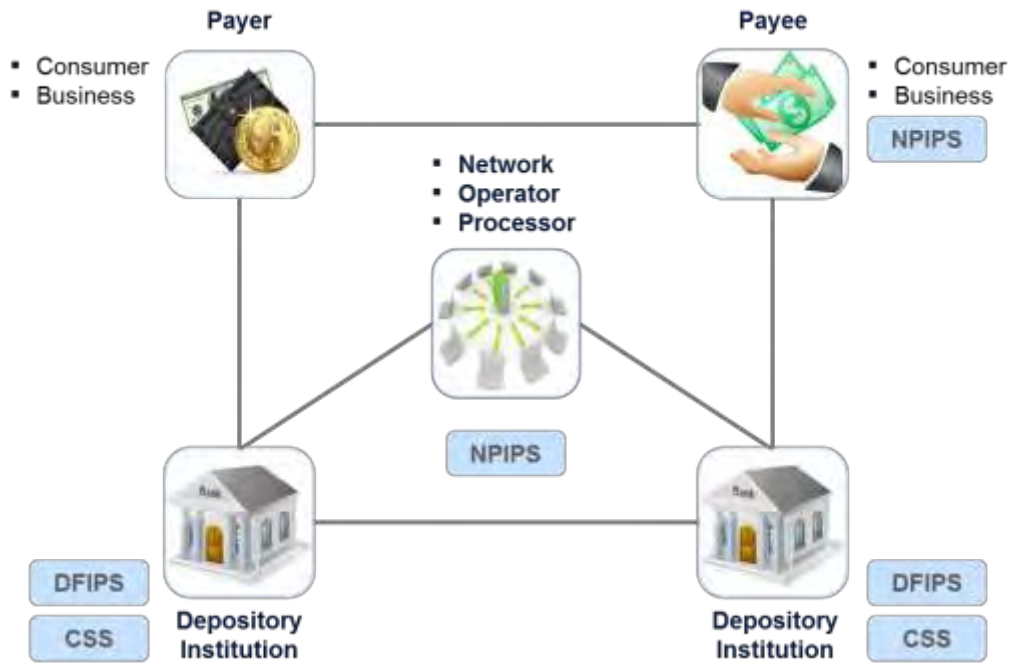
Sections 2 through 4 report information collected from the three individual survey efforts: DFIPS, NPIPS, and CSS. The Summary Report presents one estimate for each type of payment, although in some cases, the volume might be measured in more than one survey. The source of information and the timing, however, of the surveys differ: DFIPS survey forms were sent to a nationally representative, stratified random sample of depository institutions, which hold the transaction deposit accounts or credit card accounts and process checks, ACH, wire transfers, general-purpose cards, and cash for their consumer and business customers. The DFIPS collected data for the month of March 2013, while NPIPS included a set of 15 census-style surveys of networks, processors, and issuers and collected annual data for 2012.[39] The CSS

[39] Non-depository institutions, such as money market funds, hold funds in depository institutions, sometimes through sweep arrangements, to support payments. Regulations restrict payments from non-transaction accounts to no more than 6 per month. Some depository institutions that issue credit cards but do not hold transaction deposits are also included.

gathered data on individual checks collected and paid by 11 very large commercial banks during 2012.

The point of the payments process at which the survey respondents may have relevant information differs between the DFIPS, NPIPS, and CSS (Exhibit 34). Thus, while some of the data they provide are similar, the figures that the various respondents report are affected by the information available from the business processing systems they use.

**Exhibit 34: The Federal Reserve payments surveys and the payments process**




The chart depicts the parties that are potentially involved in a payment. Lines depict typical information flows, but flows vary by payment type. NPIPS collects information from payment networks, operators, and processors, as well as business payees that accept private-label payments. DFIPS and CSS collect information about payments processed by depository institutions.

Network operators and processors provided aggregate information in the NPIPS about payments that flowed through their systems. Depository institutions provided aggregate information in the DFIPS about the payments their accountholders made and, in some cases, about the payments their accountholders received. Some private-label payment cards were issued by the payee—for example, department store or oil company credit cards. In such cases, NPIPS also collected data directly from the merchant issuer (business payees in the exhibit).

While efforts are made to understand and, if possible, reconcile differences between estimates from each survey based on relevant information, some natural differences are allowed to remain in the estimates. Estimates for DFIPS, which are annualized based on March 2013 data by multiplying by 12, are not, for example, adjusted to try to reflect the growth of each estimated item between the year of 2012 and the month of March 2013.[40] Even with this minimalist approach, for estimates of payment types that have a clear overlap between DFIPS and NPIPS—as with general-purpose credit, debit, and prepaid cards—the differences tend to be consistent with the estimated growth rates of each type of payment.

While sampling error, definitional differences, seasonality, and timing are all contributing factors to some differences, when valid estimates are available from both surveys, the NPIPS annual 2012 estimates are presented in the exhibits and tables of the Summary Report and the exhibits of this detailed report. In general, where DFIPS and NPIPS survey estimates overlap they are consistent with each other once these factors are taken into account.

[40] While annualization by multiplying by 12 is arbitrary, it has the advantage of being simple. Any adjustment for seasonality could not be equally applied to all of the DFIPS estimates because the growth rates of different items are so different. Also, growth rates by item are based on previous survey estimates from three years ago, which may not serve as good estimates for more recent changes.



IPR2025-01151
Apple EX1037 Page 59

### 1.10.1 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.[41] Estimates of the number and value of network ACH payments are unchanged. Because of the change in the in-house on-us estimates, the 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 of the previously reported value.

---

[41] 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 EX1037 Page 60

- 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 revisions



IPR2025-01151
Apple EX1037 Page 61

# 2 Depository and Financial Institutions Survey (DFIPS)

## 2.1 INTRODUCTION

To address the increasing need for information on the U.S. payments system, the 2013 Depository and Financial Institutions Payments Survey (2013 DFIPS), a component of the 2013 Federal Reserve Payments Study (2013 Study), was expanded to include substantially more items than its predecessor, the 2010 Depository Institutions Payments Study (2010 DI Study).[42] To partially offset the anticipated reporting burden resulting from this expansion, respondents were asked to report information only for the month of March 2013 instead of two months (March and April 2010) as in the 2010 DI Study. When appropriate, the figures reported for the 2013 DFIPS are annualized by multiplying the estimates for March 2013 by 12. For ease of exposition, and for consistency with the 2012 annual data used in the other survey components of the 2013 Study, these annualized estimates will be referred to as estimates for 2012.[43]

The 2013 DFIPS collected information on volumes of payments and related activities from depository institutions (including credit card banks that do not offer transaction deposit accounts), such as the number and value of various types of noncash payments and cash withdrawals and deposits that posted to customer accounts, alternative payment initiation methods, and unauthorized transactions (third-party fraud) that were processed during the month of March 2013. Noncash payments measured include transactions by credit, debit and prepaid card, automated clearinghouse (ACH), wire transfer, and check. Close to 2,700 surveys were sent to a stratified random sample of commercial banks, savings institutions, credit unions, and credit card banks. Survey data returned by 1,182 institutions were used to construct annualized estimates for 2012.

---

[42] For more information on the 2010 Depository Institutions Payment Study (2010 DI Study), see https://www.frbservices.org/assets/news/research/2010-payments-study-detailed-data.pdf.

[43] Discussion of trends, seasonality, and other timing issues that could create differences between March 2013 and annual 2012 estimates may be found in section 2.9.



IPR2025-01151
Apple EX1037 Page 62

The reader may wish to refer to the survey instruments available online and the tables at the end of this section containing aggregate estimates.[44]

## 2.2 GENERAL-PURPOSE CARDS

The 2013 DFIPS included questions covering general-purpose credit, debit, and prepaid card use and reach. [45]

In addition to card payment volumes, the survey captured the number of accounts that are tied to these cards. Credit cards are used to access revolving and non-revolving (charge) credit accounts; debit cards access transaction accounts (known as checking accounts, NOW accounts, or share draft accounts in the case of credit unions); and prepaid cards access funds in special-purpose, prepaid accounts designed to support various prepaid card programs, some of which have features that resemble a typical transaction account and others of which have features tailored to specific uses.

General-purpose cards are counted several ways—cards in force, cards with purchase activity, and chip enabled (chip) cards.[46] These measurements also account for the type of network (dual-message or single-message), whether the card was used (card-present), or just the card account number and other data were used (card-not-present) and the type of cardholder (consumer or business).[47] Most general-purpose card transactions are processed through Visa, MasterCard, American Express, and Discover and several smaller networks, or, in the case of debit and prepaid cards, one of more than a dozen single-message (or PIN) debit card networks. Some card networks process general-purpose credit, debit, and prepaid card payments, while others may process only credit or only debit and prepaid. Debit and prepaid

---

[44] Electronic copies of the survey forms are available for download at https://www.frbservices.org/news/research.html.

[45] Different laws, regulations, and card network policies have varying definitions of debit cards and prepaid cards. In its definition of debit cards, the Federal Reserve's Regulation II includes "general-use prepaid cards," which this survey accounts for separately from debit cards, referring to them as general-purpose prepaid cards.

[46] Payment cards in the U.S. have magnetic stripes on the back containing static card information which is read by card terminals in payment situations where the card is present. Some cards issued in the United States also contain chips. Chip cards retain card information in a microchip embedded in the card, which can be encrypted and can use dynamic data. While not widely adopted, the availability of chip cards and chip terminals is growing. Chip cards and terminals in the United States typically use near-field communication (NFC), allowing a quick touch or wave of the card instead of a swipe of the magnetic stripe.

[47] Throughout the study, the business (or business/government) category included businesses; federal, state, and local government agencies; and nonprofit organizations.

cash-back transactions and credit cash-advance transactions are also measured in the 2013 DFIPS.

### 2.2.1 Credit Cards

The 2013 DFIPS included a new section on general-purpose credit cards, which were issued by depository institutions. In order to collect accurate credit card data in the United States, the 2013 DFIPS included depository institutions as well as credit card banks in the population and sample in 2013.[48] These institutions were asked to report data associated with all secured and unsecured general-purpose (major network) credit cards, and to exclude data associated with private-label cards or with corporate accounts where only an account number, but no card, was issued.

In addition to the number and value of credit card payment transactions, depository institutions reported the number and outstanding balances of credit card accounts they hold; the associated number of credit cards of various types, including cards in force, cards with purchase activity, and chip enabled cards; and the number and value of credit card cash advances. Depository institutions also reported all the above data for consumers and businesses separately.

Because the general-purpose credit card section is new to the 2013 DFIPS, trends are not available to be reported.

#### 2.2.1.1 General-Purpose Credit Card Payments

In 2012, the estimated total number of general-purpose credit card payments (excluding cash advances) equaled 23.7 billion. These transactions summed to a total value of $2.2 trillion, for an average value of $92 per transaction. Consumers initiated 84 percent of these payments (19.9 billion) and accounted for 69 percent ($1.5 trillion) of the total value. Meanwhile, businesses spent the remaining $0.7 trillion via 3.8 billion transactions. The average value per transaction was $179 for businesses and $76 for consumers.

---

[48] From a regulatory standpoint credit card banks are considered depository institutions but they do not hold transaction deposit accounts.

#### 2.2.1.2 General-Purpose Credit Card Cash Advances

In 2013, the DFIPS also began measuring credit card cash advances, an option allowing cardholders to withdraw or transfer cash up to a prescribed limit from an ATM or depository institution. A total of 88.6 million credit card cash-advance transactions in 2012 generated $71.1 billion in cash-advance value. Consumer credit card cash advances made up the vast majority of these advances - 94 percent of the total number and 95 percent of the total value. The remaining 4.9 million transactions were cash advances by businesses.

CONSUMER CASH ADVANCES

Approximately 65.3 million, equating to 78 percent, of consumer credit card cash advances in 2012 were provided through ATM or over-the-counter withdrawals, which averaged $260 per transaction. These withdrawals comprised 25 percent ($16.9 billion) of the total consumer credit card cash-advance value.

Convenience checks and balance transfers allow accountholders to transfer prescribed amounts (such as outstanding balances) from their credit or charge card to a payee. In a balance transfer, for instance, the accountholder transfers the balance from one card to another. Convenience checks may be used for balance transfers to obtain cash advances or to pay for a variety of goods or services.[49] In 2012, approximately 22 percent (18.4 million) of consumer credit card cash advances were completed via convenience checks or balance transfers. With an average value of $2,747, these transactions represented 75 percent ($50.5 billion) of the total consumer credit card cash-advance value.

BUSINESS CASH ADVANCES

Business cash advances often involve the use of employee travel cards, but also can involve the use of purchase cards. By number, business cash advances also favored direct withdrawals of cash over convenience checks and balance transfers. Approximately 14 percent (0.7 million) of business credit card cash advances in 2012 were initiated via convenience checks or balance transfers. Business balance transfers were likely driven by small business activities as most large corporation card accounts do not provide for revolving balances.

---

[49] Convenience checks are usually made via a “payable through” check, meaning that the check is paid by a different bank than the credit card issuing bank, which holds an account at a correspondent bank (a different depository institution) for this purpose. In that case, the correspondent bank is the paying bank and such checks are included in total checks reported by that correspondent.

The remaining 86 percent (4.2 million) of business cash advances were completed through ATM or over-the-counter withdrawals. At $401, the average value per ATM/over-the-counter withdrawal for businesses in 2012 was 54 percent higher than that for consumers. Meanwhile, business convenience checks or balance transfers had, on average, 7 percent more value ($2,940) than those for consumers.

#### 2.2.1.3 General-Purpose Credit Card Accounts

The estimated number of general-purpose credit card accounts in 2012 was 309.1 million, with total outstanding balances of $0.6 trillion.[50] The average outstanding balance in these accounts was $1,900. The outstanding balances reflect both borrowing and spending—that is, the totals include both revolving credit and current charges. Some consumers use the revolving credit feature of their credit cards, meaning they maintain a balance from period to period rather than paying the full amount of spending during the period. Many consumers pay off their balance at the end of each period.[51] Consumer credit card accounts in 2012 made up 90 percent (279.7 million) of total U.S. credit card accounts and approximately 90 percent ($0.5 trillion) of total outstanding balances. The average outstanding balance per consumer account was $1,900. Business credit card accounts made up the remaining accounts, with an average outstanding balance of $1,899. Because the typical business credit card account is essentially a "charge account," meaning that current charges must be paid at the end of the statement period, a greater portion of outstanding balances for business accounts are associated with current spending rather than revolving debt as compared with consumer accounts.

#### 2.2.1.4 Number of General-Purpose Credit Cards

In addition to the number of general-purpose credit card accounts, the 2013 DFIPS also measured the number of cards tied to these accounts. Close to 333.6 million credit cards were estimated to have been in force in 2012. Cards in force are those issued by the depository institution, activated by at least one cardholder, and unexpired. A little more than half (187.8

---

[50] These figures included both unsecured and secured credit card accounts in the United States. A portion of these accounts may not have an activated card associated with them if the cardholder has never activated the card or allowed their card to expire. In both cases, the accountholder might be paying down the balance on the account or they might maintain a zero balance.

[51] The 2013 DFIPS did not collect information about the proportion of accounts ` in these different ways, but other evidence supports these assertions (e.g., the Board's Survey of Household Economics and Decision\making (forthcoming) estimates that 57 percent of households consistently paid off their credit card balances over the 12 months prior to the survey).

million) of the credit cards in force had purchase activity (that is, made at least one purchase or bill payment in a month). With 305.3 million general-purpose credit cards, consumers controlled the majority (92 percent) of credit cards in force. The rest of the credit cards in force (28.3 million, or 8 percent) were associated with business accounts.

Consumer credit card accounts had an average of 1.1 cards in force, while businesses had an average of close to 1.0 card in force. Chip cards made up only 7 percent (23.6 million) of total credit cards in force.

Cards that were used to make at least one purchase or bill payment in a month are called cards with purchase activity or active cards. Purchase activity included card-present transactions such as point-of-sale (POS) purchases and card-not-present transactions such as bill pay, but not account activity such as interest charges or fees initiated by the depository institution. In 2012, slightly more than half (56 percent) of both consumer and business credit cards in force were cards with purchase activity. Cards issued by savings institutions posted the highest portion of card activity, with 81 percent of cards in force being active. Only 56 percent of cards in force issued by commercial banks had purchase activity during the same period—the lowest among the three depository institution types. Meanwhile 61 percent of credit union cards in force had purchase activity.

Consumer credit cards with purchase activity averaged 10 transactions per month. Active business cards, on the other hand, averaged 20 transactions per month. Consumers with cards issued by credit unions used their cards slightly less often than consumers at commercial banks (8 and 10 transactions per month, respectively), and the average credit card transaction value of credit union consumer cardholders ($68) was slightly less than that of commercial bank cardholders ($76). Meanwhile savings institution consumer cardholders used their cards least frequently (6 transactions per month) and spent $70 per transaction.

### 2.2.2 Debit and Prepaid Cards

The 2013 DFIPS collected combined as well as separate debit and general-purpose prepaid card transactions and, for the first time, also separately collected general-purpose debit and prepaid card cash-back transactions (point-of-sale transactions that included an amount of cash



IPR2025-01151
Apple EX1037 Page 67

given back to the cardholder).[52] Because previous studies collected combined debit and prepaid card cash-back transactions, the combined trend of debit and prepaid card cash-back activity has been reported in this section. Meanwhile, depository institutions reported the number and value of transaction deposit accounts and prepaid card program accounts, as well as the associated number of general-purpose debit and prepaid cards of various types, including cards in force, cards with purchase activity, and chip enabled cards.

#### 2.2.2.1 General-Purpose Debit and Prepaid Card Payments

In 2012, general-purpose debit and prepaid card transactions totaled 54.7 billion in number and $2.1 trillion in value. These transactions included debit and prepaid card transactions at the point of sale as well as card-not-present transactions on the telephone or Internet. The average value per transaction, including any cash-back amount, was $39.

General-purpose debit and prepaid card transactions were also allocated by the type of network—signature or PIN.[53] All debit and prepaid card transactions processed over a signature (dual-message) payment card network were classified as signature transactions. In 2012, just over 63 percent (34.7 billion) of these payments were signature transactions with an average value of $38 per transaction. PIN transactions made up the rest of the debit and prepaid card transactions. In addition to the card transactions processed over a PIN (single-message) payment card network, “PIN-less” bill payments settled through a regional debit card network were also classified as PIN transactions. In 2012, PIN transactions constituted 36 percent (20.0 billion) of the total and posted an average value of $42 per transaction.

#### 2.2.2.2 General-Purpose Debit and Prepaid Card Cash Back

Approximately 2.7 percent of combined debit card and prepaid card transactions involved cash back in 2012. This percentage has increase over time: The percentage of cash back in 2009 was 2.3 percent. The proportion of cash-back transactions differs considerably between debit and prepaid cards, as discussed below.

---

[52] The 2013 DFIPS is the first iteration of the study in which prepaid card estimates are reported in addition to debit cards associated with traditional transaction accounts. The 2010 Depository Institutions Payments Study (DI Study) collected information on prepaid cards, but separate estimates for prepaid card volumes were not produced.

[53] As discussed in the overview section of this report, dual-message networks are also called signature networks and single-message networks are also called PIN networks. The survey forms referred to these types of networks as Signature and PIN networks.

Although cash-back activity was significant in 2012, it was substantially smaller than ATM-withdrawal activity: The total number (1,455.0 million) and value ($47.4 billion) of cash back at the point of sale constituted 25 percent of the number and only 7 percent of the value of cash withdrawn at ATMs. From 2009 to 2012, general-purpose debit and prepaid card cash-back transactions increased 12.0 percent by number and 10.4 percent by value per year.

#### 2.2.2.3 Debit Cards

In addition to the number and value of general-purpose debit card payment transactions, depository institutions reported the number and value of transaction deposit accounts associated with debit cards (as well as checks and ACH payments), and the associated number of debit cards of various types. Depository institutions also reported the number of debit cards and the number and value of debit card transactions for consumer and business separately.

##### *2.2.2.3.1 General-Purpose Debit Card Payments*

Of the 51.2 billion debit card transactions in 2012, approximately 97 percent (49.4 billion) were made by consumers, while the value of consumer debit card transactions accounted for approximately 92 percent ($1.9 trillion) of the $2.0 trillion total value. The average value per consumer debit card transaction was $38, slightly less than the overall debit card average ($40).

Businesses accounted for the remaining 3 percent (1.7 billion) of the general-purpose debit card transactions with 8 percent ($0.2 trillion) of the total value. The average value per business debit card transaction was $89.

##### *2.2.2.3.2 General-Purpose Debit Card Cash Back*

Cash back held a relatively small share of debit card transactions as a whole. In 2012, only 2.7 percent (1,404.3 million) of debit card transactions included cash back. With a total value just surpassing $46.4 billion, the average amount of cash given back to the cardholder from these transactions was $33.

Credit union members had the highest rate of debit card cash-back activity at 4.3 percent of total debit card transactions in 2012. Cash-back transaction is a convenient alternative to ATM cash withdrawal and credit union cardholders may have fewer ways to access fee-free ATMs compared to their counterparts at savings institutions and commercial banks. Non-credit union accountholders initiated cash-back transactions only 2.4 percent of the time.

##### *2.2.2.3.3 Number of General-Purpose Debit Cards*

The total number of general-purpose debit cards in force was estimated to be 282.8 million in 2012. Of these 282.8 million cards, approximately 65 percent (182.5 million) had purchase activity. Average value of spending per card in 2012 was estimated to be $11,215. The remaining 35 percent of cards (100.3 million) did not have purchase activity; they were either idle or used only for non-purchase activity such as ATM access.

Consumers held 94 percent (265.4 million) of the total debit cards in force in 2012. Because of their extremely high share of debit cards, consumer cards largely reflected the overall figures for debit cards. Approximately 34 percent (91.4 million) of consumer debit cards in force did not have purchase activity. The estimated average spending per consumer debit card was nearly $10,885 in 2012, slightly lower than the overall average debit card 2012 spending which included business payments. Consumer cardholders at savings institutions had the highest average spending per card in 2012—approximately $13,294—compared to $10,853 for commercial bank and $10,487 for credit union consumer cardholders.

There were 17.4 million business debit cards in force in 2012, which accounted for 6 percent of all general-purpose debit cards. Less than half of them (8.6 million) had purchase activity. The average spending per business debit card was approximately $17,908 for the entire year, substantially higher than the consumer average.

In 2012, both consumer and business debit cards in force had a share of 8 percent with chips.

#### 2.2.2.4 General-Purpose Prepaid Cards

In addition to the number and value of general-purpose prepaid card transactions, the 2013 DFIPS included the number and outstanding funds value of prepaid card program accounts, the associated number of prepaid cards, and the number and value of cash-back transactions. For the number and value of prepaid card program accounts and the associated number of prepaid cards, depository institutions also reported the portion that they managed themselves separately from the portion that were managed by a third party.[54]

##### *2.2.2.4.1 General-Purpose Prepaid Card Payments*

---

[54] In addition to prepaid cards managed by issuers, many prepaid cards are based on programs managed by a third party. Major examples of cards that are managed by a third party include the U.S. Department of the Treasury's Direct Express program, which uses a non-depository institution to manage the program, as well as a depository institution to sponsor network access. Other examples include cards with brand names, like Green Dot or Net Spend, and payroll cards sponsored by various employers.

General-purpose prepaid card program accounts—including rebate or gift cards, payroll cards, and electronic benefit transfer (EBT) cards—totaled 236.3 million in 2012. From these accounts, 159.1 million prepaid cards were activated and unexpired, and 29.4 million of these prepaid cards showed purchase activity. Purchase activity on prepaid cards (18 percent) was considerably lower than that on debit cards (65 percent) in 2012. This is likely because of the fact that many prepaid cards were used as cash access devices or were marketed in ways (that is, gift cards) that drive infrequent usage.

General-purpose prepaid cards with purchase activity accounted for 3.5 billion transactions in 2012. The average value per general-purpose prepaid card transaction was $29, totaling approximately $0.10 trillion of total value in 2012. Among credit unions, the average value per general-purpose prepaid card transaction for credit union cardholders was notably large at $62.

#### *2.2.2.4.2 General-Purpose Prepaid Card Cash Back*

General-purpose prepaid cards were used to receive cash back at the point of sale 50.7 million times in 2012. With a total value of $1.0 billion, the average cash received during these transactions was $19. Prepaid card cash back in 2012 was 1.5 percent in number and 1.0 percent in value of total general-purpose prepaid card transactions.

#### *2.2.2.4.3 Number of General-Purpose Prepaid Cards*

In 2012, the total number of general-purpose prepaid cards in force was estimated to be 159.1 million, out of which approximately 96 percent (152.6 million) was held at commercial banks. Because of their extremely high share of general-purpose prepaid cards, prepaid cards at commercial banks largely reflected the overall figures for prepaid cards.

Approximately 59 percent of general-purpose prepaid cards in force in 2012 were managed by a third-party processor rather than the issuer of the card. This is mainly because approximately 62 percent of prepaid cards at commercial banks were managed by a third party. Credit unions were much less likely to sponsor a third-party program manager, with only 26 percent of their prepaid cards in force being managed by a third party, while savings institutions (at 1 percent of cards being managed by a third party) managed nearly all of the cards they had issued.



IPR2025-01151
Apple EX1037 Page 71

## 2.3 AUTOMATED CLEARINGHOUSE (ACH)

As in previous studies, the 2013 DFIPS measured ACH payments for the various channels through which these payments are cleared. These channels include the following:

- **Network** –ACH payments that are cleared through the financial network by operators (e.g., Federal Reserve, Electronic Payments Network). These transactions typically take place between two different depository institutions (called depository financial institutions, or DFIs, in NACHA rules). However, there are some instances where "on-us" transactions from a single depository institution—those between two accountholders of the same institution—are cleared over the network. In this scenario, the originating depository financial institution (ODFI), which is also the receiving depository financial institution (RDFI), makes the decision to send all of its origination volume through the network and have the operator segregate out on-us volume for settlement.
- **Direct exchange** –ACH payments cleared directly between two different depository institutions (one ODFI and one RDFI) without a network operator in between. Based the survey estimates, this type of arrangement is unusual and volumes are negligible.
- **In-house on-us** –Transactions processed internally by the same depository institution (that is, the ODFI is also the RDFI). In-house on-us payments are not cleared by a network operator.

<u>OFFSET ENTRIES</u>

Offset entries are a valid method of processing ACH payments, but tend to "double count" the value of ACH payments. Offset transactions are ACH entries used by some ODFIs to affect internal settlement so that the ODFI's general ledger remains in balance. The ODFI may, for instance, choose to originate offset entries if it receives "unbalanced" files from originators. Alternatively, it might choose a balancing method that does not involve the creation of an offsetting ACH entry, such as an internal accounting transfer (book transfer) to accomplish the same purpose. In cases where the originator sends a "balanced" file, the ACH offset entry is already included in the file for processing at the ODFI.

For further clarification, consider the case of an unbalanced file. Suppose an ODFI originates payroll for a business client (the originator) who has a biweekly payroll of $100,000 for its 100 employees. The ODFI will process 100 ACH credit entries, averaging $1,000 each. In this case, however, the originator does not send a balanced file, so in order to fund these payments the ODFI originates a single offsetting $100,000 debit entry to draw the funds from the



IPR2025-01151
Apple EX1037 Page 72

business's deposit account. All told, the ODFI has originated 101 ACH entries for a total of $200,000. The offset debit entry inflated the number of payments by one entry (just 1 percent), but it doubled the dollar amount. Offset entries, by their very definition, are on-us transactions. Depending on how the ODFI processes on-us transactions, these offset entries might be processed over the network. More typically, however, they are processed in-house.

Previous iterations of the study have requested that responding institutions exclude offset entries from their volumes, and to indicate whether or not they use offset entries. The 2013 DFIPS is the first version of the survey to request a separate allocation of total ACH payments for offset entry volumes. We believe that this approach has increased the accuracy of our estimates of ACH value compared with previous iterations.

These new data allow the exclusion of offset entries from on-us transactions resulting in, for the first time, directly estimated ACH on-us value. Previous estimates of on-us ACH value were based on the assumption that the average value of on-us ACH was equal to the average value of network ACH. These new ACH value estimates represent a revision to the 2012 estimates reported in the Summary Report from December 2013, and a break in series for trends in the value of ACH reported in past studies. While trend comparisons are still possible for ACH, by number, and for network ACH by number and by value, *trend comparisons with previous study iterations are not valid for on-us and total ACH value.*

### 2.3.1 ACH Payments

Excluding offsets, there were 20.0 billion ACH payments that totaled $134.5 trillion in 2012. The total number of ACH transactions declined 2.8 percent per year from 2009 to 2012, while their value increased 4.2 percent per year during that same time. In 2009, there were 21.8 billion payments totaling $119.0 trillion. As discussed in the introduction to this section, the 2009 estimate for total ACH value is not comparable with the 2012 estimate, but is not revised.

The new estimated average ACH payment excluding offsets was $6,733 per entry, $1,268 larger than the 2009 estimated average of $5,465. The value of the 2009 average is now assumed to be larger, but is unknown.

In 2012, nearly 78 percent of all ACH payments excluding offsets were cleared over the network using one of two network operators and just over 0.1 percent of ACH payments were exchanged directly between the ODFI and RDFI without the use of a network operator. The



IPR2025-01151
Apple EX1037 Page 73

remaining 22 percent of ACH payments were on-us payments processed in-house at the ODFI (which was also the RDFI).

#### 2.3.1.1 ACH Credit Payments

Excluding offsets, there were 7.5 billion ACH credit payments in 2012 totaling $67.6 trillion. ACH credit payments accounted for 37 percent of the total ACH payments and 50 percent of their value. Of these 7.5 billion ACH credit payments, 78 percent were cleared through a network operator while 22 percent were in-house, on-us payments. Only a small fraction of ACH credit payments—0.1 percent—were direct exchange entries.

#### 2.3.1.2 ACH Debit Payments

In 2012, there were 12.5 billion ACH debits excluding offset entries in the United States. These payments amounted to $66.9 trillion. Compared to the 13.7 billion ACH debit payments worth $57.1 trillion in 2009, the 2012 estimates represented a 3.1 percent decline per year in number and a 5.4 percent increase per year in value from 2009 to 2012.

The number of ACH debit payments excluding offsets constituted 63 percent of total ACH payments in 2012. By value, ACH debit payments represented almost 50 percent of the total ACH estimates.

Excluding offset entries, 77 percent (9.7 billion) ACH debit payments were cleared over the network—either by the Federal Reserve or EPN. Only a small fraction (0.2 percent) was exchanged directly between the ODFI and RDFI. The remaining 2.8 billion ACH debit payments were on-us and cleared solely within the ODFI.

#### 2.3.1.3 ACH On-Us Payments

On-us payments are those between to accountholders at the same institution. The 2013 DFIPS measured on-us payments cleared by the ODFI without a network operator. These are referred to as in-house on-us payments. The 2013 DFIPS, however, did not measure total on-us ACH payments as some on-us payments may be cleared using a network operator. These network on-us payments were included in network volumes reported earlier and are not discretely measured.

Excluding offset entries, the total number of in-house on-us ACH payments decreased from 5.0 billion payments in 2009 to 4.4 billion payments in 2012—a 4.0 percent decrease per year. The

value of in-house on-us payments increased during the period, from $84.9 trillion in 2009 to $98.6 trillion in 2012—a 5.1 percent increase per year.

## 2.4 WIRE TRANSFERS

Wire transfers include payments made using the two large-value funds transfer systems: 1) CHIPS, operated by The Clearing House, and 2) Fedwire, operated by the Federal Reserve Banks. In addition to wires over these systems, some wires are on-us, meaning they are settled on the books of a depository institution or through a correspondent bank without passing over these systems. The 2013 DFIPS included another new section on overall wire transfers originated from accounts at U.S.-domiciled depository institutions, separated into consumer and business wire transfers, as well as separated into wire transfers to a domestic payee (another U.S. bank accountholder) or a foreign payee (foreign bank accountholder). The survey also asked institutions to separate business wire transfers between those initiated for the purpose of the banks' own interbank settlement needs and wire transfers for business customer needs.

### 2.4.1 Total Wire Transfers

There were 287.5 million wire transfer transactions, totaling $1,116.3 trillion in value, in 2012.[55] This total value of wire transfers far exceeded every other payment instrument that was measured in the 2013 Study in terms of dollar value, followed by total ACH payment transactions at a value of $134.5 trillion (excluding offset entries). In terms of number of payments, wire transfers were the least used of the broadly defined payment instruments measured by the survey.

On average, wire payments were approximately $3.9 million in 2012.

#### 2.4.1.1 Consumer Wire Transfers

Consumer-originated wires summed to 6 percent (17.4 million) of the total wire transfers in 2012, accounting for 0.1 percent ($1.5 trillion) of the total value. The average value for these transactions was $88,112—or 2.3 percent of the average value for all wire transfers.

---

[55] Based on the difference between the estimated total number and value of wires and the number and value known to have been processed over the large-value funds transfer systems, roughly 20 percent of wires by number and 14 percent by value were estimated to have been settled outside of the large-value funds transfer systems.

#### 2.4.1.2 Settlement/Bank Business Wire Transfers

The wire transfers for a depository institution's own account consisted of 23.6 million transfers and $293.7 trillion in value in 2012. At $12.4 million per transaction, these settlement/bank business wire transfers held the highest average value of any wire transfer type measured in this study. This measure included all wires originated by depository institutions settling bank positions in, for example, the overnight lending market, or for the purpose of paying vendors. These 23.6 million settlement/bank business transfers constituted 8 percent of the total number and 26 percent of the total value for wire transfers made across U.S. networks in 2012.

#### 2.4.1.3 Other Business Wire Transfers

The remaining business-originated wires represented 86 percent (246.5 million) of the total wire transfers in 2012. They accounted for approximately 74 percent ($821.1 trillion) of the total value, with an average size of just over $3.3 million per transfer.

#### 2.4.1.4 Wire Transfers by Payer Type

The estimated ratio of settlement/bank business to consumer wires in 2012 was approximately 4:3, while the ratio of other business to settlement/bank business wires was approximately 10:1. Meanwhile, for every dollar wired for U.S. consumers, $191 was wired for settlement/bank businesses and $535 for other businesses. Correspondingly, by value, the ratio of other business-to-settlement/bank business was approximately 3:1, which implied that the total value of wires for settlement/bank businesses was approximately one third of the total value of wires for other businesses.

#### 2.4.1.5 Wire transfers by Payee Location

The 2013 DFIPS also measured wire transfers sent to domestic and foreign payees separately. Wires sent to domestic payees (or domestic recipients) were defined to be wire transfers originated from accounts at depository institutions in the United States to another account in the United States. Wires sent to foreign payees (or foreign recipients) were defined as wire transfers originated from accounts at depository institutions in the United States to an account outside the United States. In 2012, 38 percent of all wire transfer originations were to foreign payees. These transfers accounted for 39 percent of the total transferred value. Foreign-payee wire transfers were further disaggregated by their source of origination. Consumer-originated foreign transfers made up 3 percent of all foreign-payee wire transfers by number but merely 0.1 percent by value.



IPR2025-01151
Apple EX1037 Page 76

## 2.5 CHECKS

Data from the 2013 DFIPS affirmed the historical decline in checks, and also showed that the checks still in circulation continue to gain efficiencies, especially in interbank clearing where the process had become virtually 100 percent electronic. The number of checks deposited directly by depository institution customers as images (via mobile device or scanner) also continued to grow. For the first time, the 2013 DFIPS estimated the number and value of image-deposited checks by type of depositors (consumer versus business) and by image-capturing device (mobile device versus other device, such as a scanner).

### 2.5.1 Checks Paid

The number of checks paid in 2012 amounted to 18.3 billion. This figure accounted for all negotiable instruments drawn on depository institutions including traveler's check and money orders, but excluded courtesy checks from credit card accounts. The checks-paid instrument included checks cleared via image exchange, but excluded checks converted to ACH (that is, ARC, POP, BOC transactions).

From 2009 to 2012, the total number of checks paid declined at an annual rate of 9.2 percent. The steepest decline occurred at savings institutions followed by credit unions, where total checks paid dropped 17.1 percent and 10.2 percent per year, respectively, during the period. Commercial banks experienced the smallest decline at 8.6 percent per year. While the 2013 DFIPS did not measure consumer and business checks separately, the more rapid decline at savings institutions and credit unions, which had larger proportions of consumer transaction deposit accounts (91 percent and 98 percent, respectively, compared to commercial banks at 87 percent), suggests that consumers transitioned to check alternatives more quickly than their business counterparts.

The total value paid through checks also declined. In 2012, $25.9 trillion were paid through checks, compared to $31.6 trillion in 2009. This represented an annual decline of 6.5 percent from 2009 to 2012. The average value per paid check, however, increased from $1,291 in 2009 to $1,410 in 2012, a 3.0 percent increase per year. This growth can be attributed to overall economic growth during the period and not just an increasing share of business checks (see the CSS).



IPR2025-01151
Apple EX1037 Page 77

#### 2.5.1.1 Interbank Checks Paid

The 2013 DFIPS measured two types of checks paid: interbank and on-us checks. Interbank checks are checks that involve two or more depository institutions to clear. Approximately 13.0 billion (71 percent) of all checks paid in 2012 were interbank checks. These checks accounted for $16.5 trillion, or 64 percent of the total check value paid. Consistent with the decreasing number of all checks paid, the number of interbank checks paid fell by an annual rate of 10.4 percent from 2009 to 2012.

#### 2.5.1.2 On-Us Checks Paid

When two accountholders from the same depository institution write checks to one another, the cleared checks are considered on-us checks. In 2012, 5.4 billion on-us checks were paid—a 5.9 percent annual decline from 2009. Approximately 29 percent of all checks paid in 2012 were on-us, a 3 percentage point increase over 2009, when the on-us rate was 26 percent. Credit unions and commercial banks saw the largest increases of on-us checks paid relative to interbank checks paid. Nearly one in three checks paid (32 percent) at commercial banks were on-us (compared with 29 percent in 2009), while at credit unions, 10 percent were on-us in 2012 (compared with 7 percent in 2009). The increased rate of on-us checks paid at these types of institutions suggests an increase in market share for commercial banks and credit unions. For commercial banks, this may be a result of consolidation in the market, while for credit unions, it may be a result of consumers seeking credit unions for lower fees and reduced or no-minimum-balance requirements. Savings institutions experienced a smaller increase in the percentage of on-us checks paid—17 percent in 2012 compared with 15 percent in 2009.

The total value of on-us checks also declined, at an annual rate of 5.0 percent from 2009 to 2012. In 2012, $9.4 trillion on-us checks were paid versus $11.0 trillion in 2009.

### 2.5.2 Deposited Checks

The number of checks deposited at depository institutions, including paper and image checks, totaled 24.7 billion in 2012. This number represents an annual decline of 6.8 percent from 2009. The value of these deposited checks also fell, at a rate of 4.7 percent per year from $37.5 trillion in 2009 to $32.4 trillion in 2012.

The total number of checks deposited in 2012 (24.7 billion) was 6.4 billion more than the total number of checks paid (18.3 billion) reported above. The relationship between checks paid and checks deposited is complicated by several factors:



IPR2025-01151
Apple EX1037 Page 78

- **Checks deposited more than once.** Some depository institutions, for example, enter into a correspondent banking relationship with another depository institution. Under this arrangement, the bank of first deposit re-deposits the check at the processing depository institution for clearing. In this example, one check accounts for two check deposits. Excluding correspondent check deposits, the number of checks deposited by consumers and businesses in 2012 totaled 19.3 billion—still 1.0 billion more than the number of checks paid (18.3 billion) previously reported. This difference is due, in part, to measurement issues, as well as the definitional reasons listed below:
    - **Checks drawn on foreign accounts that are deposited in the United States.** These checks would be counted as checks deposited but not checks paid.
    - **Checks drawn on U.S.-domiciled accounts that are deposited at foreign depository institutions**. These checks would be counted as checks paid but not checks deposited.

#### 2.5.2.1 Image Check Deposits

In 2012, 35 percent (8.8 billion) of checks and 33 percent ($10.7 billion) of check value entered the financial system through accountholder-initiated image deposits. These deposits included consumer, business, and correspondent image transmissions made via mobile phones or desktop scanners. They did not include checks deposited as paper but subsequently converted to images, such as branch or ATM-capture deposits. At $1,221 per check, the average value of these image deposits is less than the average value of all deposited checks ($1,312).

From 2009 to 2012, the number of image check deposits declined 2.4 percent per year. However, the overall share of checks deposited as images increased 4 percentage points, from 31 percent in 2009 to 35 percent in 2012.

##### *2.5.2.1.1 Image Check Deposits by Depositor*

Image checks captured by consumers in 2012 accounted for only 3 percent (0.2 billion, $0.3 trillion) of both the number and value of all image check deposits. Meanwhile, business-deposited image checks accounted for 36 percent (3.2 billion) of the number and 48 percent ($5.1 trillion) of the value of all image check deposits. Correspondent-deposited image checks—checks truncated at an unaffiliated depository institution and deposited at another bank for clearing—accounted for remaining 61 percent (5.3 billion) of the number and 49 percent ($5.2 trillion) of the value of all image check deposits. Meanwhile, these 5.3 billion

correspondent deposited image checks accounted for almost all (99 percent) of correspondent checks deposited in 2012.

#### 2.5.2.1.1.1 Consumer Image Check Deposits by Capture Device

Of the 0.2 billion image checks deposited by consumers in 2012, 58 percent (0.1 billion) used a mobile device to capture and deposit the check image. These mobile-captured images accounted for 39 percent ($0.1 trillion) of the total image check value by consumers ($0.3 trillion). The remaining 42 percent of consumer image checks (0.1 billion) were deposited by other means including desktop scanners. These alternative methods made up $0.2 trillion or 61 percent of the total image check value by consumers.

On average, consumer mobile-deposited image checks are lower in value ($1000) than checks deposited by consumers through other means of image capture ($2,161). Mobile deposits might have lower average value because of dollar limits set by the depositing depository institutions, stricter risk holds on mobile deposits, and demographic biases (e.g., younger, lower income depositors). In addition, deposits captured by devices other than mobile may include small businesses, which typically deposit higher-value checks.

#### 2.5.2.2 Paper Check Deposits

In 2012, 15.9 billion paper check deposits totaled $21.7 trillion in value. These paper checks were received through various deposit channels such as branches, lockboxes, and ATMs. From 2009 to 2012, paper checks deposited decreased 9.0 percent per year by number and 5.7 percent per year by value. In 2012, approximately 65 percent of checks were deposited as paper compared with 69 percent in 2009.

Consumer and business paper check deposits together made up the majority (99.8 percent) of paper check deposits in 2012. Only 0.04 billion (0.2 percent) were classified as correspondent checks. From 2009 to 2012, the number of correspondent paper checks declined 58.9 percent per year.

### 2.5.3 Checks Returned Unpaid

In 2012, nearly 66.4 million checks were returned unpaid. Checks are returned unpaid by the payer bank for a host of reasons, but most likely because the payers did not have sufficient funds in their accounts (that is, non-sufficient funds, or NSF). Other reasons might include a lack of a signature or because a positive-pay customer refused to pay an item not on its issued

file. Check images received by the payer bank failing to pass the quality or usability analysis were not counted as checks returned unpaid.

The number of checks returned unpaid declined 19.4 percent per year between 2009 and 2012, much faster than total checks paid which decreased at 9.2 percent per year. As a result, the overall rate at which checks were returned unpaid decreased from 0.5 percent in 2009 to 0.4 percent in 2012. The total value of checks returned unpaid also declined. In 2009, only 0.4 percent ($126.9 billion) of the total value of checks paid was from checks returned unpaid. By 2012, however, the unpaid amount decreased to $83.1 billion which accounted for 0.3 percent of the total value of checks paid in 2012.

#### 2.5.3.1 Interbank Checks Returned Unpaid

Returned checks occurred most frequently between accountholders at different depository institutions. In 2012, interbank checks accounted for 86 percent (57.2 million) of the checks returned unpaid and 84 percent ($70.0 billion) of their value. The average value of these unpaid interbank checks amounted to just above $1,224.

#### 2.5.3.2 On-Us Checks Returned Unpaid

The remaining 14 percent of checks returned unpaid in 2012 were the check returns between accountholders of the same depository institution. There were 9.1 million on-us check returns, accounting for $13.1 billion (16 percent) of total unpaid value. With an average value of $1,432, the average on-us check return was 17 percent more than the average interbank check return.

The overall rate of returns in 2012 for on-us checks was 0.2 percent compared to 0.4 percent for interbank checks. One potential reason for the lower returns rate for on-us checks is the ability of the paying bank to check for funds availability at the teller line for an on-us check. If the payer does not have funds to cover the amount of the check, the check is simply handed back to the depositor and the clearing process is not attempted.

## 2.6 CASH WITHDRAWALS AND DEPOSITS

The 2013 DFIPS collected information on ATM cash withdrawals, as in past iterations; however, the survey was expanded considerably for 2013 by collecting the number and value of cash withdrawals and cash deposits made through a comprehensive list of channels. Aside from ATM cash withdrawals, the estimates for cash withdrawals from other channels as well as cash

deposits were included in the 2013 Study for the first time and, therefore, do not reveal trends. They may be tracked by future iterations of the study for that purpose.

### 2.6.1 Cash Withdrawals

The 2013 DFIPS estimated the number and value of cash withdrawals initiated through a variety of channels in 2012. Cash withdrawals by businesses included withdrawals made over the counter at branches, wholesale vaults, or remote currency management terminals. Consumer-initiated cash withdrawals included those made over the counter at branches or at ATMs. In total, there were 7.9 billion cash withdrawals in 2012 with a value of $2.5 trillion. Withdrawals at commercial banks accounted for the vast majority of these transactions—approximately 73 percent by number and 81 percent by value.

#### 2.6.1.1 Over-the-Counter Cash Withdrawals

Over-the-counter cash withdrawals include cases where a consumer or business accountholder makes cash withdrawals with the help of a branch teller, either walk-in or at drive-up window. In 2012, there were 2.1 billion over-the-counter cash withdrawals with a value of $1.5 trillion. Likely due to the fact that they almost exclusively cater to consumers, credit unions issued a larger share of over-the-counter cash relative to the number of transaction deposit accounts they held: 22 percent of all over-the-counter cash withdrawals were made at credit unions even though credit unions held only 20 percent of U.S. transaction deposit accounts in 2012.

#### 2.6.1.2 ATM Cash Withdrawals

In 2012, there were 5.8 billion ATM withdrawals totaling $687.0 billion in value. The number of ATM withdrawals decreased 0.9 percent per year from 2009 to 2012. During the same period, the total dollar value of ATM withdrawals increased 2.0 percent, and the average value per withdrawal increased from $108 in 2009 to $118 in 2012.

The 2013 DFIPS also captured ATM cash withdrawals made by cardholders from ATMs operated by their depository institutions (that is, on-us ATM cash withdrawals) and withdrawals made from ATMs operated by institutions other than the cardholder's (foreign ATM cash withdrawals). In 2012, 68 percent of ATM cash withdrawals were on-us, an increase from 2009 when only 64 percent of all ATM withdrawals were on-us. In terms of dollar value, 71 percent of total ATM cash withdrawals were on-us in 2012.



IPR2025-01151
Apple EX1037 Page 82

The ATM cash withdrawals were also measured by the type of account from which the cash was withdrawn. In 2012, approximately 3 percent of ATM withdrawals were initiated by prepaid card accounts. The remaining 97 percent of ATM cash withdrawals came from all other types of accounts, such as transaction deposit accounts (e.g., checking and savings accounts) and credit card accounts.

#### 2.6.1.3 Wholesale Vault Cash Withdrawals

In the case of a wholesale vault cash withdrawal, a business accountholder, usually with the aid of an armored courier service, withdraws cash straps and/or coin rolls for the purpose of making change in retail stores. In this case, the courier often picks up cash and coin for deposit as well. The wholesale vault withdrawals measured in the 2013 DFIPS did not include transfers of cash related to bank business, such as replenishing a branch's cash supply. The 2012 estimates did include cash withdrawals made at remote currency management terminals (RCMTs). The number of cash withdrawals at wholesale vault (including withdrawals at RCMTs) in the United States in 2012 was 31.4 million while the value was estimated to be $385.8 billion. These wholesale vault cash withdrawals accounted for only 0.4 percent of all cash withdrawals by number but 15 percent by value.

#### 2.6.1.4 Remote Currency Management Terminal Cash Withdrawals

Remote currency management terminals (RCMTs), that is "smart safes" and "cash recyclers", allow businesses to deposit cash as a substitute for visiting a bank branch or a wholesale vault. Typically deployed by a depository institution at restaurants, gas stations, and convenience stores, some of these terminals also offer the ability to withdraw cash. The number and value of cash withdrawals at RCMTs collected for March 2013 was not of sufficient quality to produce standalone annual estimates—they were included in the 2012 estimates for wholesale vault cash withdrawals.

### 2.6.2 Cash Deposits

In 2012, an estimated 2.8 billion cash deposits were made with a value of approximately $2.7 trillion to U.S. depository institutions.[56] The average value for all cash deposits was $953.

---

[56] During 2012, about $2.5 trillion in cash was withdrawn, which was roughly 4 percent less than the total value of cash deposits, but the difference was not significantly different. This difference may be attributed to several factors including: (1) these annual estimates were based on one month of data (March 2013) where the lag

Cash deposits in 2012 were made less frequently at labor-intensive channels (branches and cash vaults) than at automated channels (that is, ATMs).

#### 2.6.2.1 Over-the-Counter Cash Deposits

Over-the-counter cash deposits include all in-person cash deposits to a consumer or business bank account at branch locations. Being the leading method for cash deposits, over-the-counter cash deposits accounted for 59 percent (1.6 billion) of the total number of cash deposits and 61 percent ($1.6 trillion) of the total value of cash deposits in 2012. The average value for over-the-counter cash deposits was $1,000 per deposit.

#### 2.6.2.2 ATM Cash Deposits

In 2012, there were approximately 1.0 billion cash deposits at ATMs with a total value of $381.2 billion. Out of these 1.0 billion cash deposits, 98 percent was made at fee-free or on-us ATMs with a value of $376.5 billion, which accounted for almost 99 percent of the total value of ATM cash deposits. The remaining part of ATM cash deposits (15.9 million) were made at foreign ATMs (that is, cash deposits made at ATMs owned by another depository institution other than the accountholder's). The average value of foreign ATM cash deposits ($298) was lower than that of on-us ATM cash deposits ($374).

#### 2.6.2.3 Wholesale Vault Cash Deposits

In 2012, wholesale vault cash deposits—business transactions usually conducted with the aid of an armored courier service—constituted just 5 percent (128.9 million) of the total number of cash deposits; however, they accounted for 24 percent ($641.7 billion) of the total value. As with wholesale vault cash withdrawals, the 2012 estimates for wholesale vault cash deposits included cash deposits made at RCMTs. At $4,978 per deposit, the average value of wholesale vault cash deposits was approximately 5 and 13 times that of over-the-counter ($1,000) and ATM ($372) cash deposits, respectively.

---

between customers withdrawing and depositing cash could be substantial, and (2) the greater value of cash deposits versus cash withdrawals could reflect inflows of cash stock from outside the country as currency can be withdrawn overseas and deposited domestically, or (3) sampling error or errors in figures reported by respondents.

#### 2.6.2.4 Remote Currency Management Terminal Cash Deposits

The 2013 DFIPS attempted to measure the cash deposits at RCMTs in 2012. As with RCMT cash withdrawal data, the reported number and value of cash deposits at RCMTs for March 2013 was not of sufficient quality to produce standalone annual estimates—they were combined with the 2012 estimates for wholesale vault cash deposits.

## 2.7 ALTERNATIVE PAYMENT INITIATION METHODS AT DEPOSITORY INSTITUTIONS

The 2013 DFIPS was also expanded to measure alternative payments as these payments are becoming more familiar to U.S. households. For 2013, alternative payments included online and mobile bill payment transactions as well as online and mobile person-to-person transfers. In the 2013 DFIPS, "online channel" captured only bill payment transactions or person-to-person transfers conducted on the website of the accountholder's depository institution via a web browser. Likewise, "mobile channel" captured only payments that were conducted via SMS/text message or the mobile banking application provided by the accountholder's depository institution.

Particularly evident in this year's study, the decline of checks was partly attributed to customers' replacement of check writing with alternative bill payment methods. One alternative to check writing was direct payment to the biller through ACH transactions or via general-purpose cards.[57] Another popular alternative, online or mobile bill payments, was estimated to have 2.5 billion transactions in 2012. Online or mobile person-to-person transfers, yet another popular alternative offered by depository institutions, totaled 138.0 million transactions in 2012.

### 2.7.1 Online or Mobile Bill Payments

Online bill payments are bill payments initiated by accountholders on their depository institution's website through a web browser. Mobile bill payments, on the other hand, are bill payments initiated through a mobile application or SMS/text message.[58] Bill payments made on a mobile device via a web browser are classified as online—not mobile—bill payments.

---

[57] While these alternative methods are believed to have been significant, volumes are unknown and not captured in the 2013 DFIPS.

[58] Online and mobile bill payments excluded bill payments made through the biller's website and a mobile application.

In 2012, there were 2.5 billion online or mobile bill payments initiated by accountholders. The vast majority (93 percent) of these bill payments were initiated through a web browser. The remaining 7 percent of these bill payments were initiated through either a mobile application on an accountholder's smartphone or tablet or via an SMS/text message. The largest share of the total online or mobile bill payments in 2012—81 percent by number and 95 percent by value—were made by accountholders at commercial banks, even though commercial banks accounted for only 73 percent of consumer transaction deposit accounts in the United States.

### 2.7.2 Online or Mobile Person-to-Person Transfers

Although well below the volume levels of online or mobile bill payments, online or mobile person-to-person (P2P) transfers now constitute a noticeable share of the payments landscape. Like online or mobile bill payments, P2P transfers are financial transactions initiated by customers through web browsers (including mobile web browsers), mobile applications, or SMS/text messages. Unlike online or mobile bill payments, P2P transfers facilitate payments strictly between persons.

In 2012, online or mobile P2P transfers totaled close to 138.0 million payments. While structurally similar to online or mobile bill payments, P2P transfers accounted only approximately 5.4 percent of the 2.5 billion online or mobile bill payments. The average value of $348 per P2P transfer was also much lower compared to that of online or mobile bill payments ($1,370).

At 68 percent of all P2P transfers, browser-initiated transfer was the most common P2P-initiation method in 2012, followed by mobile applications at 32 percent. SMS-initiated payments, which made up the remainder, accounted for less than 1 percent of total P2P transfers.

In 2012, customers tended to use web browsers for P2P transfers of higher value. The average value of browser-initiated transfers was $359, compared with $326 for those initiated through mobile applications.

## 2.8 THIRD-PARTY PAYMENTS FRAUD

For the first time, the 2013 DFIPS attempted to estimate unauthorized transactions (third-party payments fraud) made within the United States in 2012. The survey asked the depository



IPR2025-01151
Apple EX1037 Page 86

institutions to report third-party payments fraud in the form of the number and value of unauthorized transactions across several payment types, including check; ACH; debit and prepaid card; credit card; and ATM cash withdrawals. Third-party payments fraud were limited to unauthorized third-party fraud payments, or fraud in which an accountholder's payment credentials or form factor were compromised by an unauthorized external party. Because this year marks the first time fraud data has been collected, trends are not available to be reported.

### 2.8.1 Unauthorized Check Payments

Of the 18.3 billion checks paid in 2012, slightly under 0.9 million were unauthorized third-party fraud payments. By number, the fraud rate for check payments in 2012 was 0.47 basis points (0.47 unauthorized transactions per 10,000 transactions). These 0.9 million checks included those that were not authorized by accountholders during the period before recoveries. It did not count fraud prevented before a loss was incurred, fraudulent checks deposited at the institution, fraud committed by the institutions' accountholders (first-party fraud), or checks authorized by a valid accountholder as part of a scam. As defined by these constraints, the total unauthorized check value amounted to $1.1 billion, with an average value of $1,272 per unauthorized check payment.

### 2.8.2 Unauthorized ACH Credits

In the 2013 DFIPS, unauthorized ACH credits included only ACH transactions originated from depository institutions but were not authorized by a valid accountholder before any recoveries or chargebacks. In 2012, there were over 0.5 million unauthorized ACH credit payments (worth $393.3 million) that were originated from U.S. depository institutions. By number, the fraud rate for ACH credits in 2012 was 0.62 basis points.[59] Meanwhile, the average value of these unauthorized transactions was $755.

### 2.8.3 Unauthorized ACH Debits

There were more than twice as many unauthorized ACH debit payments as there were unauthorized ACH credit payments in 2012. Here, 1.2 million unauthorized ACH debit

---

[59]Calculation based on total ACH credits including offset entries. If calculated using ACH credits excluding offsets the rate would be 0.70 basis points.

payments (69 percent of all ACH fraud) accounted for $837.5 million. By number, the fraud rate for ACH debits was 0.87 basis points.[60] At $727 per transaction, the average value of these unauthorized ACH debits was slightly lower than the average unauthorized ACH credit value—an indication that the fraud targets may be consumers.

### 2.8.4 Unauthorized Debit and Prepaid Card Transactions

Unauthorized debit and prepaid card transactions include third-party fraud payments over a dual-message (signature) or single-message (PIN) network before any recoveries or chargebacks. They excluded first-party fraud, credit card fraud, fraud prevented before a loss was incurred, fraudulent ATM withdrawals, or debit and prepaid card transactions authorized by valid cardholders as part of a misunderstanding or scam. Approximately 14.9 million unauthorized debit and prepaid card transactions accounting for $1.5 billion took place in 2012. The average value of these transactions was $104, much larger than the average value of an authorized debit or prepaid card transaction ($39). By number, the fraud rate for debit and prepaid card transactions was 2.72 basis points.

#### 2.8.4.1 Unauthorized Dual-Message Debit and Prepaid Transactions

Unauthorized debit and prepaid signature transactions in 2012 included third-party fraudulent transactions over a dual-message debit card network before any recoveries or chargebacks. The estimated 14.0 million of these transactions accounted for 94 percent of all debit and prepaid card fraud instances. These transactions totaled $1.4 billion in value for an average value of $101 per transaction. In 57 percent (8.0 million) of these fraudulent signature cases, the unauthorized card was present—either in its original instantiation or as an exact copy. In card-present transactions, the average fraudulent payment amounted to $120. For the 6.0 million transactions where the unauthorized card was not present, the average transaction value fell to $76. By number, the fraud rate for debit and prepaid signature transactions in 2012 was approximately 4.04 basis points.

---

[60] Calculation based on total ACH debits including offset entries. If calculated excluding offsets the rate would be 0.92 basis points.

#### 2.8.4.2 Unauthorized Single-Message Debit and Prepaid Transactions

A small remainder of unauthorized debit and prepaid card transactions (0.8 million) took place over PIN (single-message) debit card networks. By definition, the card (or a duplicate of the card) was present in all these instances. These fraudulent PIN transactions totaled $124.1 million in value and averaged $148 per transaction in 2012. By number, the fraud rate for debit and prepaid PIN transactions in 2012 was 0.42 basis points—a rate that was much lower than that of unauthorized debit and prepaid signature transactions.

### 2.8.5 Unauthorized Credit Card Transactions

There were just over 13.7 million unauthorized credit card transactions in 2012 which had a total value of $2.3 billion in fraudulent charges. These transactions included all unauthorized credit card and charge card transactions before any recoveries or chargebacks. They also included all unauthorized cash advances. By number, credit card transactions in 2012 had a fraud rate higher than any other payment method captured in the 2013 DFIPS with 5.76 basis points.

The survey further divided unauthorized credit card activity into card-present versus card-not-present transactions. Approximately 52 percent of the unauthorized credit card transactions were card-present, meaning the credit card was present at the point of sale. The other half (48 percent) were card-not-present transactions, which were initiated via Internet, mail-order, or telephone.

### 2.8.6 Unauthorized ATM Cash Withdrawals

Unauthorized ATM cash withdrawals included ATM cash withdrawals which were not authorized by valid accountholders and were made against the accounts of U.S. depository institutions from any ATM. In 2012, there were 1.3 million unauthorized ATM cash withdrawals totaling $256.3 million. The average unauthorized ATM cash withdrawal ($199) was significantly higher than the average authorized ATM cash withdrawal ($118). By number, the fraud rate for ATM cash withdrawals in 2012 was 2.21 basis points.

## 2.9 METHODOLOGY

The 2013 DFIPS estimates were based on data reported by a stratified random sample of depository institutions. For sampling and estimation, institutions were stratified by both type and

size. The samples were used to create population estimates of the number and value of payments for the size-type strata using a statistical technique called ratio estimation.

### 2.9.1 Sampling

The respondents selected were sampled from the population of insured depository institutions in the United States, including credit card banks.[61] The population included commercial banks, state-chartered and federally chartered savings institutions, and credit unions. Domestic branches of foreign-owned banks were not sampled.

Most public checkable deposits (defined in section 2.9.1.1) are held by a relatively small number of very large depository institutions. As a result, the most efficient sampling method is to assign a higher sampling probability to the largest depository institutions. The largest depository institutions, therefore, were sampled with 100 percent probability. That approach resulted in a census of the largest depository institutions and random samples of the remaining ones. The probability of an institution being sampled decreased with size.

The largest depository institutions within each institution type, as well as others likely to substantially affect estimate precision, were designated “high-priority” institutions. Extraordinary efforts were made to maximize the completeness and quality of responses from these institutions. In addition to the effort on the largest institutions, enough high-quality responses from depository institutions of all sizes and types were obtained to ensure that the results are representative of the entire population of depository institutions.

#### 2.9.1.1 Sample Design

The population of depository institutions (the sample frame) was stratified before sampling, first by type of depository institution and then by size. There were three primary strata (by type of institution) in the original design:

1. Commercial banks (CMB)
2. Savings institutions (SVG)
3. Credit unions (CUS)

---

[61] From a regulatory standpoint credit card banks are depository institutions but they do not offer transaction deposit accounts.



IPR2025-01151
Apple EX1037 Page 90

These categories were chosen because members of each type classification tend to share similar characteristics. Grouping them in this way improves the precision of the estimates.

Stratification of depository institutions within types was carried out on the basis of the sum of public checkable deposits (PCD) and deposits held in money market deposit accounts (MMDAs), both of which are available for all insured depository institutions in the United States.[62] In general, PCD includes transaction deposits of individuals, partnerships, and corporations, but does not include deposits of the federal government or other depository institutions. Most payments and cash withdrawals are made from PCD. Payments and withdrawals can also be made from other accounts, such as MMDAs.

#### 2.9.1.2 Sample Frame

The frame was constructed from reports filed with the Federal Reserve by depository institutions and holding companies. The frame represented the population of insured depository institutions in the United States with nonzero PCD + MMDA deposits. Prior to stratification, depository institutions were grouped with their holding company, if applicable, using the most current ownership information, and PCD + MMDA deposits for the holding company were defined as the sum of the PCD + MMDA deposits for the depository institutions it owned. The sampling unit, therefore, was the depository institution at its highest institutional level (that is, top holding company).[63]

For estimation, the frame was defined as the entire population of depository institutions with PCD + MMDA deposits greater than zero.[64] For sampling, however, depository institutions with PCD + MMDA deposits less than $1 million were not sampled because of their very small size. The depository institutions excluded from sampling represented a negligible share of PCD + MMDA deposits.

Estimates for depository institutions excluded from sampling were produced using the ratios from the smallest stratum of depository institutions within each type for which a sample was

---

62 Prior studies used PCD alone as the size stratification variable. Studies conducted by Gerdes, Liu, and Parke (2009) and Gerdes and Liu (2010) showed that the standard error of estimates could be reduced by using the sum of PCD and MMDA instead. These reports are available from the authors upon request. Please send requests by e-mail to Geoffrey Gerdes (Geoffrey.gerdes@frb.gov) or May Liu (may.x.liu@frb.gov).

63 Depository institutions reported data for their entire consolidated organization.

64 Depository institutions with no transaction deposits do not account for a significant number of payments.

obtained. The preliminary frame consisted of 13,461 depository institutions. These institutions were stratified by type and then by size within each type, for a total of 22 strata.

#### 2.9.1.3 Sample Size and Allocation

Like prior depository institutions surveys, a sample size of 2,700 institutions was chosen. The sample size was based on the desired margin of error of less than +/-5 percent, for a 95 percent level of confidence for the estimate of the total number of checks.

Allocation of the sample to strata was based on a version of Neyman allocation, which approximates the allocation that minimizes the standard error of the total estimate. Within each type, the allocation method included “certainty strata,” where very large depository institutions represent only themselves, which considerably reduces the estimated standard errors. Exhibit 35 shows the number of institutions in each stratum of the frame and the sample.



IPR2025-01151
Apple EX1037 Page 92

**Exhibit 35: Original Sample Frame Details**

| Institution Type | Size Stratum | PCD+MMDA upper bound (thousands) | PCD+MMDA lower bound (thousands) | In Frame (N) | Sampled (n) |
|---|---|---|---|---|---|
| Commercial Banks | 0 | $5,000 | $0 | 116 | 3* |
| | 1 | $41,450 | $5,000 | 1,879 | 203 |
| | 2 | $102,240 | $41,450 | 1,783 | 333 |
| | 3 | $199,350 | $102,240 | 920 | 262 |
| | 4 | $418,000 | $199,350 | 436 | 297 |
| | 5 | $965,000 | $418,000 | 216 | 216 |
| | 6 | $3,100,000 | $965,000 | 135 | 135 |
| | 7 | max | $3,100,000 | 88 | 88 |
| | *Subtotal:* | | | *5,573* | *1,534* |
| Savings Institutions | 0 | $5,000 | $0 | 94 | 0 |
| | 1 | $74,173 | $5,000 | 439 | 82 |
| | 2 | $212,010 | $74,173 | 245 | 92 |
| | 3 | $620,424 | $212,010 | 102 | 102 |
| | 4 | $8,820,800 | $620,424 | 51 | 51 |
| | 5 | max | $8,820,800 | 6 | 6 |
| | *Subtotal:* | | | *937* | *333* |
| Credit Unions | 0 | $1,000 | $0 | 2,674 | 0 |
| | 1 | $15,548 | $1,000 | 2,365 | 145 |
| | 2 | $49,728 | $15,548 | 924 | 133 |
| | 3 | $122,688 | $49,728 | 454 | 139 |
| | 4 | $253,878 | $122,688 | 278 | 158 |
| | 5 | $549,620 | $253,878 | 152 | 151 |
| | 6 | $2,699,744 | $549,620 | 98 | 98 |
| | 7 | max | $2,699,744 | 6 | 6 |
| | *Subtotal:* | | | *6,951* | *830* |
| **Overall Total:** | | | | **13,461** | **2,697** |

*Includes institutions that were sampled with certainty because they are anomalous rather than because of their size.

#### 2.9.1.4 High-Priority Institutions

Depository institutions within each type stratum with the highest PCD + MMDA deposits (that is, largest in size) were designated high-priority respondents. The largest depository institutions were expected to account for a high percentage of the figures being estimated. Additional effort was made to ensure the participation of high-priority institutions, which helped increase the precision of the aggregate estimates.

### 2.9.2 Imputation and Estimation

Data were collected for March 2013. For estimation purposes, a new frame concurrent with that period was constructed using PCD and MMDA deposits from reports filed with the Federal Reserve as of March 31, 2013. The population and sample were reallocated to strata according to the revised data. Exhibit 36 illustrates the final sample frame.

**Exhibit 36: Final Sample Frame Detail**

| Institution Type | Size Stratum | PCD+MMDA upper bound (thousands) | PCD+MMDA lower bound (thousands) | In Frame (N) | Sampled (n) |
|---|---|---|---|---|---|
| Commercial Banks | 0 | $5,000 | $0 | 108 | 4* |
| | 1 | $41,450 | $5,000 | 1,752 | 189 |
| | 2 | $102,240 | $41,450 | 1,768 | 321 |
| | 3 | $199,350 | $102,240 | 990 | 267 |
| | 4 | $418,000 | $199,350 | 467 | 296 |
| | 5 | $965,000 | $418,000 | 225 | 214 |
| | 6 | $20,000,000 | $965,000 | 209 | 209 |
| | 7 | max | $20,000,000 | 31 | 31 |
| | *Subtotal:* | | | *5,550* | *1,527* |
| Savings Institutions | 0 | $5,000 | $0 | 93 | 0 |
| | 1 | $74,173 | $5,000 | 426 | 81 |
| | 2 | $212,010 | $74,173 | 241 | 83 |
| | 3 | $620,424 | $212,010 | 110 | 105 |
| | 4 | $8,820,800 | $620,424 | 50 | 50 |
| | 5 | max | $8,820,800 | 6 | 6 |
| | *Subtotal:* | | | *926* | *325* |
| Credit Unions | 0 | $1,000 | $0 | 2,582 | 1* |
| | 1 | $15,548 | $1,000 | 2,344 | 140 |
| | 2 | $49,728 | $15,548 | 931 | 129 |
| | 3 | $122,688 | $49,728 | 478 | 134 |
| | 4 | $253,878 | $122,688 | 281 | 160 |
| | 5 | $549,620 | $253,878 | 165 | 154 |
| | 6 | $2,699,744 | $549,620 | 104 | 104 |
| | 7 | max | $2,699,744 | 6 | 6 |
| | *Subtotal:* | | | *6,891* | *827* |
| **Overall Total:** | | | | **13,367** | **2,679** |

*Includes institutions sampled because they were sampled with certainty because they are anomalous, or because their PCD+MMDA fell below the sampling threshold.

Some of the analysis required complete data for every included respondent. For example, estimated subcategories of various payment types needed to add up to totals. Since some responses contained missing data, numbers and values were imputed using a linear regression

technique that provided estimated responses for all missing data, subject to logical constraints, and based on related data from other depository institutions of similar type and size.

### 2.9.3 Reference Period

The reference period was March 2013. March was chosen because is believed to be sufficiently representative for checks and does not have an unusual number of processing days. A two-month reference period, March and April, was used in prior studies. For the 2013 DFIPS, a one-month reference period was selected to reduce respondent burden while still producing statistically significant results.

The research plan called for annual estimates. Monthly Federal Reserve check processing data show that the use of a multiplication factor of twelve (12) to annualize March data is reasonably accurate. For simplicity, the factor was used to annualize the one-month data for all transaction types.

### 2.9.4 Survey Instruments

Copies of the survey instruments, referred to as the Long Form and the Short Form are available online.[65]

In addition to measuring the number and value of the payment types and cash withdrawal transactions during March 2013, the survey included a section labeled as the Institution Profile that listed all affiliates (if any) held by the sampled depository institution. The purpose of the Institution Profile section was to allow respondents to indicate whether any particular affiliate had been excluded from the institution's response, and in which survey section(s) that affiliate's data were excluded. Because the design variable of the study, PCD + MMDA deposits, was a measure of each institution's size, it was important that the size of each institution in the sample correspond to the number of transactions reported. If data reported reflected activity from only half of a bank holding company's subsidiaries, for example, the PCD + MMDA deposits variable would need to be adjusted accordingly. Otherwise, the depository institution would appear to have a relatively low number of transactions for an institution of its size.

---

[65] Electronic copies of the survey forms are available for download at https://www.frbservices.org/news/research.html.



IPR2025-01151
Apple EX1037 Page 95

The survey was mailed to respondents in hard copy with a postage-paid business reply envelope enclosed. Respondents were encouraged to respond either by returning the survey in the business reply envelope, faxing the survey to a designated toll-free number, or entering totals securely online at www.paymentsstudy.com.

In all correspondence, respondents were encouraged to respond online at www.paymentsstudy.com. Site access was secured by a unique ID and password for each institution. The ID and password were printed on each letter the institution received and in the header of each page of the hard-copy survey. The website included an online version of the survey as well as a downloadable PDF (portable document format).

### 2.9.5 Survey Recruitment and Participation

Sampled depository institutions were asked to confirm their participation (during a recruitment phase) and then to report transaction totals for the one-month reference period. The recruitment phase served to identify the individual(s) who would report data for the survey and encouraged organizational buy-in. The process of recruitment and participation unfolded over many months through multiple mailings, follow-up calls and e-mails as needed, and ultimately receipt of data from the respondent.

#### 2.9.5.1 Contact List Development and Recruitment

After generating the sample, the project team identified two contacts at each institution. Accuity's *Databank* served as the default list for contact names, addresses, phone numbers, etc. McKinsey supplemented the default list with information from the firm's own database of industry contacts. This was done for high-priority respondents. In cases where McKinsey did not have contact information for a high-priority respondent, the institution was called and the appropriate contacts identified.

The two contacts were designated as primary and secondary. The primary contact was typically more senior in title than the secondary contact. The initial recruitment mailing, conducted in January 2013, was sent to the primary contact and included a preview copy of the survey. Consistent with past study recruiting communications, a letter from the Vice Chair of the Federal Reserve Board was also included as part of the consultant's initial recruitment packet.

If the primary contact did not respond within 14 business days, a second mailing was sent, this time to the secondary contact. If the secondary contact did not reply within 10 business days,

McKinsey or its subcontractor, Lieberman Research Group (Lieberman), followed up by calling each contact to confirm receipt of the mailing.

To supplement the initial recruiting effort, and achieve response rates comparable to previous iterations, the Federal Reserve project team took additional steps in sending a series of emails to depository institutions in May 2013 in conjunction with ongoing consultant telephone recruitment communications.

Depository institutions that had not been successfully recruited by May 2013 were segmented into three categories, receiving the following treatments:

*Non-responders*, defined as depository institutions that had registered, but not yet submitted a survey response

- Received two reminder emails regarding the submission deadline.
- Subsequently received a consultant mailing containing the DFIPS short form survey instrument.

*Non-communicators*, defined as depository institutions that had not registered

- Received a single reminder email regarding the submission deadline.
- Subsequently received a consultant mailing containing the DFIPS short form survey instrument.

*Refusers*, defined as depository institutions that had communicated their desire not to participate

- Received a mailing containing the DFIPS short form survey instrument with a cover letter and no other follow up communication.

#### 2.9.5.2 Registration

The initial recruitment materials included a request that the primary contact return a *Respondent Registration Form* to identify the appropriate individual to coordinate response to the study. A copy of the form can be found in the appendix. The *Registration Form* encouraged a depository institution to select a single individual who would coordinate the institution's response. Alternatively, a depository institution could indicate a different individual for each section of the survey.



IPR2025-01151
Apple EX1037 Page 97

Exhibit 37 indicates the number of institutions that registered for the study by mode of registration.

**Exhibit 37: Distribution of Registrations by Mode**

| | Web Site | Phone | Mail | Fax | Total |
|---|---|---|---|---|---|
| Commercial Banks | 580 | 275 | 32 | 32 | 919 |
| Savings Institutions | 149 | 50 | 7 | 5 | 211 |
| Credit Unions | 289 | 107 | 18 | 19 | 433 |
| Total | 1,018 | 432 | 57 | 56 | 1,563 |

#### 2.9.5.3 Respondent Training

McKinsey invited registered depository institutions to participate in webinars to review and discuss the survey instrument. The webinars were intended to improve the quality of reporting by enhancing respondents' understanding of what was being measured. Six two-hour webinars were conducted during the formal data-collection phase of the study. These webinars were held from February through April, with two webinars being held each month. In all, 675 individuals representing 552 institutions participated in the survey review webinars.

Sampled institutions were invited to participate in any webinar of their choosing, and participation was free. During each webinar, McKinsey explained in detail each data element being measured by the survey and fielded questions from participants regarding the study via web-based chat. After the conclusion of each webinar, questions and answers were e-mailed to webinar participants and posted on the study's website on a frequently asked questions (FAQ) page.

**Exhibit 38: Response Rate by Institution Type and Stratum**

| Institution Type | Size Stratum | In Frame (N) | Sampled (n) | Responses | Rate of Response |
|---|---|---|---|---|---|
| Commercial Banks | 0 | 103 | 1* | | |
| | 1 | 1,751 | 189 | 63 | 33% |
| | 2 | 1,767 | 320 | 117 | 37% |
| | 3 | 990 | 267 | 109 | 41% |
| | 4 | 465 | 294 | 150 | 51% |
| | 5 | 224 | 213 | 108 | 51% |
| | 6 | 205 | 205 | 113 | 55% |
| | 7 | 24 | 24 | 24 | 100% |
| | 9** | 10 | 10 | 10 | 100% |
| | *Subtotal:* | *5,539* | *1,523* | 694 | 46% |
| Savings Institutions | 0 | 93 | 0 | | |
| | 1 | 426 | 81 | 37 | 46% |
| | 2 | 241 | 85 | 42 | 49% |
| | 3 | 109 | 106 | 54 | 51% |
| | 4 | 47 | 47 | 29 | 62% |
| | 5 | 5 | 5 | 5 | 100% |
| | *Subtotal:* | *921* | *324* | *167* | *52%* |
| Credit Unions | 0 | 2,582 | 1* | | |
| | 1 | 2,344 | 140 | 30 | 21% |
| | 2 | 931 | 129 | 33 | 26% |
| | 3 | 478 | 134 | 39 | 29% |
| | 4 | 281 | 160 | 77 | 48% |
| | 5 | 165 | 154 | 74 | 48% |
| | 6 | 104 | 104 | 64 | 62% |
| | 7 | 6 | 6 | 6 | 100% |
| | *Subtotal:* | *6,891* | *828* | *323* | *39%* |
| **Overall Total:** | | **13,351** | **2,675** | **1,184** | **44%** |

*The PCD+MMDA of these institutions fell below the sampling threshold. **Anomalous institutions.

#### 2.9.5.4 Survey Response

Of the 1,563 depository institutions that registered to participate in the study, a total of 1,182 institutions provided survey data. Out of the 2,700 depository institutions in the final sample, this represents a 44 percent rate of response (Exhibit 38).[66] The lowest stratum-level response rate, at 21 percent, was for the smallest credit unions. Participation was highest among the largest depository institutions. All of the 21 largest commercial banks participated. The high

66 Prior depository institution studies' response rates ranged from 54 to 56 percent.

concentration of payments among the largest commercial banks allowed the 2013 DFIPS to count a large number of payments rather than estimate their totals through statistical estimation.

### 2.9.6 Data Collection and Data Management

Responses were received through any of the four modes: mail, fax, e-mail, or online. Responses received by mail or fax were logged and processed through a manual data entry system by Lieberman. Responses received online were put into a mirror copy of the master database as respondents saved data when they entered online. Data from all modes were integrated in a master database maintained by Lieberman.

Lieberman distributed the current copy of the master dataset on a weekly basis to team members from the Federal Reserve and McKinsey. In this way, team members synchronized their copies of the data while maintaining a central, master copy of the database. Lieberman backed up the database daily to provide redundancy and as an ongoing record of point-in-time data.

Lieberman also implemented a software program to track changes and edits to the database, including the source of the change, the content of the record before the change, and the date and time of the change.

### 2.9.7 Data Editing

In collaboration with Federal Reserve team members, McKinsey worked to improve the quality of survey data. Data editing, as this process was called, involved testing the reasonableness of each respondent's data to identify potential reporting errors, following up with respondents as necessary, and either revising or confirming the accuracy of submitted data.

#### 2.9.7.1 Outlier Identification

Outliers—data outside the expected range of responses—were identified in numerous ways. Some outliers were identified with respect to the sample as a whole. Others were identified within a particular stratum.

McKinsey focused on identifying outliers in distributions that included the entire sample. For example, staff members calculated each respondent's average value of paid checks (that is, total value/total number). Responses greater than two standard deviations (assuming a normal



IPR2025-01151
Apple EX1037 Page 100

distribution) from the mean of these average values were flagged for follow up. Example statistics used to test the reasonableness of a response included the following:

1. Average value per transaction
2. Transaction number per deposit liabilities (that is, size of the institution)
3. Percentage of total transactions that are on-us (that is, intra-depository institution payments)
4. Ratio of returned checks to total checks

McKinsey also identified any logical errors in reported data. For example, cases where the sum of subsets did not equal totals were flagged for follow up.

Federal Reserve team members focused on identifying outliers using various techniques, such as reviewing data that made substantial contributions to standard errors.

McKinsey maintained a central database to identify outlier responses and tracking data edits and confirmations.

#### 2.9.7.2 Tracking Outliers and Revisions

Managing the data-editing process required the project team to coordinate a regularly updated list of outlier responses and the status of revisions to those outliers. This included tracking current outliers as well as those already "resolved." An outlier response might be resolved in a number of ways based on follow-up dialogue with respondents. A relational database was used to track the status of individual outlier responses throughout the data editing process. Additional details about outlier responses were tracked through detailed annotations. If an outlier response had not been revised before the estimation process began, the project team would review the disposition and any annotations about the outlier to determine whether to use the data or not in the estimation.



IPR2025-01151
Apple EX1037 Page 101

## 2.10 TABULAR RESULTS

*In the tables that follow, CI stands for confidence interval. The reported confidence intervals are preliminary and do not account for errors associated with the imputations. Additional analyses of the survey data are being conducted and may be available at a future date.

### 2.10.1 All Depository Institutions

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Payment accounts** | | | | | | | | | | | | | |
| **All transaction deposit accts** | MM | BN | | | | 320.0 | 8.8 | 4,313.6 | 132.7 | 13,480 | 404 | | |
| Consumer transaction deposit accts | MM | BN | | | | 287.4 | 8.2 | 2,299.0 | 50.6 | 8,001 | 189 | | |
| Business transaction deposit accts | MM | BN | | | | 32.6 | 1.0 | 2,014.5 | 110.1 | 61,706 | 3,107 | | |
| **All prepaid card accts** | MM | BN | | | | 236.3 | 4.1 | 8.34 | 0.22 | 35 | 1 | | |
| Prepaid card accts managed by DI | MM | BN | | | | 119.4 | 4.1 | 7.38 | 0.22 | 62 | 1 | | |
| Prepaid card accts managed by third party | MM | BN | | | | 116.9 | 0.5 | 0.95 | 0.01 | 8 | 0 | | |
| **Credit card accts** | MM | BN | | | | 309.1 | 8.6 | 587.37 | 13.36 | 1,900 | 19 | | |
| Consumer credit card accts | MM | BN | | | | 279.7 | 7.2 | 531.44 | 12.06 | 1,900 | 13 | | |
| Business/government credit card accts | MM | BN | | | | 29.5 | 2.7 | 55.93 | 1.41 | 1,899 | 149 | | |
| **Checks** | | | | | | | | | | | | | |
| **Checks (Paid)** | BN | TR | 24.5 | 31.61 | 1,291 | 18.3 | 0.6 | 25.85 | 1.63 | 1,410 | 66 | -9.2 | -6.5 |
| Interbank paid checks | BN | TR | 18.0 | 20.65 | 1,145 | 13.0 | 0.5 | 16.45 | 0.89 | 1,268 | 37 | -10.4 | -7.3 |
| Inclearings | BN | TR | 17.5 | 19.95 | 1,141 | 12.4 | 0.5 | 15.78 | 0.88 | 1,268 | 38 | -10.7 | -7.5 |
| Checks drawn on FIs | BN | TR | 17.1 | 19.61 | 1,144 | 12.2 | 0.5 | 15.56 | 0.88 | 1,274 | 38 | -10.7 | -7.4 |
| U.S. treasury checks | BN | TR | 0.2 | 0.31 | 1,545 | 0.1 | | 0.20 | | 1,645 | | -15.7 | -13.9 |
| Postal money orders | BN | TR | 0.1 | 0.02 | 183 | 0.1 | | 0.02 | | 204 | | -6.2 | -2.9 |
| On-us correspondent checks | BN | TR | 0.6 | 0.70 | 1,240 | 0.5 | 0.0 | 0.67 | 0.03 | 1,260 | 15 | -2.0 | -1.5 |
| On-us paid checks | BN | TR | 6.4 | 10.96 | 1,702 | 5.4 | 0.3 | 9.40 | 1.13 | 1,753 | 188 | -5.9 | -5.0 |
| **Deposited checks** | BN | TR | 30.6 | 37.47 | 1,226 | 24.7 | 0.6 | 32.42 | 0.89 | 1,312 | 23 | -6.8 | -4.7 |
| Image deposited checks | BN | TR | 9.4 | 11.60 | 1,233 | 8.8 | 0.2 | 10.69 | 0.35 | 1,221 | 25 | -2.4 | -2.7 |
| Consumer and business image deposited checks | BN | TR | 3.0 | 4.11 | 1,354 | 3.4 | 0.1 | 5.44 | 0.24 | 1,595 | 60 | 4.0 | 9.8 |
| Consumer image deposited checks | BN | TR | | | | 0.2 | 0.0 | 0.33 | 0.03 | 1,489 | 161 | | |
| Consumer image deposited checks via mobile | BN | TR | | | | 0.1 | 0.0 | 0.13 | 0.01 | 1,000 | 104 | | |
| Consumer image deposited checks via other methods | BN | TR | | | | 0.1 | 0.0 | 0.20 | 0.02 | 2,161 | 392 | | |
| Business/government image deposited checks | BN | TR | | | | 3.2 | 0.1 | 5.11 | 0.24 | 1,602 | 63 | | |
| Correspondent image deposited checks | BN | TR | 6.4 | 7.49 | 1,175 | 5.3 | 0.2 | 5.25 | 0.19 | 982 | 7 | -5.7 | -11.2 |
| Paper deposited checks | BN | TR | 21.2 | 25.89 | 1,223 | 15.9 | 0.5 | 21.73 | 0.69 | 1,363 | 30 | -9.0 | -5.7 |
| Consumer and business paper deposited checks | BN | TR | 20.6 | 25.17 | 1,220 | 15.9 | 0.5 | 21.64 | 0.69 | 1,360 | 30 | -8.3 | -4.9 |
| Correspondent paper deposited checks | BN | TR | 0.5 | 0.72 | 1,329 | 0.0 | 0.0 | 0.09 | 0.00 | 2,283 | 277 | -58.9 | -50.8 |
| **Returned checks** | MM | BN | 126.8 | 126.93 | 1,001 | 66.4 | 6.9 | 83.10 | 2.79 | 1,252 | 116 | -19.4 | -13.2 |
| Interbank returned checks | MM | BN | 107.4 | 104.17 | 970 | 57.2 | 6.6 | 70.05 | 2.50 | 1,224 | 130 | -18.9 | -12.4 |
| Paper interbank returned checks | MM | BN | 11.2 | 11.17 | 994 | 2.7 | 1.1 | 4.01 | 1.03 | 1,467 | 591 | -37.5 | -28.9 |
| Image interbank returned checks | MM | BN | 96.6 | 93.00 | 962 | 54.5 | 6.7 | 66.04 | 2.42 | 1,211 | 137 | -17.4 | -10.8 |
| On-us returned checks | MM | BN | 19.4 | 22.78 | 1,174 | 9.1 | 0.9 | 13.05 | 0.83 | 1,432 | 109 | -22.3 | -16.9 |



IPR2025-01151
Apple EX1037 Page 102

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **ACH** | | | | | | | | | | | | | |
| **Network ACH credit payments (cleared via FED and EPN)** | BN | TR | 6.4 | 19.57 | 3,066 | 6.5 | 0.5 | 21.99 | 0.68 | 3,358 | 187 | 0.9 | 4.0 |
| Offset ACH credits | BN | TR | | | | 0.7 | 0.3 | 2.58 | 0.62 | 3,684 | 1,148 | | |
| Other ACH credits | BN | TR | | | | 5.8 | 0.3 | 19.41 | 0.25 | 3,319 | 129 | | |
| **Network ACH debit payments (cleared via FED and EPN)** | BN | TR | 10.2 | 14.06 | 1,381 | 10.1 | 0.5 | 17.98 | 0.39 | 1,786 | 73 | -0.4 | 8.5 |
| Offset ACH debits | BN | TR | | | | 0.4 | 0.1 | 1.59 | 0.26 | 3,940 | 558 | | |
| Other ACH debits | BN | TR | | | | 9.7 | 0.5 | 16.39 | 0.30 | 1,696 | 73 | | |
| **Direct exchange ACH credit payments** | MM | BN | 126.9 | 378.55 | 2,984 | 5.4 | 6.6 | 9.83 | 13.41 | 1,812 | 299 | -65.0 | -70.4 |
| **Direct exchange ACH debit payments** | MM | BN | 75.2 | 32.07 | 427 | 21.9 | 12.2 | 12.74 | 8.49 | 581 | 73 | -33.7 | -26.5 |
| **In-house on-us credit payments** | BN | TR | 1.5 | 41.95 | 27,251 | 1.8 | 0.0 | 54.77 | 0.41 | 29,663 | 620 | 6.2 | 9.3 |
| In-house on-us offset ACH credits | BN | TR | | | | 0.2 | 0.0 | 6.61 | 0.24 | 29,452 | 1,246 | | |
| Other in-house on-us ACH credits | BN | TR | | | | 1.6 | 0.0 | 48.16 | 0.19 | 29,693 | 738 | | |
| **In-house on-us debit payments** | BN | TR | 3.5 | 42.96 | 12,389 | 3.1 | 0.1 | 52.40 | 0.38 | 16,886 | 630 | -3.6 | 6.8 |
| In-house on-us offset ACH debits | BN | TR | | | | 0.3 | 0.0 | 1.93 | 0.24 | 6,555 | 775 | | |
| Other in-house on-us ACH debits | BN | TR | | | | 2.8 | 0.1 | 50.47 | 0.18 | 17,972 | 730 | | |
| **Wire** | | | | | | | | | | | | | |
| **All wire payments** | MM | TR | | | | 287.5 | 4.5 | 1,116.29 | 2.57 | 3,882,258 | 55,334 | | |
| Consumer wires | MM | TR | | | | 17.4 | 1.5 | 1.54 | 0.12 | 88,112 | 9,664 | | |
| Other wires | MM | TR | | | | 270.1 | 3.9 | 1,114.76 | 2.56 | 4,127,135 | 53,403 | | |
| Settlement/bank business wires | MM | TR | | | | 23.6 | 0.3 | 293.69 | 0.79 | 12,438,821 | 155,695 | | |
| Other business/government wires | MM | TR | | | | 246.5 | 3.8 | 821.07 | 2.02 | 3,330,999 | 47,372 | | |
| Domestic (U.S.) wire payee | MM | TR | | | | 177.2 | 3.9 | 677.10 | 2.54 | 3,821,804 | 75,752 | | |
| Foreign wire payee | MM | TR | | | | 110.4 | 1.0 | 439.20 | 0.18 | 3,979,298 | 36,838 | | |
| Consumer-originated foreign wires | MM | TR | | | | 3.2 | 0.5 | 0.49 | 0.01 | 151,087 | 20,887 | | |
| Other foreign wires | MM | TR | | | | 107.1 | 0.9 | 438.71 | 0.18 | 4,094,769 | 31,908 | | |



IPR2025-01151
Apple EX1037 Page 103

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Debit and Prepaid Cards** | | | | | | | | | | | | | |
| **All debit cards in force** | MM | | | | | 282.8 | 7.8 | | | | | | |
| Consumer debit cards in force | MM | | | | | 265.4 | 7.5 | | | | | | |
| Business debit cards in force | MM | | | | | 17.4 | 0.5 | | | | | | |
| **All debit cards with purchase activity** | MM | | | | | 182.5 | 5.3 | | | | | | |
| Consumer debit cards with purchase activity | MM | | | | | 173.9 | 5.0 | | | | | | |
| Business debit cards with purchase activity | MM | | | | | 8.6 | 0.3 | | | | | | |
| **All debit cards that are chip enabled** | MM | | | | | 23.5 | 0.1 | | | | | | |
| Consumer debit cards that are chip enabled | MM | | | | | 22.1 | 0.1 | | | | | | |
| Business debit cards that are chip enabled | MM | | | | | 1.4 | 0.0 | | | | | | |
| **All prepaid cards in force** | MM | | | | | 159.1 | 6.5 | | | | | | |
| Prepaid cards in force managed by DI | MM | | | | | 64.8 | 6.5 | | | | | | |
| Prepaid cards in force managed by third party | MM | | | | | 94.3 | 0.5 | | | | | | |
| **All prepaid cards with purchase activity** | MM | | | | | 29.4 | 4.0 | | | | | | |
| Prepaid cards with purchase activity managed by DI | MM | | | | | 21.3 | 4.0 | | | | | | |
| Prepaid cards with purchase activity managed by third party | MM | | | | | 8.1 | 0.2 | | | | | | |
| **All prepaid cards that are chip enabled** | MM | | | | | 0.0 | 0.0 | | | | | | |
| Prepaid cards that are chip enabled managed by DI | MM | | | | | 0.0 | 0.0 | | | | | | |
| Prepaid cards that are chip enabled managed by third party | MM | | | | | 0.0 | 0.0 | | | | | | |
| **Total debit and prepaid card** | BN | TR | 45.0 | 1.74 | 39 | 54.7 | 1.5 | 2.15 | 0.06 | 39 | 0 | 6.7 | 7.3 |
| Signature (dual-message) transactions | BN | TR | 28.8 | 1.08 | 37 | 34.7 | 1.1 | 1.32 | 0.04 | 38 | 0 | 6.3 | 6.9 |
| PIN (single-message) transactions | BN | TR | 16.2 | 0.66 | 41 | 20.0 | 0.5 | 0.83 | 0.02 | 42 | 0 | 7.2 | 7.8 |
| **Debit card transactions** | BN | TR | | | | 51.2 | 1.5 | 2.05 | 0.06 | 40 | 0 | | |
| Consumer debit transactions | BN | TR | | | | 49.4 | 1.4 | 1.89 | 0.05 | 38 | 0 | | |
| Business/government debit transactions | BN | TR | | | | 1.7 | 0.1 | 0.15 | 0.01 | 89 | 3 | | |
| **Prepaid card transactions** | BN | TR | | | | 3.5 | 0.3 | 0.10 | 0.01 | 29 | 2 | | |
| **Total cash-back transactions** | MM | BN | 1,036.0 | 35.22 | 34 | 1,455.0 | 173.6 | 47.39 | 2.39 | 33 | 4 | 12.0 | 10.4 |
| Debit card cash-back transactions | MM | BN | | | | 1,404.3 | 173.7 | 46.42 | 2.39 | 33 | 4 | | |
| Prepaid card cash-back transactions | MM | BN | | | | 50.7 | 19.8 | 0.98 | 0.09 | 19 | 6 | | |



IPR2025-01151
Apple EX1037 Page 104

| Note:<br>Figures may not sum because of rounding.<br>CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Credit Cards** | | | | | | | | | | | | | |
| **All credit cards in force** | MM | | | | | 333.6 | 10.6 | | | | | | |
| Consumer credit cards in force | MM | | | | | 305.3 | 9.0 | | | | | | |
| Business credit cards in force | MM | | | | | 28.3 | 3.0 | | | | | | |
| **All credit cards with purchase activity** | MM | | | | | 187.8 | 4.4 | | | | | | |
| Consumer credit cards with purchase activity | MM | | | | | 172.1 | 3.8 | | | | | | |
| Business credit cards with purchase activity | MM | | | | | 15.7 | 0.7 | | | | | | |
| **All credit cards that are chip enabled** | MM | | | | | 23.6 | 1.1 | | | | | | |
| Consumer credit cards that are chip enabled | MM | | | | | 23.4 | 1.1 | | | | | | |
| Business credit cards that are chip enabled | MM | | | | | 0.1 | 0.0 | | | | | | |
| **Total credit card transactions** | BN | TR | | | | 23.7 | 0.4 | 2.19 | 0.04 | 92 | 1 | | |
| Consumer credit card transactions | BN | TR | | | | 19.9 | 0.3 | 1.51 | 0.02 | 76 | 0 | | |
| Business/government credit card transactions | BN | TR | | | | 3.8 | 0.1 | 0.68 | 0.02 | 179 | 4 | | |
| **Cash advances** | MM | BN | | | | 88.6 | 2.9 | 71.14 | 2.30 | 803 | 23 | | |
| Consumer cash advances | MM | BN | | | | 83.7 | 2.8 | 67.43 | 2.28 | 806 | 23 | | |
| Consumer convenience checks and balance transfers | MM | BN | | | | 18.4 | 0.9 | 50.48 | 2.04 | 2,747 | 52 | | |
| Consumer ATM withdrawals and over-the-counter withdrawals from credit card accts | MM | BN | | | | 65.3 | 2.4 | 16.95 | 0.61 | 260 | 7 | | |
| Business/government cash advances | MM | BN | | | | 4.9 | 0.2 | 3.71 | 0.04 | 754 | 28 | | |
| Business/government convenience checks and balance transfers | MM | BN | | | | 0.7 | 0.0 | 2.01 | 0.02 | 2,940 | 29 | | |
| Business/government ATM withdrawals and over-the-counter withdrawals from credit card accts | MM | BN | | | | 4.2 | 0.2 | 1.70 | 0.03 | 401 | 16 | | |



IPR2025-01151
Apple EX1037 Page 105

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Cash** | | | | | | | | | | | | | |
| **Debit cards with ATM withdrawals** | MM | | | | | 114.1 | 3.4 | | | | | | |
| **Prepaid cards with ATM withdrawals** | MM | | | | | 23.5 | 2.9 | | | | | | |
| **Over-the-counter cash withdrawals** | MM | BN | | | | 2,055.6 | 91.0 | 1,468.86 | 50.50 | 715 | 26 | | |
| **Cash orders at wholesale vaults** | MM | BN | | | | 31.4 | 0.7 | 385.84 | 10.01 | 12,299 | 722 | | |
| **ATM withdrawals** | MM | BN | 5,966.7 | 646.67 | 108 | 5,804.4 | 289.6 | 687.03 | 18.19 | 118 | 5 | -0.9 | 2.0 |
| On-us ATM withdrawals | MM | BN | 3,826.5 | 439.92 | 115 | 3,948.4 | 183.3 | 489.29 | 11.73 | 124 | 5 | 1.1 | 3.6 |
| "Foreign" ATM withdrawals | MM | BN | 2,140.2 | 206.75 | 97 | 1,856.0 | 135.2 | 197.74 | 8.84 | 107 | 7 | -4.6 | -1.5 |
| ATM withdrawals from transaction deposit accts | MM | BN | | | | 5,603.6 | 289.3 | 654.33 | 17.99 | 117 | 5 | | |
| ATM withdrawals from prepaid card accts | MM | BN | | | | 200.8 | 17.1 | 32.70 | 2.86 | 163 | 9 | | |
| **Over-the-counter deposits** | MM | BN | | | | 1,628.3 | 68.4 | 1,628.23 | 82.07 | 1,000 | 45 | | |
| **Wholesale vault deposits** | MM | BN | | | | 128.9 | 3.2 | 641.72 | 17.66 | 4,978 | 192 | | |
| **ATM deposits** | MM | BN | | | | 1,023.4 | 7.1 | 381.19 | 2.87 | 372 | 2 | | |
| On-us ATM deposits | MM | BN | | | | 1,007.5 | 7.0 | 376.45 | 2.64 | 374 | 2 | | |
| "Foreign" ATM deposits | MM | BN | | | | 15.9 | 1.2 | 4.74 | 0.93 | 298 | 47 | | |
| **Selected Payment Initiation Channels** | | | | | | | | | | | | | |
| **Total online or mobile bill payments** | MM | BN | | | | 2,547.8 | 44.1 | 3,491.34 | 15.86 | 1,370 | 18 | | |
| Bill payments via a web browser | MM | BN | | | | 2,378.5 | 43.7 | 3,456.18 | 15.77 | 1,453 | 21 | | |
| Bill payments via a mobile app or text message | MM | BN | | | | 169.3 | 1.6 | 35.15 | 0.66 | 208 | 3 | | |
| **Total online or mobile P2P transfers** | MM | BN | | | | 138.0 | 7.0 | 47.96 | 4.83 | 348 | 25 | | |
| P2P transfers via a web browser | MM | BN | | | | 94.1 | 6.7 | 33.75 | 4.06 | 359 | 30 | | |
| P2P transfers via a mobile app | MM | BN | | | | 43.5 | 0.8 | 14.20 | 0.98 | 326 | 21 | | |
| P2P transfers via text message | MM | BN | | | | 0.4 | 0.3 | 0.00 | 0.00 | 0 | 1 | | |
| **Third-party Payment Fraud** | | | | | | | | | | | | | |
| **Unauthorized check payments** | K | MM | | | | 866.8 | 34.9 | 1,102.50 | 32.66 | 1,272 | 55 | | |
| **Unauthorized ACH credits** | K | MM | | | | 521.0 | 3.5 | 393.28 | 3.63 | 755 | 7 | | |
| **Unauthorized ACH debits** | K | MM | | | | 1,151.5 | 45.7 | 837.53 | 161.37 | 727 | 142 | | |
| **Unauthorized debit and prepaid card transactions** | K | MM | | | | 14,857.7 | 327.1 | 1,546.43 | 31.47 | 104 | 1 | | |
| Unauthorized debit and prepaid signature (dual-message) transactions | K | MM | | | | 14,021.8 | 313.4 | 1,422.33 | 30.46 | 101 | 1 | | |
| Unauthorized debit and prepaid card-present transactions | K | MM | | | | 8,047.1 | 139.0 | 967.97 | 18.95 | 120 | 1 | | |
| Unauthorized debit and prepaid card-not-present transactions | K | MM | | | | 5,974.7 | 217.3 | 454.36 | 16.89 | 76 | 2 | | |
| Unauthorized debit and prepaid PIN (single-message) transactions | K | MM | | | | 835.9 | 36.4 | 124.10 | 4.32 | 148 | 4 | | |
| **Unauthorized credit card** | K | MM | | | | 13,654.4 | 103.4 | 2,256.21 | 22.78 | 165 | 1 | | |
| Unauthorized credit card-present transactions | K | MM | | | | 7,061.7 | 50.7 | 1,123.01 | 13.64 | 159 | 1 | | |
| Unauthorized credit card-not-present transactions | K | MM | | | | 6,592.7 | 62.0 | 1,133.20 | 13.21 | 172 | 2 | | |
| **Unauthorized ATM withdrawals** | K | MM | | | | 1,285.4 | 18.7 | 256.33 | 5.15 | 199 | 2 | | |



IPR2025-01151
Apple EX1037 Page 106

## 2.10.2 Commercial Banks

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Payment accounts** | | | | | | | | | | | | | |
| **All transaction deposit accts** | MM | BN | | | | 239.0 | 7.5 | 3,944.6 | 129.6 | 16,501 | 535 | | |
| Consumer transaction deposit accts | MM | BN | | | | 209.2 | 6.9 | 1,988.0 | 43.7 | 9,505 | 248 | | |
| Business transaction deposit accts | MM | BN | | | | 29.9 | 1.0 | 1,956.6 | 109.8 | 65,458 | 3,377 | | |
| **All prepaid card accts** | MM | BN | | | | 229.1 | 1.2 | 8.10 | 0.06 | 35 | 0 | | |
| Prepaid card accts managed by DI | MM | BN | | | | 112.6 | 1.1 | 7.17 | 0.06 | 64 | 0 | | |
| Prepaid card accts managed by third party | MM | BN | | | | 116.5 | 0.4 | 0.94 | 0.01 | 8 | 0 | | |
| **Credit card accts** | MM | BN | | | | 283.9 | 8.4 | 522.96 | 12.72 | 1,842 | 18 | | |
| Consumer credit card accts | MM | BN | | | | 254.7 | 6.9 | 467.28 | 11.39 | 1,835 | 11 | | |
| Business/government credit card accts | MM | BN | | | | 29.3 | 2.7 | 55.68 | 1.40 | 1,903 | 151 | | |
| **Checks** | | | | | | | | | | | | | |
| **Checks (Paid)** | BN | TR | 20.7 | 29.22 | 1,412 | 15.8 | 0.6 | 24.01 | 1.63 | 1,518 | 75 | -8.6 | -6.3 |
| Interbank paid checks | BN | TR | 14.6 | 18.58 | 1,272 | 10.7 | 0.5 | 14.85 | 0.88 | 1,383 | 41 | -9.8 | -7.2 |
| Inclearings | BN | TR | 14.0 | 17.88 | 1,273 | 10.2 | 0.5 | 14.18 | 0.88 | 1,390 | 43 | -10.1 | -7.4 |
| Checks drawn on FIs | BN | TR | 14.0 | 17.88 | 1,273 | 10.2 | 0.5 | 14.18 | 0.88 | 1,390 | 43 | -10.1 | -7.4 |
| U.S. treasury checks | BN | TR | | | | | | | | | | | |
| Postal money orders | BN | TR | | | | | | | | | | | |
| On-us correspondent checks | BN | TR | 0.6 | 0.70 | 1,240 | 0.5 | 0.0 | 0.67 | 0.03 | 1,259 | 15 | -2.1 | -1.6 |
| On-us paid checks | BN | TR | 6.1 | 10.64 | 1,750 | 5.1 | 0.3 | 9.16 | 1.12 | 1,801 | 198 | -5.8 | -4.9 |
| **Deposited checks** | BN | TR | 28.4 | 35.56 | 1,253 | 23.1 | 0.6 | 30.77 | 0.88 | 1,334 | 24 | -6.7 | -4.7 |
| Image deposited checks | BN | TR | 9.3 | 11.45 | 1,234 | 8.6 | 0.2 | 10.42 | 0.34 | 1,219 | 24 | -2.7 | -3.1 |
| Consumer and business image deposited checks | BN | TR | 2.9 | 3.98 | 1,362 | 3.3 | 0.1 | 5.23 | 0.23 | 1,602 | 61 | 3.7 | 9.5 |
| Consumer image deposited checks | BN | TR | | | | 0.2 | 0.0 | 0.31 | 0.03 | 1,793 | 111 | | |
| Consumer image deposited checks via mobile | BN | TR | | | | 0.1 | 0.0 | 0.12 | 0.01 | 1,168 | 115 | | |
| Consumer image deposited checks via other methods | BN | TR | | | | 0.1 | 0.0 | 0.19 | 0.02 | 2,694 | 247 | | |
| Business/government image deposited checks | BN | TR | | | | 3.1 | 0.1 | 4.91 | 0.23 | 1,592 | 63 | | |
| Correspondent image deposited checks | BN | TR | 6.3 | 7.46 | 1,176 | 5.3 | 0.2 | 5.20 | 0.19 | 982 | 7 | -5.9 | -11.4 |
| Paper deposited checks | BN | TR | 19.1 | 24.11 | 1,263 | 14.5 | 0.5 | 20.35 | 0.68 | 1,402 | 33 | -8.7 | -5.5 |
| Consumer and business paper deposited checks | BN | TR | 18.6 | 23.40 | 1,261 | 14.5 | 0.5 | 20.26 | 0.68 | 1,400 | 33 | -8.0 | -4.7 |
| Correspondent paper deposited checks | BN | TR | 0.5 | 0.71 | 1,331 | 0.0 | 0.0 | 0.09 | 0.00 | 2,293 | 279 | -58.9 | -50.7 |
| **Returned checks** | MM | BN | 97.8 | 114.39 | 1,169 | 54.2 | 6.9 | 74.56 | 2.38 | 1,377 | 155 | -17.9 | -13.3 |
| Interbank returned checks | MM | BN | 80.1 | 92.59 | 1,156 | 45.7 | 6.6 | 62.10 | 2.04 | 1,358 | 178 | -17.0 | -12.5 |
| Paper interbank returned checks | MM | BN | 4.1 | 9.94 | 2,442 | 1.5 | 0.5 | 3.63 | 1.02 | 2,349 | 497 | -27.6 | -28.5 |
| Image interbank returned checks | MM | BN | 76.0 | 82.64 | 1,087 | 44.2 | 6.6 | 58.48 | 1.95 | 1,324 | 180 | -16.5 | -10.9 |
| On-us returned checks | MM | BN | 17.8 | 21.82 | 1,229 | 8.4 | 0.9 | 12.45 | 0.82 | 1,476 | 120 | -22.0 | -17.1 |



IPR2025-01151
Apple EX1037 Page 107

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **ACH** | | | | | | | | | | | | | |
| **Network ACH credit payments (cleared via FED and EPN)** | BN | TR | 6.2 | 19.24 | 3,111 | 6.2 | 0.4 | 21.75 | 0.68 | 3,523 | 127 | -0.1 | 4.2 |
| Offset ACH credits | BN | TR | | | | 0.5 | 0.3 | 2.54 | 0.62 | 4,758 | 1,097 | | |
| Other ACH credits | BN | TR | | | | 5.6 | 0.3 | 19.21 | 0.24 | 3,406 | 125 | | |
| **Network ACH debit payments (cleared via FED and EPN)** | BN | TR | 7.5 | 12.77 | 1,695 | 7.6 | 0.5 | 16.66 | 0.37 | 2,179 | 113 | 0.5 | 9.3 |
| Offset ACH debits | BN | TR | | | | 0.4 | 0.1 | 1.50 | 0.26 | 4,263 | 625 | | |
| Other ACH debits | BN | TR | | | | 7.3 | 0.5 | 15.17 | 0.27 | 2,078 | 114 | | |
| **Direct exchange ACH credit payments** | MM | BN | 126.2 | 378.10 | 2,997 | 5.1 | 6.6 | 9.47 | 13.40 | 1,856 | 266 | -65.7 | -70.7 |
| **Direct exchange ACH debit payments** | MM | BN | 14.7 | 18.99 | 1,295 | 21.8 | 12.2 | 12.61 | 8.49 | 578 | 75 | 14.1 | -12.8 |
| **In-house on-us credit payments** | BN | TR | 1.4 | 41.50 | 29,285 | 1.7 | 0.0 | 54.64 | 0.41 | 31,691 | 701 | 6.8 | 9.6 |
| In-house on-us offset ACH credits | BN | TR | | | | 0.1 | 0.0 | 6.52 | 0.24 | 54,918 | 2,886 | | |
| Other in-house on-us ACH credits | BN | TR | | | | 1.6 | 0.0 | 48.12 | 0.19 | 29,973 | 745 | | |
| **In-house on-us debit payments** | BN | TR | 3.2 | 42.33 | 13,373 | 2.9 | 0.1 | 52.30 | 0.38 | 18,204 | 732 | -3.2 | 7.3 |
| In-house on-us offset ACH debits | BN | TR | | | | 0.1 | 0.0 | 1.88 | 0.24 | 23,495 | 3,240 | | |
| Other in-house on-us ACH debits | BN | TR | | | | 2.8 | 0.1 | 50.42 | 0.17 | 18,053 | 737 | | |
| **Wire** | | | | | | | | | | | | | |
| **All wire payments** | MM | TR | | | | 278.5 | 3.7 | 1,113.77 | 2.42 | 3,999,464 | 49,426 | | |
| Consumer wires | MM | TR | | | | 12.8 | 0.9 | 1.10 | 0.11 | 85,536 | 9,902 | | |
| Other wires | MM | TR | | | | 265.7 | 3.3 | 1,112.67 | 2.41 | 4,188,177 | 47,053 | | |
| Settlement/bank business wires | MM | TR | | | | 22.2 | 0.3 | 292.62 | 0.78 | 13,190,503 | 158,309 | | |
| Other business/government wires | MM | TR | | | | 243.5 | 3.3 | 820.05 | 1.85 | 3,367,966 | 41,860 | | |
| Domestic (U.S.) wire payee | MM | TR | | | | 169.2 | 3.1 | 674.60 | 2.39 | 3,986,755 | 65,298 | | |
| Foreign wire payee | MM | TR | | | | 109.3 | 0.9 | 439.17 | 0.18 | 4,019,145 | 33,948 | | |
| Consumer-originated foreign wires | MM | TR | | | | 2.4 | 0.2 | 0.48 | 0.00 | 198,496 | 13,891 | | |
| Other foreign wires | MM | TR | | | | 106.9 | 0.9 | 438.69 | 0.18 | 4,105,533 | 32,018 | | |



IPR2025-01151
Apple EX1037 Page 108

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Debit and Prepaid Cards** | | | | | | | | | | | | | |
| **All debit cards in force** | MM | | | | | 218.3 | 7.0 | | | | | | |
| Consumer debit cards in force | MM | | | | | 202.0 | 6.6 | | | | | | |
| Business debit cards in force | MM | | | | | 16.2 | 0.5 | | | | | | |
| **All debit cards with purchase activity** | MM | | | | | 138.1 | 4.7 | | | | | | |
| Consumer debit cards with purchase activity | MM | | | | | 130.4 | 4.5 | | | | | | |
| Business debit cards with purchase activity | MM | | | | | 7.7 | 0.3 | | | | | | |
| **All debit cards that are chip enabled** | MM | | | | | 22.4 | 0.1 | | | | | | |
| Consumer debit cards that are chip enabled | MM | | | | | 21.0 | 0.1 | | | | | | |
| Business debit cards that are chip enabled | MM | | | | | 1.4 | 0.0 | | | | | | |
| **All prepaid cards in force** | MM | | | | | 152.6 | 3.5 | | | | | | |
| Prepaid cards in force managed by DI | MM | | | | | 58.7 | 3.5 | | | | | | |
| Prepaid cards in force managed by third party | MM | | | | | 93.9 | 0.5 | | | | | | |
| **All prepaid cards with purchase activity** | MM | | | | | 26.0 | 1.2 | | | | | | |
| Prepaid cards with purchase activity managed by DI | MM | | | | | 18.2 | 1.1 | | | | | | |
| Prepaid cards with purchase activity managed by third party | MM | | | | | 7.8 | 0.2 | | | | | | |
| **All prepaid cards that are chip enabled** | MM | | | | | 0.0 | 0.0 | | | | | | |
| Prepaid cards that are chip enabled managed by DI | MM | | | | | 0.0 | 0.0 | | | | | | |
| Prepaid cards that are chip enabled managed by third party | MM | | | | | 0.0 | 0.0 | | | | | | |
| **Total debit and prepaid card** | BN | TR | 34.4 | 1.34 | 39 | 41.7 | 1.3 | 1.65 | 0.05 | 39 | 0 | 6.7 | 7.0 |
| Signature (dual-message) transactions | BN | TR | 21.8 | 0.84 | 38 | 26.1 | 0.9 | 1.01 | 0.04 | 39 | 0 | 6.1 | 6.4 |
| PIN (single-message) transactions | BN | TR | 12.6 | 0.51 | 40 | 15.7 | 0.4 | 0.64 | 0.02 | 41 | 0 | 7.7 | 8.1 |
| **Debit card transactions** | BN | TR | | | | 38.4 | 1.3 | 1.56 | 0.05 | 41 | 0 | | |
| Consumer debit transactions | BN | TR | | | | 36.8 | 1.3 | 1.41 | 0.05 | 38 | 0 | | |
| Business/government debit transactions | BN | TR | | | | 1.6 | 0.1 | 0.15 | 0.01 | 90 | 3 | | |
| **Prepaid card transactions** | BN | TR | | | | 3.3 | 0.1 | 0.09 | 0.00 | 28 | 1 | | |
| **Total cash-back transactions** | MM | BN | 797.8 | 25.98 | 33 | 927.5 | 24.2 | 36.17 | 1.96 | 39 | 1 | 5.1 | 11.7 |
| Debit card cash-back transactions | MM | BN | | | | 903.0 | 24.2 | 35.30 | 1.96 | 39 | 1 | | |
| Prepaid card cash-back transactions | MM | BN | | | | 24.5 | 0.5 | 0.87 | 0.02 | 36 | 1 | | |



IPR2025-01151
Apple EX1037 Page 109

| Note:<br>Figures may not sum because of rounding.<br>CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Credit Cards** | | | | | | | | | | | | | |
| **All credit cards in force** | MM | | | | | 313.9 | 10.5 | | | | | | |
| Consumer credit cards in force | MM | | | | | 285.8 | 8.8 | | | | | | |
| Business credit cards in force | MM | | | | | 28.1 | 3.0 | | | | | | |
| **All credit cards with purchase activity** | MM | | | | | 175.6 | 4.3 | | | | | | |
| Consumer credit cards with purchase activity | MM | | | | | 160.0 | 3.7 | | | | | | |
| Business credit cards with purchase activity | MM | | | | | 15.6 | 0.7 | | | | | | |
| **All credit cards that are chip enabled** | MM | | | | | 23.5 | 1.1 | | | | | | |
| Consumer credit cards that are chip enabled | MM | | | | | 23.4 | 1.1 | | | | | | |
| Business credit cards that are chip enabled | MM | | | | | 0.1 | 0.0 | | | | | | |
| **Total credit card transactions** | BN | TR | | | | 22.0 | 0.4 | 2.07 | 0.04 | 94 | 1 | | |
| Consumer credit card transactions | BN | TR | | | | 18.7 | 0.3 | 1.43 | 0.02 | 76 | 0 | | |
| Business/government credit card transactions | BN | TR | | | | 3.3 | 0.1 | 0.64 | 0.02 | 196 | 5 | | |
| **Cash advances** | MM | BN | | | | 75.5 | 1.6 | 64.05 | 2.13 | 848 | 16 | | |
| Consumer cash advances | MM | BN | | | | 70.7 | 1.6 | 60.38 | 2.11 | 854 | 17 | | |
| Consumer convenience checks and balance transfers | MM | BN | | | | 16.9 | 0.8 | 46.78 | 1.97 | 2,762 | 40 | | |
| Consumer ATM withdrawals and over-the-counter withdrawals from credit card accts | MM | BN | | | | 53.8 | 1.0 | 13.60 | 0.29 | 253 | 2 | | |
| Business/government cash advances | MM | BN | | | | 4.8 | 0.1 | 3.67 | 0.04 | 764 | 5 | | |
| Business/government convenience checks and balance transfers | MM | BN | | | | 0.7 | 0.0 | 2.00 | 0.02 | 2,932 | 25 | | |
| Business/government ATM withdrawals and over-the-counter withdrawals from credit card accts | MM | BN | | | | 4.1 | 0.1 | 1.67 | 0.03 | 405 | 4 | | |



IPR2025-01151
Apple EX1037 Page 110

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Cash** | | | | | | | | | | | | | |
| **Debit cards with ATM withdrawals** | MM | | | | | 81.6 | 3.1 | | | | | | |
| **Prepaid cards with ATM withdrawals** | MM | | | | | 21.3 | 0.2 | | | | | | |
| **Over-the-counter cash withdrawals** | MM | BN | | | | 1,476.5 | 53.9 | 1,139.19 | 41.48 | 772 | 23 | | |
| **Cash orders at wholesale vaults** | MM | BN | | | | 31.1 | 0.6 | 376.62 | 9.25 | 12,098 | 687 | | |
| **ATM withdrawals** | MM | BN | 4,234.6 | 478.48 | 113 | 4,291.9 | 168.6 | 539.22 | 16.24 | 126 | 3 | 0.4 | 4.1 |
| On-us ATM withdrawals | MM | BN | 3,030.2 | 360.93 | 119 | 3,118.9 | 129.6 | 406.94 | 10.14 | 130 | 4 | 1.0 | 4.1 |
| "Foreign" ATM withdrawals | MM | BN | 1,204.3 | 117.55 | 98 | 1,173.0 | 65.2 | 132.28 | 7.45 | 113 | 3 | -0.9 | 4.0 |
| ATM withdrawals from transaction deposit accts | MM | BN | | | | 4,109.1 | 168.5 | 509.11 | 16.22 | 124 | 3 | | |
| ATM withdrawals from prepaid card accts | MM | BN | | | | 182.8 | 4.6 | 30.11 | 0.39 | 165 | 3 | | |
| **Over-the-counter deposits** | MM | BN | | | | 1,258.1 | 60.7 | 1,329.43 | 75.74 | 1,057 | 55 | | |
| **Wholesale vault deposits** | MM | BN | | | | 128.3 | 3.2 | 638.82 | 17.60 | 4,979 | 191 | | |
| **ATM deposits** | MM | BN | | | | 958.0 | 3.1 | 352.84 | 1.05 | 368 | 1 | | |
| On-us ATM deposits | MM | BN | | | | 947.1 | 3.0 | 351.95 | 1.01 | 372 | 1 | | |
| "Foreign" ATM deposits | MM | BN | | | | 10.9 | 0.2 | 0.89 | 0.14 | 81 | 12 | | |
| **Selected Payment Initiation Channels** | | | | | | | | | | | | | |
| **Total online or mobile bill payments** | MM | BN | | | | 2,062.0 | 38.4 | 3,329.40 | 14.22 | 1,615 | 24 | | |
| Bill payments via a web browser | MM | BN | | | | 1,898.3 | 38.0 | 3,296.22 | 14.14 | 1,736 | 28 | | |
| Bill payments via a mobile app or text message | MM | BN | | | | 163.7 | 1.2 | 33.18 | 0.31 | 203 | 1 | | |
| **Total online or mobile P2P transfers** | MM | BN | | | | 116.6 | 1.6 | 37.28 | 2.19 | 320 | 18 | | |
| P2P transfers via a web browser | MM | BN | | | | 75.5 | 1.4 | 25.21 | 2.19 | 334 | 28 | | |
| P2P transfers via a mobile app | MM | BN | | | | 41.2 | 0.2 | 12.07 | 0.00 | 293 | 1 | | |
| P2P transfers via text message | MM | BN | | | | 0.0 | 0.0 | 0.00 | 0.00 | 0 | 0 | | |
| **Third-party Payment Fraud** | | | | | | | | | | | | | |
| **Unauthorized check payments** | K | MM | | | | 785.1 | 33.6 | 1,034.16 | 31.14 | 1,317 | 61 | | |
| **Unauthorized ACH credits** | K | MM | | | | 517.0 | 2.9 | 388.49 | 3.45 | 751 | 7 | | |
| **Unauthorized ACH debits** | K | MM | | | | 930.7 | 41.5 | 751.33 | 161.06 | 807 | 176 | | |
| **Unauthorized debit and prepaid card transactions** | K | MM | | | | 13,030.6 | 296.3 | 1,312.76 | 25.27 | 101 | 1 | | |
| Unauthorized debit and prepaid signature (dual-message) transactions | K | MM | | | | 12,260.5 | 282.8 | 1,202.85 | 24.51 | 98 | 1 | | |
| Unauthorized debit and prepaid card-present transactions | K | MM | | | | 7,148.3 | 116.1 | 833.05 | 12.93 | 117 | 1 | | |
| Unauthorized debit and prepaid card-not-present transactions | K | MM | | | | 5,112.2 | 202.2 | 369.80 | 15.22 | 72 | 2 | | |
| Unauthorized debit and prepaid PIN (single-message) transactions | K | MM | | | | 770.1 | 30.6 | 109.91 | 2.63 | 143 | 4 | | |
| **Unauthorized credit card** | K | MM | | | | 13,134.9 | 75.4 | 2,159.26 | 17.89 | 164 | 1 | | |
| Unauthorized credit card-present transactions | K | MM | | | | 6,812.1 | 32.5 | 1,061.58 | 7.47 | 156 | 0 | | |
| Unauthorized credit card-not-present transactions | K | MM | | | | 6,322.8 | 44.5 | 1,097.68 | 12.63 | 174 | 2 | | |
| **Unauthorized ATM withdrawals** | K | MM | | | | 1,212.6 | 14.1 | 239.08 | 3.40 | 197 | 1 | | |

## 2.10.3 Savings Institutions

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Payment accounts** | | | | | | | | | | | | | |
| **All transaction deposit accts** | MM | BN | | | | 18.1 | 2.1 | 146.1 | 18.1 | 8,090 | 607 | | |
| Consumer transaction deposit accts | MM | BN | | | | 16.4 | 1.9 | 97.4 | 13.1 | 5,928 | 527 | | |
| Business transaction deposit accts | MM | BN | | | | 1.6 | 0.3 | 48.7 | 7.8 | 29,820 | 3,431 | | |
| **All prepaid card accts** | MM | BN | | | | 4.1 | 3.9 | 0.14 | 0.21 | 34 | 34 | | |
| Prepaid card accts managed by DI | MM | BN | | | | 4.0 | 3.9 | 0.14 | 0.21 | 34 | 34 | | |
| Prepaid card accts managed by third party | MM | BN | | | | 0.1 | 0.1 | 0.00 | 0.00 | 48 | 31 | | |
| **Credit card accts** | MM | BN | | | | 7.3 | 1.8 | 23.68 | 3.04 | 3,234 | 378 | | |
| Consumer credit card accts | MM | BN | | | | 7.2 | 1.7 | 23.55 | 2.89 | 3,260 | 365 | | |
| Business/government credit card accts | MM | BN | | | | 0.1 | 0.1 | 0.13 | 0.15 | 1,337 | 195 | | |
| **Checks** | | | | | | | | | | | | | |
| **Checks (Paid)** | BN | TR | 1.3 | 1.31 | 973 | 0.8 | 0.1 | 0.97 | 0.12 | 1,264 | 102 | -17.1 | -9.6 |
| Interbank paid checks | BN | TR | 1.1 | 1.08 | 941 | 0.6 | 0.1 | 0.79 | 0.11 | 1,253 | 116 | -17.9 | -9.7 |
| Inclearings | BN | TR | 1.1 | 1.08 | 941 | 0.6 | 0.1 | 0.79 | 0.11 | 1,253 | 116 | -17.9 | -9.7 |
| Checks drawn on FIs | BN | TR | 1.1 | 1.08 | 941 | 0.6 | 0.1 | 0.79 | 0.11 | 1,253 | 116 | -17.9 | -9.7 |
| U.S. treasury checks | BN | TR | | | | | | | | | | | |
| Postal money orders | BN | TR | | | | | | | | | | | |
| On-us correspondent checks | BN | TR | 0.0 | 0.00 | 2,872 | 0.0 | 0.0 | 0.00 | 0.00 | 1,628 | 325 | 41.2 | 52.9 |
| On-us paid checks | BN | TR | 0.2 | 0.23 | 2,243 | 0.1 | 0.0 | 0.17 | 0.03 | 1,318 | 153 | -12.8 | -9.1 |
| **Deposited checks** | BN | TR | 1.1 | 1.11 | 2,049 | 0.7 | 0.1 | 0.90 | 0.11 | 1,319 | 120 | -13.7 | -6.6 |
| Image deposited checks | BN | TR | 0.1 | 0.13 | 2,795 | 0.1 | 0.1 | 0.25 | 0.07 | 1,645 | 461 | 18.2 | 24.3 |
| Consumer and business image deposited checks | BN | TR | 0.1 | 0.10 | 3,283 | 0.1 | 0.0 | 0.19 | 0.05 | 2,035 | 468 | 13.5 | 23.9 |
| Consumer image deposited checks | BN | TR | | | | 0.0 | 0.0 | 0.00 | 0.00 | 651 | 190 | | |
| Consumer image deposited checks via mobile | BN | TR | | | | 0.0 | 0.0 | 0.00 | 0.00 | 401 | 102 | | |
| Consumer image deposited checks via other methods | BN | TR | | | | 0.0 | 0.0 | 0.00 | 0.00 | 1,687 | 418 | | |
| Business/government image deposited checks | BN | TR | | | | 0.1 | 0.0 | 0.19 | 0.05 | 2,119 | 497 | | |
| Correspondent image deposited checks | BN | TR | 0.0 | 0.03 | 2,948 | 0.1 | 0.1 | 0.05 | 0.06 | 959 | 38 | 28.6 | 25.9 |
| Paper deposited checks | BN | TR | 1.0 | 0.98 | 1,979 | 0.5 | 0.1 | 0.65 | 0.08 | 1,228 | 114 | -18.1 | -12.5 |
| Consumer and business paper deposited checks | BN | TR | 1.0 | 0.98 | 1,979 | 0.5 | 0.1 | 0.65 | 0.08 | 1,228 | 114 | -18.0 | -12.5 |
| Correspondent paper deposited checks | BN | TR | 0.0 | 0.00 | 1,946 | 0.0 | 0.0 | 0.00 | 0.00 | 596 | 93 | -54.8 | -62.0 |
| **Returned checks** | MM | BN | 6.2 | 5.71 | 1,820 | 2.6 | 0.3 | 2.63 | 0.36 | 999 | 95 | -25.0 | -22.8 |
| Interbank returned checks | MM | BN | 5.8 | 5.17 | 1,779 | 2.3 | 0.3 | 2.32 | 0.32 | 999 | 101 | -26.2 | -23.4 |
| Paper interbank returned checks | MM | BN | 0.6 | 0.80 | 2,611 | 0.0 | 0.0 | 0.03 | 0.02 | 843 | 423 | -63.7 | -68.4 |
| Image interbank returned checks | MM | BN | 5.6 | 4.36 | 1,489 | 2.3 | 0.3 | 2.30 | 0.32 | 1,001 | 101 | -25.7 | -19.2 |
| On-us returned checks | MM | BN | 0.4 | 0.55 | 2,380 | 0.3 | 0.1 | 0.30 | 0.08 | 999 | 192 | -11.8 | -18.0 |



IPR2025-01151
Apple EX1037 Page 112

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **ACH** | | | | | | | | | | | | | |
| **Network ACH credit payments (cleared via FED and EPN)** | BN | TR | 0.1 | 0.24 | 3,635 | 0.3 | 0.3 | 0.17 | 0.04 | 590 | 620 | 35.0 | -11.8 |
| Offset ACH credits | BN | TR | | | | 0.1 | 0.2 | 0.02 | 0.01 | 128 | 198 | | |
| Other ACH credits | BN | TR | | | | 0.1 | 0.1 | 0.15 | 0.04 | 1,006 | 675 | | |
| **Network ACH debit payments (cleared via FED and EPN)** | BN | TR | 0.9 | 0.69 | 1,563 | 0.6 | 0.1 | 0.59 | 0.12 | 970 | 181 | -11.3 | -5.4 |
| Offset ACH debits | BN | TR | | | | 0.0 | 0.0 | 0.06 | 0.02 | 6,481 | 3,692 | | |
| Other ACH debits | BN | TR | | | | 0.6 | 0.1 | 0.53 | 0.10 | 889 | 158 | | |
| **Direct exchange ACH credit payments** | MM | BN | 0.2 | 0.07 | 865 | 0.3 | 0.4 | 0.36 | 0.44 | 1,109 | 16 | 21.3 | 75.2 |
| **Direct exchange ACH debit payments** | MM | BN | 4.7 | 0.01 | 9 | 0.1 | 0.1 | 0.12 | 0.14 | 1,093 | 23 | -71.0 | 136.4 |
| **In-house on-us credit payments** | BN | TR | 0.1 | 0.44 | 11,360 | 0.1 | 0.0 | 0.10 | 0.03 | 923 | 229 | -2.5 | -39.1 |
| In-house on-us offset ACH credits | BN | TR | | | | 0.1 | 0.0 | 0.07 | 0.02 | 658 | 178 | | |
| Other in-house on-us ACH credits | BN | TR | | | | 0.0 | 0.0 | 0.03 | 0.02 | 4,291 | 1,208 | | |
| **In-house on-us debit payments** | BN | TR | 0.3 | 0.62 | 8,018 | 0.2 | 0.0 | 0.10 | 0.03 | 460 | 132 | -9.9 | -45.9 |
| In-house on-us offset ACH debits | BN | TR | | | | 0.2 | 0.0 | 0.06 | 0.02 | 266 | 88 | | |
| Other in-house on-us ACH debits | BN | TR | | | | 0.0 | 0.0 | 0.04 | 0.02 | 11,313 | 5,073 | | |
| **Wire** | | | | | | | | | | | | | |
| **All wire payments** | MM | TR | | | | 5.2 | 2.3 | 1.84 | 0.85 | 357,012 | 81,269 | | |
| Consumer wires | MM | TR | | | | 1.6 | 1.1 | 0.34 | 0.01 | 205,507 | 137,672 | | |
| Other wires | MM | TR | | | | 3.5 | 2.0 | 1.50 | 0.85 | 428,083 | 73,172 | | |
| Settlement/bank business wires | MM | TR | | | | 0.8 | 0.1 | 0.58 | 0.15 | 757,435 | 180,072 | | |
| Other business/government wires | MM | TR | | | | 2.8 | 2.0 | 0.93 | 0.81 | 337,078 | 90,878 | | |
| Domestic (U.S.) wire payee | MM | TR | | | | 4.8 | 2.3 | 1.82 | 0.85 | 377,397 | 89,691 | | |
| Foreign wire payee | MM | TR | | | | 0.3 | 0.1 | 0.02 | 0.01 | 67,454 | 22,020 | | |
| Consumer-originated foreign wires | MM | TR | | | | 0.1 | 0.0 | 0.00 | 0.00 | 42,486 | 21,952 | | |
| Other foreign wires | MM | TR | | | | 0.2 | 0.0 | 0.02 | 0.01 | 80,300 | 28,569 | | |



IPR2025-01151
Apple EX1037 Page 113

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Debit and Prepaid Cards** | | | | | | | | | | | | | |
| **All debit cards in force** | MM | | | | | 11.7 | 1.7 | | | | | | |
| Consumer debit cards in force | MM | | | | | 11.0 | 1.6 | | | | | | |
| Business debit cards in force | MM | | | | | 0.7 | 0.1 | | | | | | |
| **All debit cards with purchase activity** | MM | | | | | 8.1 | 1.0 | | | | | | |
| Consumer debit cards with purchase activity | MM | | | | | 7.7 | 1.0 | | | | | | |
| Business debit cards with purchase activity | MM | | | | | 0.4 | 0.1 | | | | | | |
| **All debit cards that are chip enabled** | MM | | | | | 0.0 | 0.0 | | | | | | |
| Consumer debit cards that are chip enabled | MM | | | | | 0.0 | 0.0 | | | | | | |
| Business debit cards that are chip enabled | MM | | | | | 0.0 | 0.0 | | | | | | |
| **All prepaid cards in force** | MM | | | | | 5.2 | 5.4 | | | | | | |
| Prepaid cards in force managed by DI | MM | | | | | 5.1 | 5.4 | | | | | | |
| Prepaid cards in force managed by third party | MM | | | | | 0.1 | 0.1 | | | | | | |
| **All prepaid cards with purchase activity** | MM | | | | | 2.9 | 3.8 | | | | | | |
| Prepaid cards with purchase activity managed by DI | MM | | | | | 2.9 | 3.8 | | | | | | |
| Prepaid cards with purchase activity managed by third party | MM | | | | | 0.1 | 0.1 | | | | | | |
| **All prepaid cards that are chip enabled** | MM | | | | | 0.0 | 0.0 | | | | | | |
| Prepaid cards that are chip enabled managed by DI | MM | | | | | 0.0 | 0.0 | | | | | | |
| Prepaid cards that are chip enabled managed by third party | MM | | | | | 0.0 | 0.0 | | | | | | |
| **Total debit and prepaid card** | BN | TR | 2.6 | 0.10 | 39 | 2.8 | 0.4 | 0.11 | 0.02 | 41 | 1 | 2.5 | 4.0 |
| Signature (dual-message) transactions | BN | TR | 1.8 | 0.07 | 73 | 1.9 | 0.3 | 0.08 | 0.01 | 40 | 2 | 1.6 | 4.9 |
| PIN (single-message) transactions | BN | TR | 0.8 | 0.04 | 87 | 0.9 | 0.1 | 0.04 | 0.01 | 41 | 3 | 4.6 | 2.3 |
| **Debit card transactions** | BN | TR | | | | 2.6 | 0.3 | 0.11 | 0.01 | 40 | 1 | | |
| Consumer debit transactions | BN | TR | | | | 2.6 | 0.3 | 0.10 | 0.01 | 39 | 2 | | |
| Business/government debit transactions | BN | TR | | | | 0.0 | 0.0 | 0.00 | 0.00 | 91 | 8 | | |
| **Prepaid card transactions** | BN | TR | | | | 0.2 | 0.3 | 0.01 | 0.01 | 42 | 3 | | |
| **Total cash-back transactions** | MM | BN | 72.6 | 2.21 | 61 | 66.5 | 3.8 | 2.73 | 0.13 | 41 | 2 | -2.9 | 7.3 |
| Debit card cash-back transactions | MM | BN | | | | 66.5 | 3.8 | 2.73 | 0.13 | 41 | 2 | | |
| Prepaid card cash-back transactions | MM | BN | | | | 0.0 | 0.0 | 0.00 | 0.01 | 995 | 1,349 | | |

| Note:<br>Figures may not sum because of rounding.<br>CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Credit Cards** | | | | | | | | | | | | | |
| **All credit cards in force** | MM | | | | | 1.4 | 1.3 | | | | | | |
| Consumer credit cards in force | MM | | | | | 1.3 | 1.3 | | | | | | |
| Business credit cards in force | MM | | | | | 0.1 | 0.1 | | | | | | |
| **All credit cards with purchase activity** | MM | | | | | 1.1 | 1.1 | | | | | | |
| Consumer credit cards with purchase activity | MM | | | | | 1.0 | 1.0 | | | | | | |
| Business credit cards with purchase activity | MM | | | | | 0.1 | 0.1 | | | | | | |
| **All credit cards that are chip enabled** | MM | | | | | 0.0 | 0.0 | | | | | | |
| Consumer credit cards that are chip enabled | MM | | | | | 0.0 | 0.0 | | | | | | |
| Business credit cards that are chip enabled | MM | | | | | 0.0 | 0.0 | | | | | | |
| **Total credit card transactions** | BN | TR | | | | 0.6 | 0.1 | 0.04 | 0.01 | 72 | 1 | | |
| Consumer credit card transactions | BN | TR | | | | 0.1 | 0.1 | 0.01 | 0.01 | 70 | 5 | | |
| Business/government credit card transactions | BN | TR | | | | 0.5 | 0.0 | 0.04 | 0.00 | 72 | 0 | | |
| **Cash advances** | MM | BN | | | | 0.3 | 0.3 | 0.42 | 0.44 | 1,275 | 137 | | |
| Consumer cash advances | MM | BN | | | | 0.3 | 0.3 | 0.41 | 0.44 | 1,292 | 137 | | |
| Consumer convenience checks and balance transfers | MM | BN | | | | 0.1 | 0.1 | 0.35 | 0.39 | 2,956 | 244 | | |
| Consumer ATM withdrawals and over-the-counter withdrawals from credit card accts | MM | BN | | | | 0.2 | 0.2 | 0.06 | 0.06 | 291 | 24 | | |
| Business/government cash advances | MM | BN | | | | 0.0 | 0.0 | 0.01 | 0.00 | 765 | 127 | | |
| Business/government convenience checks and balance transfers | MM | BN | | | | 0.0 | 0.0 | 0.00 | 0.00 | 1,973 | 2,046 | | |
| Business/government ATM withdrawals and over-the-counter withdrawals from credit card accts | MM | BN | | | | 0.0 | 0.0 | 0.01 | 0.00 | 725 | 128 | | |

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Cash** | | | | | | | | | | | | | |
| **Debit cards with ATM withdrawals** | MM | | | | | 6.1 | 0.8 | | | | | | |
| **Prepaid cards with ATM withdrawals** | MM | | | | | 2.2 | 2.9 | | | | | | |
| **Over-the-counter cash withdrawals** | MM | BN | | | | 131.9 | 22.8 | 104.90 | 16.65 | 795 | 90 | | |
| **Cash orders at wholesale vaults** | MM | BN | | | | 0.0 | 0.0 | 0.70 | 0.50 | 21,825 | 10,950 | | |
| **ATM withdrawals** | MM | BN | 345.3 | 35.95 | 200 | 275.5 | 34.6 | 33.03 | 3.89 | 120 | 5 | -7.3 | -2.8 |
| On-us ATM withdrawals | MM | BN | 169.1 | 18.24 | 210 | 200.3 | 20.2 | 23.97 | 2.13 | 120 | 4 | 5.8 | 9.5 |
| "Foreign" ATM withdrawals | MM | BN | 176.2 | 17.71 | 190 | 75.2 | 19.2 | 9.06 | 2.67 | 120 | 13 | -24.7 | -20.0 |
| ATM withdrawals from transaction deposit accts | MM | BN | | | | 259.5 | 31.2 | 30.88 | 3.18 | 119 | 4 | | |
| ATM withdrawals from prepaid card accts | MM | BN | | | | 16.0 | 15.1 | 2.15 | 2.52 | 134 | 40 | | |
| **Over-the-counter deposits** | MM | BN | | | | 118.2 | 25.3 | 122.28 | 25.74 | 1,035 | 210 | | |
| **Wholesale vault deposits** | MM | BN | | | | 0.5 | 0.6 | 1.40 | 1.10 | 2,596 | 1,831 | | |
| **ATM deposits** | MM | BN | | | | 11.2 | 3.5 | 4.87 | 0.69 | 434 | 128 | | |
| On-us ATM deposits | MM | BN | | | | 10.9 | 3.5 | 4.67 | 0.69 | 429 | 130 | | |
| "Foreign" ATM deposits | MM | BN | | | | 0.3 | 0.3 | 0.20 | 0.12 | 612 | 336 | | |
| **Selected Payment Initiation Channels** | | | | | | | | | | | | | |
| **Total online or mobile bill payments** | MM | BN | | | | 111.2 | 12.7 | 41.09 | 4.64 | 370 | 12 | | |
| Bill payments via a web browser | MM | BN | | | | 109.6 | 12.5 | 40.60 | 4.59 | 371 | 12 | | |
| Bill payments via a mobile app or text message | MM | BN | | | | 1.6 | 0.4 | 0.49 | 0.12 | 302 | 17 | | |
| **Total online or mobile P2P transfers** | MM | BN | | | | 0.3 | 0.1 | 0.10 | 0.05 | 377 | 23 | | |
| P2P transfers via a web browser | MM | BN | | | | 0.2 | 0.1 | 0.09 | 0.05 | 386 | 26 | | |
| P2P transfers via a mobile app | MM | BN | | | | 0.0 | 0.0 | 0.01 | 0.01 | 320 | 17 | | |
| P2P transfers via text message | MM | BN | | | | 0.0 | 0.0 | 0.00 | 0.00 | 0 | 0 | | |
| **Third-party Payment Fraud** | | | | | | | | | | | | | |
| **Unauthorized check payments** | K | MM | | | | 18.2 | 3.3 | 11.11 | 3.04 | 611 | 177 | | |
| **Unauthorized ACH credits** | K | MM | | | | 0.6 | 0.8 | 0.51 | 0.32 | 906 | 849 | | |
| **Unauthorized ACH debits** | K | MM | | | | 49.9 | 8.3 | 26.40 | 6.78 | 529 | 114 | | |
| **Unauthorized debit and prepaid card transactions** | K | MM | | | | 382.1 | 72.2 | 43.76 | 6.85 | 115 | 12 | | |
| Unauthorized debit and prepaid signature (dual-message) transactions | K | MM | | | | 364.6 | 71.6 | 40.64 | 6.62 | 111 | 11 | | |
| Unauthorized debit and prepaid card-present transactions | K | MM | | | | 188.0 | 35.4 | 22.87 | 3.67 | 122 | 12 | | |
| Unauthorized debit and prepaid card-not-present transactions | K | MM | | | | 176.5 | 40.4 | 17.77 | 3.39 | 101 | 12 | | |
| Unauthorized debit and prepaid PIN (single-message) transactions | K | MM | | | | 17.5 | 3.8 | 3.12 | 1.02 | 178 | 28 | | |
| **Unauthorized credit card** | K | MM | | | | 64.6 | 59.5 | 7.71 | 10.30 | 119 | 63 | | |
| Unauthorized credit card-present transactions | K | MM | | | | 17.1 | 23.3 | 5.80 | 8.03 | 339 | 15 | | |
| Unauthorized credit card-not-present transactions | K | MM | | | | 47.5 | 37.9 | 1.91 | 2.29 | 40 | 25 | | |
| **Unauthorized ATM withdrawals** | K | MM | | | | 22.1 | 5.6 | 4.70 | 1.21 | 213 | 18 | | |



IPR2025-01151
Apple EX1037 Page 116

## 2.10.4 Credit Unions

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Payment accounts** | | | | | | | | | | | | | |
| **All transaction deposit accts** | MM | BN | | | | 62.9 | 4.0 | 222.9 | 22.1 | 3,543 | 316 | | |
| Consumer transaction deposit accts | MM | BN | | | | 61.8 | 4.0 | 213.7 | 21.9 | 3,459 | 319 | | |
| Business transaction deposit accts | MM | BN | | | | 1.1 | 0.1 | 9.2 | 1.6 | 8,183 | 1,014 | | |
| **All prepaid card accts** | MM | BN | | | | 3.1 | 0.3 | 0.09 | 0.01 | 29 | 3 | | |
| Prepaid card accts managed by DI | MM | BN | | | | 2.8 | 0.3 | 0.08 | 0.01 | 29 | 3 | | |
| Prepaid card accts managed by third party | MM | BN | | | | 0.3 | 0.1 | 0.01 | 0.00 | 30 | 13 | | |
| **Credit card accts** | MM | BN | | | | 17.9 | 1.2 | 40.72 | 2.73 | 2,273 | 134 | | |
| Consumer credit card accts | MM | BN | | | | 17.8 | 1.2 | 40.61 | 2.72 | 2,279 | 135 | | |
| Business/government credit card accts | MM | BN | | | | 0.1 | 0.0 | 0.11 | 0.02 | 1,176 | 181 | | |
| **Checks** | | | | | | | | | | | | | |
| **Checks (Paid)** | BN | TR | 2.1 | 0.74 | 352 | 1.5 | 0.1 | 0.65 | 0.05 | 428 | 28 | -10.2 | -4.1 |
| Interbank paid checks | BN | TR | 2.0 | 0.66 | 336 | 1.4 | 0.1 | 0.59 | 0.05 | 424 | 31 | -10.9 | -3.8 |
| Inclearings | BN | TR | 2.0 | 0.66 | 336 | 1.4 | 0.1 | 0.59 | 0.05 | 424 | 31 | -10.9 | -3.8 |
| Checks drawn on FIs | BN | TR | 2.0 | 0.66 | 336 | 1.4 | 0.1 | 0.59 | 0.05 | 424 | 31 | -10.9 | -3.8 |
| U.S. treasury checks | BN | TR | | | | | | | | | | | |
| Postal money orders | BN | TR | | | | | | | | | | | |
| On-us correspondent checks | BN | TR | 0.0 | 0.00 | 969 | 0.0 | 0.0 | 0.00 | 0.00 | 0 | 0 | -100.0 | -100.0 |
| On-us paid checks | BN | TR | 0.2 | 0.08 | 538 | 0.1 | 0.0 | 0.07 | 0.01 | 466 | 35 | -2.3 | -6.8 |
| **Deposited checks** | BN | TR | 1.1 | 0.81 | 717 | 1.0 | 0.1 | 0.75 | 0.05 | 779 | 53 | -5.4 | -2.7 |
| Image deposited checks | BN | TR | 0.0 | 0.03 | 567 | 0.1 | 0.0 | 0.02 | 0.01 | 394 | 128 | 6.3 | -5.8 |
| Consumer and business image deposited checks | BN | TR | 0.0 | 0.03 | 567 | 0.1 | 0.0 | 0.02 | 0.01 | 394 | 128 | 6.3 | -5.8 |
| Consumer image deposited checks | BN | TR | | | | 0.0 | 0.0 | 0.01 | 0.01 | 346 | 141 | | |
| Consumer image deposited checks via mobile | BN | TR | | | | 0.0 | 0.0 | 0.01 | 0.00 | 315 | 90 | | |
| Consumer image deposited checks via other methods | BN | TR | | | | 0.0 | 0.0 | 0.01 | 0.01 | 378 | 255 | | |
| Business/government image deposited checks | BN | TR | | | | 0.0 | 0.0 | 0.01 | 0.00 | 559 | 147 | | |
| Correspondent image deposited checks | BN | TR | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 0.00 | 0.00 | 0 | 0 | | -100.0 |
| Paper deposited checks | BN | TR | 1.1 | 0.80 | 724 | 0.9 | 0.1 | 0.72 | 0.05 | 803 | 56 | -6.5 | -3.2 |
| Consumer and business paper deposited checks | BN | TR | 1.1 | 0.80 | 724 | 0.9 | 0.1 | 0.72 | 0.05 | 803 | 56 | -6.5 | -3.2 |
| Correspondent paper deposited checks | BN | TR | 0.0 | 0.00 | 965 | 0.0 | 0.0 | 0.00 | 0.00 | 0 | 0 | -100.0 | -100.0 |
| **Returned checks** | MM | BN | 22.8 | 6.83 | 300 | 9.6 | 0.6 | 5.91 | 1.41 | 618 | 145 | -25.1 | -4.7 |
| Interbank returned checks | MM | BN | 21.5 | 6.42 | 298 | 9.2 | 0.6 | 5.62 | 1.41 | 611 | 150 | -24.7 | -4.3 |
| Paper interbank returned checks | MM | BN | 6.5 | 0.42 | 64 | 1.2 | 1.0 | 0.36 | 0.15 | 308 | 276 | -43.8 | -5.0 |
| Image interbank returned checks | MM | BN | 15.0 | 6.00 | 399 | 8.0 | 1.1 | 5.26 | 1.41 | 655 | 190 | -18.8 | -4.3 |
| On-us returned checks | MM | BN | 1.2 | 0.41 | 342 | 0.4 | 0.1 | 0.29 | 0.09 | 790 | 190 | -32.4 | -10.6 |



IPR2025-01151
Apple EX1037 Page 117

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **ACH** | | | | | | | | | | | | | |
| **Network ACH credit payments (cleared via FED and EPN)** | BN | TR | 0.1 | 0.09 | 1,081 | 0.1 | 0.0 | 0.07 | 0.02 | 803 | 245 | 3.3 | -6.4 |
| Offset ACH credits | BN | TR | | | | 0.0 | 0.0 | 0.02 | 0.01 | 683 | 282 | | |
| Other ACH credits | BN | TR | | | | 0.1 | 0.0 | 0.05 | 0.01 | 868 | 336 | | |
| **Network ACH debit payments (cleared via FED and EPN)** | BN | TR | 1.8 | 0.59 | 334 | 1.8 | 0.2 | 0.73 | 0.06 | 403 | 30 | 0.7 | 7.3 |
| Offset ACH debits | BN | TR | | | | 0.0 | 0.0 | 0.04 | 0.01 | 823 | 233 | | |
| Other ACH debits | BN | TR | | | | 1.8 | 0.2 | 0.69 | 0.06 | 392 | 29 | | |
| **Direct exchange ACH credit payments** | MM | BN | 0.5 | 0.39 | 750 | 0.0 | 0.0 | 0.00 | 0.00 | 0 | 0 | -100.0 | -100.0 |
| **Direct exchange ACH debit payments** | MM | BN | 55.8 | 13.07 | 234 | 0.0 | 0.0 | 0.00 | 0.00 | 0 | 0 | -100.0 | -100.0 |
| **In-house on-us credit payments** | BN | TR | 0.0 | 0.01 | 1,318 | 0.0 | 0.0 | 0.03 | 0.02 | 1,903 | 1,992 | 37.0 | 54.8 |
| In-house on-us offset ACH credits | BN | TR | | | | 0.0 | 0.0 | 0.02 | 0.02 | 3,510 | 5,524 | | |
| Other in-house on-us ACH credits | BN | TR | | | | 0.0 | 0.0 | 0.01 | 0.00 | 963 | 685 | | |
| **In-house on-us debit payments** | BN | TR | 0.0 | 0.01 | 658 | 0.0 | 0.0 | 0.01 | 0.00 | 634 | 388 | 21.9 | 20.4 |
| In-house on-us offset ACH debits | BN | TR | | | | 0.0 | 0.0 | 0.00 | 0.00 | 749 | 520 | | |
| Other in-house on-us ACH debits | BN | TR | | | | 0.0 | 0.0 | 0.01 | 0.00 | 594 | 403 | | |
| **Wire** | | | | | | | | | | | | | |
| **All wire payments** | MM | TR | | | | 3.9 | 0.7 | 0.68 | 0.06 | 174,832 | 33,673 | | |
| Consumer wires | MM | TR | | | | 3.0 | 0.6 | 0.10 | 0.02 | 34,140 | 8,077 | | |
| Other wires | MM | TR | | | | 0.9 | 0.2 | 0.58 | 0.06 | 629,621 | 106,799 | | |
| Settlement/bank business wires | MM | TR | | | | 0.7 | 0.1 | 0.49 | 0.03 | 734,037 | 127,796 | | |
| Other business/government wires | MM | TR | | | | 0.3 | 0.1 | 0.09 | 0.05 | 357,032 | 193,844 | | |
| Domestic (U.S.) wire payee | MM | TR | | | | 3.1 | 0.5 | 0.68 | 0.06 | 215,468 | 35,575 | | |
| Foreign wire payee | MM | TR | | | | 0.8 | 0.4 | 0.01 | 0.00 | 7,711 | 1,158 | | |
| Consumer-originated foreign wires | MM | TR | | | | 0.7 | 0.4 | 0.00 | 0.00 | 5,403 | 723 | | |
| Other foreign wires | MM | TR | | | | 0.1 | 0.0 | 0.00 | 0.00 | 33,945 | 31,691 | | |



IPR2025-01151
Apple EX1037 Page 118

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Debit and Prepaid Cards** | | | | | | | | | | | | | |
| **All debit cards in force** | MM | | | | | 52.8 | 3.2 | | | | | | |
| Consumer debit cards in force | MM | | | | | 52.3 | 3.2 | | | | | | |
| Business debit cards in force | MM | | | | | 0.5 | 0.1 | | | | | | |
| **All debit cards with purchase activity** | MM | | | | | 36.3 | 2.1 | | | | | | |
| Consumer debit cards with purchase activity | MM | | | | | 35.9 | 2.1 | | | | | | |
| Business debit cards with purchase activity | MM | | | | | 0.4 | 0.2 | | | | | | |
| **All debit cards that are chip enabled** | MM | | | | | 1.1 | 0.0 | | | | | | |
| Consumer debit cards that are chip enabled | MM | | | | | 1.1 | 0.0 | | | | | | |
| Business debit cards that are chip enabled | MM | | | | | 0.0 | 0.0 | | | | | | |
| **All prepaid cards in force** | MM | | | | | 1.3 | 0.4 | | | | | | |
| Prepaid cards in force managed by DI | MM | | | | | 1.0 | 0.3 | | | | | | |
| Prepaid cards in force managed by third party | MM | | | | | 0.3 | 0.1 | | | | | | |
| **All prepaid cards with purchase activity** | MM | | | | | 0.5 | 0.1 | | | | | | |
| Prepaid cards with purchase activity managed by DI | MM | | | | | 0.3 | 0.1 | | | | | | |
| Prepaid cards with purchase activity managed by third party | MM | | | | | 0.2 | 0.1 | | | | | | |
| **All prepaid cards that are chip enabled** | MM | | | | | 0.0 | 0.0 | | | | | | |
| Prepaid cards that are chip enabled managed by DI | MM | | | | | 0.0 | 0.0 | | | | | | |
| Prepaid cards that are chip enabled managed by third party | MM | | | | | 0.0 | 0.0 | | | | | | |
| **Total debit and prepaid card** | BN | TR | 8.1 | 0.30 | 37 | 10.1 | 0.6 | 0.39 | 0.02 | 38 | 1 | 7.8 | 9.3 |
| Signature (dual-message) transactions | BN | TR | 5.2 | 0.18 | 34 | 6.8 | 0.4 | 0.24 | 0.01 | 35 | 1 | 8.8 | 10.2 |
| PIN (single-message) transactions | BN | TR | 2.8 | 0.12 | 42 | 3.3 | 0.2 | 0.15 | 0.01 | 45 | 1 | 5.9 | 8.0 |
| **Debit card transactions** | BN | TR | | | | 10.1 | 0.6 | 0.38 | 0.02 | 38 | 1 | | |
| Consumer debit transactions | BN | TR | | | | 10.0 | 0.6 | 0.38 | 0.02 | 38 | 1 | | |
| Business/government debit transactions | BN | TR | | | | 0.1 | 0.0 | 0.00 | 0.00 | 62 | 5 | | |
| **Prepaid card transactions** | BN | TR | | | | 0.0 | 0.0 | 0.00 | 0.00 | 62 | 53 | | |
| **Total cash-back transactions** | MM | BN | 165.6 | 7.03 | 42 | 461.0 | 17.1.9 | 8.49 | 1.35 | 18 | 7 | 40.7 | 6.5 |
| Debit card cash-back transactions | MM | BN | | | | 434.8 | 172.0 | 8.39 | 1.35 | 19 | 8 | | |
| Prepaid card cash-back transactions | MM | BN | | | | 26.2 | 19.8 | 0.10 | 0.09 | 4 | 2 | | |



IPR2025-01151
Apple EX1037 Page 119

| Note:<br>Figures may not sum because of rounding.<br>CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Credit Cards** | | | | | | | | | | | | | |
| **All credit cards in force** | MM | | | | | 18.3 | 1.1 | | | | | | |
| Consumer credit cards in force | MM | | | | | 18.2 | 1.1 | | | | | | |
| Business credit cards in force | MM | | | | | 0.1 | 0.0 | | | | | | |
| **All credit cards with purchase activity** | MM | | | | | 11.1 | 0.6 | | | | | | |
| Consumer credit cards with purchase activity | MM | | | | | 11.1 | 0.6 | | | | | | |
| Business credit cards with purchase activity | MM | | | | | 0.0 | 0.0 | | | | | | |
| **All credit cards that are chip enabled** | MM | | | | | 0.0 | 0.0 | | | | | | |
| Consumer credit cards that are chip enabled | MM | | | | | 0.0 | 0.0 | | | | | | |
| Business credit cards that are chip enabled | MM | | | | | 0.0 | 0.0 | | | | | | |
| **Total credit card transactions** | BN | TR | | | | 1.1 | 0.1 | 0.08 | 0.01 | 68 | 5 | | |
| Consumer credit card transactions | BN | TR | | | | 1.1 | 0.1 | 0.07 | 0.01 | 68 | 5 | | |
| Business/government credit card transactions | BN | TR | | | | 0.0 | 0.0 | 0.00 | 0.00 | 199 | 156 | | |
| **Cash advances** | MM | BN | | | | 12.7 | 2.4 | 6.68 | 0.75 | 524 | 76 | | |
| Consumer cash advances | MM | BN | | | | 12.6 | 2.3 | 6.65 | 0.74 | 526 | 71 | | |
| Consumer convenience checks and balance transfers | MM | BN | | | | 1.3 | 0.3 | 3.34 | 0.35 | 2,549 | 468 | | |
| Consumer ATM withdrawals and over-the-counter withdrawals from credit card accts | MM | BN | | | | 11.3 | 2.2 | 3.31 | 0.54 | 292 | 42 | | |
| Business/government cash advances | MM | BN | | | | 0.1 | 0.2 | 0.03 | 0.02 | 303 | 482 | | |
| Business/government convenience checks and balance transfers | MM | BN | | | | 0.0 | 0.0 | 0.01 | 0.01 | 6,204 | 7,104 | | |
| Business/government ATM withdrawals and over-the-counter withdrawals from credit card accts | MM | BN | | | | 0.1 | 0.2 | 0.02 | 0.01 | 193 | 263 | | |



IPR2025-01151
Apple EX1037 Page 120

| Note: Figures may not sum because of rounding. CAGR is compound annual growth rate. | Unit | | 2009 | | | 2012 | | | | | | 2009-2012 CAGR (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Num | Val | Num | Val | Avg | Num | Num CI* (+/-) | Val | Val CI* (+/-) | Avg | Avg CI* (+/-) | Num | Val |
| **Cash** | | | | | | | | | | | | | |
| **Debit cards with ATM withdrawals** | MM | | | | | 26.4 | 1.0 | | | | | | |
| **Prepaid cards with ATM withdrawals** | MM | | | | | 0.0 | 0.0 | | | | | | |
| **Over-the-counter cash withdrawals** | MM | BN | | | | 447.1 | 69.7 | 224.77 | 23.51 | 503 | 67 | | |
| **Cash orders at wholesale vaults** | MM | BN | | | | 0.2 | 0.2 | 8.52 | 3.75 | 40,417 | 23,823 | | |
| **ATM withdrawals** | MM | BN | 1,386.8 | 132.24 | 95 | 1,237.0 | 232.9 | 114.77 | 7.21 | 93 | 17 | -3.7 | -4.6 |
| On-us ATM withdrawals | MM | BN | 627.1 | 60.75 | 97 | 629.1 | 128.0 | 58.38 | 5.49 | 93 | 17 | 0.1 | -1.3 |
| "Foreign" ATM withdrawals | MM | BN | 759.7 | 71.49 | 94 | 607.8 | 116.9 | 56.40 | 3.93 | 93 | 18 | -7.2 | -7.6 |
| ATM withdrawals from transaction deposit accts | MM | BN | | | | 1,235.0 | 233.0 | 114.34 | 7.10 | 93 | 17 | | |
| ATM withdrawals from prepaid card accts | MM | BN | | | | 2.0 | 6.7 | 0.43 | 1.30 | 222 | 946 | | |
| **Over-the-counter deposits** | MM | BN | | | | 252.0 | 19.1 | 176.52 | 18.35 | 701 | 51 | | |
| **Wholesale vault deposits** | MM | BN | | | | 0.1 | 0.0 | 1.50 | 0.90 | 16,279 | 11,396 | | |
| **ATM deposits** | MM | BN | | | | 54.1 | 5.4 | 23.48 | 2.59 | 434 | 19 | | |
| On-us ATM deposits | MM | BN | | | | 49.5 | 5.3 | 19.83 | 2.33 | 401 | 19 | | |
| "Foreign" ATM deposits | MM | BN | | | | 4.6 | 1.1 | 3.66 | 0.91 | 788 | 161 | | |
| **Selected Payment Initiation Channels** | | | | | | | | | | | | | |
| **Total online or mobile bill payments** | MM | BN | | | | 374.6 | 17.7 | 120.85 | 5.28 | 323 | 12 | | |
| Bill payments via a web browser | MM | BN | | | | 370.6 | 17.7 | 119.37 | 5.25 | 322 | 12 | | |
| Bill payments via a mobile app or text message | MM | BN | | | | 4.0 | 1.0 | 1.48 | 0.58 | 369 | 143 | | |
| **Total online or mobile P2P transfers** | MM | BN | | | | 21.1 | 6.8 | 10.58 | 4.30 | 502 | 112 | | |
| P2P transfers via a web browser | MM | BN | | | | 18.4 | 6.6 | 8.45 | 3.42 | 460 | 99 | | |
| P2P transfers via a mobile app | MM | BN | | | | 2.4 | 0.8 | 2.12 | 0.98 | 903 | 403 | | |
| P2P transfers via text message | MM | BN | | | | 0.4 | 0.3 | 0.00 | 0.00 | 0 | 0 | | |
| **Third-party Payment Fraud** | | | | | | | | | | | | | |
| **Unauthorized check payments** | K | MM | | | | 63.5 | 8.9 | 57.24 | 9.37 | 901 | 136 | | |
| **Unauthorized ACH credits** | K | MM | | | | 3.5 | 1.8 | 4.28 | 1.07 | 1,211 | 371 | | |
| **Unauthorized ACH debits** | K | MM | | | | 171.0 | 17.3 | 59.81 | 7.31 | 350 | 37 | | |
| **Unauthorized debit and prepaid card transactions** | K | MM | | | | 1,445.0 | 118.3 | 189.91 | 17.45 | 131 | 8 | | |
| Unauthorized debit and prepaid signature (dual-message) transactions | K | MM | | | | 1,396.7 | 114.5 | 178.84 | 16.84 | 128 | 8 | | |
| Unauthorized debit and prepaid card-present transactions | K | MM | | | | 710.7 | 67.7 | 112.06 | 13.36 | 158 | 12 | | |
| Unauthorized debit and prepaid card-not-present transactions | K | MM | | | | 686.0 | 68.5 | 66.78 | 6.49 | 97 | 8 | | |
| Unauthorized debit and prepaid PIN (single-message) transactions | K | MM | | | | 48.3 | 19.2 | 11.07 | 3.28 | 229 | 43 | | |
| **Unauthorized credit card** | K | MM | | | | 454.8 | 38.2 | 89.24 | 9.64 | 196 | 15 | | |
| Unauthorized credit card-present transactions | K | MM | | | | 232.5 | 31.2 | 55.63 | 8.11 | 239 | 22 | | |
| Unauthorized credit card-not-present transactions | K | MM | | | | 222.4 | 20.7 | 33.61 | 3.10 | 151 | 12 | | |
| **Unauthorized ATM withdrawals** | K | MM | | | | 50.7 | 10.9 | 12.55 | 3.66 | 248 | 41 | | |



IPR2025-01151
Apple EX1037 Page 121

# 3 Networks, Processors, and Issuers Payments Surveys (NPIPS)

## 3.1 INTRODUCTION

The 2013 Networks, Processors, and Issuers Payments Surveys (2013 NPIPS) estimated the number and value of a variety of electronic payments in the United States for calendar year 2012. The 2013 NPIPS was a set of 15 different survey forms for 13 categories of payment instruments including general-purpose cards (credit, debit, and prepaid cards), automated clearinghouse (ACH), and private-label payment cards (credit, prepaid, and electronic benefit transfer (EBT) cards) as well as private-label prepaid transportation payments (private-label prepaid transit card payments and far-field radio frequency identification (RFID) toll collections).

The surveys also included several innovative types of alternative payment initiation methods which typically settled through a card network or ACH, and thus do not represent unique payments. The methods selected included person-to-person (P2P) and money transfer, online and walk-in bill payments, deferred payments, private-label ACH debit card payments, secure online payments, and mobile wallets.

The survey forms were sent to 272 payment organizations that process, clear or settle electronic payments. Survey data were returned by 205 organizations. National estimates were produced for general-purpose card payments, ACH, private-label credit card, and non-transit prepaid card payments. Where national estimates were not possible, that is for prepaid transportation and alternative payment initiation methods, aggregate totals from organizations that responded are reported, which can be treated as lower bound estimates.

Major trends in most of the payments discussed in this section are discussed in the Summary Report and the overview (section 1) of this report. Text in this section adds to those discussions by making some additional points, but it does not necessarily cover the points already discussed, nor does it cover all of the information collected. Tables containing aggregate estimates for all the items collected are attached at the end of this section, and, along with the



IPR2025-01151
Apple EX1037 Page 122

survey instruments available online, can be used to obtain a complete picture of all of the information available from the surveys.[67]

## 3.2 GENERAL-PURPOSE CARDS

### 3.2.1 General-Purpose Credit Cards - Networks

General-purpose credit card (including charge card) payments include point-of-sale (POS), e-commerce, and bill payment transactions made with a credit card (or charge card) and routed through one of the 7 general-purpose credit card networks: Visa, MasterCard, American Express, Discover, Diners Club, Universal Air Travel Plan (UATP), and JCB International Credit Card Co., Ltd. (JCB). The 2013 NPIPS requested the above seven networks to report general-purpose credit card payments data in 2012 including consumer transactions, business transactions made via procurement cards or fleet cards, money sent through the credit card networks by person-to-person (P2P) payment systems, and transactions charged to a credit card where the original payment mechanism was a device other than a card, such as a key-fob transponder or an automated toll system.[68]

Reflecting, in part, 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 from 2009 to 2012. During the same time period, the value of general-purpose credit card-not-present transactions increased more than 25 percent annually to approximately $1.0 trillion, which, calculations show, accounted for more than two-thirds of all general-purpose card-not-present expenditures in 2012.

---

[67] Electronic copies of the survey forms are available for download at https://www.frbservices.org/news/research.html.

[68] Business payments are defined to include federal, state and local government payments as well as those of various kinds of businesses and nonprofit institutions.

### 3.2.2 Debit Cards - Networks

Debit card transactions include POS, e-commerce, and bill payment transactions made with a debit card issued by a depository institution but exclude ATM cash withdrawals and electronic benefit transfer (EBT) card transactions.

Previous electronic payments studies conducted two separate surveys to distinguish signature and PIN payment transactions on the basis of the type of network.[69] As discussed in section 1.2, signature networks are also called dual-message networks, and PIN networks are also called single-message networks. With the advent of card-not-present PIN-less PIN transactions and POS transactions that do not require a PIN or a signature, the 2013 NPIPS combined the two surveys and added new survey questions related to debit card initiation and authorization methods to capture information about how cards are being used, while still allowing the traditional split by network brand discussed in section 1.2.5 and shown in Exhibit 9. Data collected in the initiation and authorization methods section of the survey forms were used to determine the number of payments at the POS that were authenticated with a PIN, signature, or other method.

Signature (dual-message) debit card transactions are primarily those POS and bill payment debit transactions that go through Visa or MasterCard networks. Discover also offers a signature (dual-message) debit product called Discover Debit.

From 2009 to 2012, signature (dual-message) debit card payments grew from 23.1 billion to 30.2 billion, or 9.3 percent per year by number, and from $0.8 trillion to $1.1 trillion, or 10.2 percent per year by value. In 2012, signature (dual-message) debit card transactions accounted for 64 percent and 62 percent of total debit card payments by number and value, respectively.

PIN debit (single-message) transactions are debit transactions that are PIN-based and routed through the 14 regional or national electronic funds transfer (EFT) networks. Every PIN debit transaction carries only one network brand. To avoid double counting the transactions, networks were asked to report only transactions that carried their own network brand. From 2009 to 2012, PIN debit (single-message) transactions grew from 14.4 billion to 16.8 billion, or

[69] Previous iterations of the NPIPS were called the Electronic Payments Study (EPS).



IPR2025-01151
Apple EX1037 Page 124

5.2 percent per year by number, and from $0.6 trillion to $0.7 trillion, or 7.1 percent per year by value.

In 2012, 41 percent of the number and 48 percent of the value of purchase transactions at the point of sale were authenticated with a PIN. While some PIN (single-message) networks reported processing PIN-less PIN transactions and some signature networks reported collecting PIN-authorizations, the net difference in authorization method compared with the traditional split by network brand was 241 million payments, a small proportion of the 47.0 billion debit transactions.

From 2009 to 2012, the number of debit card transactions at the point of sale grew more than 3 times as fast as card-not-present transactions with annual rates of 8.6 percent and 2.4 percent, respectively. During the same time period, the value of debit card transactions at the point of sale grew more than 10 times as fast as card-not-present transactions with annual rates of 11.6 percent and 1.1 percent, respectively.

Based on allocations reported by debit card networks in both 2009 and 2012, the number and value of debit cards were dominated by consumer payments. Both consumers and businesses increased their use of debit cards from 2009 to 2012, and their shares of debit card use stayed flat with approximately 97 percent of the number and 93 percent of the value of transactions being from consumers.

### 3.2.3 General-Purpose Prepaid Cards - Networks

General-purpose prepaid card payments include point-of-sale (POS), e-commerce, and bill payment transactions, and are processed by the same networks as general-purpose debit cards but are generally not linked to traditional transaction or checking accounts. Accounts associated with general-purpose prepaid cards typically have maximum balance limits and limited deposit and withdrawal options and different fee structures compared to multipurpose transaction accounts with debit cards. The 2013 NPIPS requested that networks report general-purpose prepaid card payments made in 2012 by reloadable and non-reloadable general-purpose prepaid cards, including; network-branded gift cards, incentive cards, and prepaid cards for bonus payments; payroll cards and cash-benefit disbursement cards (that is, Direct Express); and health savings account and flexible savings account cards.



IPR2025-01151
Apple EX1037 Page 125

General-purpose prepaid card payments continued to be the fastest growing noncash payment type, increasing at a 33.9 percent annual rate by number and a 36.6 percent annual rate by value from 2009 to 2012. In 2012, there were 3.1 billion general-purpose prepaid card transactions with a value of $105 billion, or 1.8 billion more transactions and $64 billion more value than in 2009.

In 2012, the average value of general-purpose prepaid card transactions was $34, slightly lower than the average value of debit transactions ($39).

Similar to debit cards, slightly over a third of the total general-purpose prepaid card transactions in 2012, both by number and value, were authorized at the point of sale via PIN entry.

Smaller value and larger value general-purpose prepaid card transactions grew at roughly similar rates from 2009 to 2012.

## 3.3 PRIVATE-LABEL CARDS

### 3.3.1 Private-Label Credit Cards

Private-label credit cards are branded for a specific retailer, independent dealer, or manufacturer. If the retailer does not manage the private-label card, a third party issues the cards and collects the payments from cardholders. Because there is no central clearing network or switch involved, the 2013 NPIPS surveyed 10 private-label credit card retail merchant issuers as well as 16 processors. To avoid double counting in the retail merchant issuer survey each organization was asked to report transaction data only for the in-house processed portion of its portfolio.[70]

As in previous studies, it was challenging to gain participation for the surveys of private-label credit cards. For non-responding organizations, any missing data for their private-label credit card transactions were imputed based on ratios computed from similar organizations applied to known reported information or information in the public domain.

---

[70] Reported data may include some payments from selective authorization card programs that are designed to be used at a limited set of proximate merchants, such as for use near and around a town, university or mall.



IPR2025-01151
Apple EX1037 Page 126

#### 3.3.1.1 Private-Label Credit Cards - Retail Merchant Issuers

The number of private-label credit card payments for retail merchant issuers increased approximately 0.2 billion, or approximately 41.4 percent per year from 2009 to 2012. The value increased 55.3 percent per year during the same time period.

From 2009 to 2012, private-label credit card payments at the point of sale grew far more rapidly than card-not-present transactions by both number and value: the number increased 42.0 percent per year for point-of-sale (POS) transactions compared with 24.2 percent per year for card-not-present transactions, while the value increased by an annual rate of 56.3 percent for point-of-sale (POS) transactions compared with an annual rate of 35.3 percent for card-not-present transactions.

In 2012, point-of-sale (POS) transactions accounted for almost all the private-label credit card payments for retail merchant issuers with 98 percent by number and 96 percent by value.

In both 2009 and 2012, the average value for consumer private-label credit card payments for retail merchant issuers was greater than the average value of business payments, which was opposite of the observations for general-purpose credit and debit card payments.

#### 3.3.1.2 Private-Label Credit Cards - Processors

In 2012, the average value for private-label credit card payments handled by third-party processors was $113, which was greater than the average value for general-purpose credit card payments ($93) and private-label credit card payments for retail merchant issuers ($100).

From 2009 to 2012, the number of consumer private-label credit card payments for processors grew 4 times as fast as business payments while the value for consumer payments grew more than twice as fast as for business payments. The average value for consumer private-label credit card payments for processors decreased from $129 in 2009 to $105 in 2012, while the average value for business payments increased slightly from $124 to $125.

From 2009 to 2012, private-label credit card payments at the point of sale for processors had an annual growth of 15.4 percent by number, while card-not-present transactions had an annual decrease of 26.4 percent. During the same period, the value of private-label credit card payments increased 10.5 percent per year for point-of-sale (POS) payments but decreased 6.4 percent per year for card-not-present transactions.

### 3.3.2 Private-Label Prepaid Cards - Non-Transit

Private-label prepaid card transactions are typically limited to a single merchant brand (or group of brands under a single merchant organization). Similar to private-label credit cards, there is no central clearing network or switch involved. Because, as with other types of private-label cards, every private-label prepaid card transaction must be authorized by either an in-house or a third-party processor, the 2013 NPIPS conducted a combined issuer and processor survey with 29 non-transit organizations to collect both in-house and outsourced private-label prepaid card non-transit data.

From 2009 to 2012, the number of private-label prepaid card non-transit transactions grew much more rapidly (10.8 percent per year) than the value (2.3 percent per year), which led to a decline in the average value from $16 per transaction in 2009 to $13 per transaction in 2012.

In 2012, the average value for credits/loads to private-label prepaid non-transit cards was $16. In the meantime, at least 0.05 billion private-label prepaid card non-transit transactions were initiated using a mobile device, with a national estimate of 0.23 billion based on a very small fraction of organizations that responded.

From 2009 to 2012, the number of private-label prepaid card non-transit transactions with values under $15 grew, while the number of transactions with values over $15 declined.

### 3.3.3 EBT Cards

Electronic benefit transfer (EBT) is an electronic system that allows federal and state agencies to issue benefits via a magnetically encoded payment card, similar to a debit card, but usually purchases are limited. Common benefits provided in the United States via EBT are typically of two general categories: food and cash benefits. A recipient uses his/her EBT card to make purchases (transactions) at participating retailers.

The U.S. Food and Nutrition Service (FNS) oversees the management and distribution of the benefits administered through EBT programs primarily through the Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program. All states participating in EBT have a contractor that administers their EBT payments program. Any cash benefits included with the card would be included in prepaid network volumes reported in the



IPR2025-01151
Apple EX1037 Page 128

general-purpose prepaid network survey. Contractors may subcontract processing or any other aspect of the program to another company.

The 2012 NPIPS collected EBT card transaction data from federal and state processors. In 2012, EBT card transactions were estimated to have totaled at least 4.9 billion by number and $143 billion by value. Underlying details on the transactions were not available from the processors.

### 3.3.4 Additional Categories of Prepaid Data

The 2013 NPIPS also gathered data on prepaid card payments from three other types of sources: general-purpose prepaid card payments from processors, and private-label prepaid transportation payments.

#### 3.3.4.1 General-Purpose Prepaid Cards - Processors

Earlier in this section, findings related to the general-purpose prepaid card transactions from the network survey were discussed. Because the networks had limited insight into the specific market applications that served prepaid cards, the 2013 NPIPS also included a survey of 35 organizations that were identified as processors for general-purpose prepaid card transactions in 2012.

The total sums of general-purpose prepaid card transactions from processors contains some double counting of transactions that is not present in network volumes. For this reason, processor data are not used to estimate national totals, but data from the processor surveys such as transaction allocations based on a variety of criteria, including card program type and card funding method, help to better understand the trends in prepaid card transactions at a level of detail not available from another source.

The number of transactions (including some counted more than once) from general-purpose prepaid card processors totaled 4.9 billion with value of $162.2 billion in 2012, which was the largest portion of processor volumes.[71]

---

[71] Because of double-counting these volumes are much larger than the national estimates of 3.12 billion transactions by number and $105 billion by value in 2012 from the general-purpose prepaid card network survey.

Reloadable government cards had the second-largest share of prepaid processor value at $31.2 billion, followed by payroll cards ($17.2 billion) and health benefits cards ($17.1 billion).[72] From 2009 to 2012, the market share for reloadable government cards exceeded payroll card usage. During the same time period, health benefits and government cards were the fastest growing segments reported.

In 2012, more than half of the reported loading transactions were from reloads. ACH and cash were the most often used methods for card funding.

#### 3.3.4.2 Prepaid Transportation (Transit and Toll Collections)

##### *3.3.4.2.1 Private-Label Prepaid Cards – Transit Payments*

The use of electronic fare cards in transportation continued to grow. The 2013 NPIPS collected private-label prepaid card transit payments data from 24 local transit organizations in the larger metropolitan areas in the United States, but did not include smaller market areas where there were no fixed rail system. Nevertheless, cards could be used for bus services in those areas. Therefore, the estimated private-label prepaid card transit transactions should be viewed as lower bounds for the national private-label prepaid card transit fares collected from electronic fare cards.

From 2009 to 2012, the estimated number of private-label prepaid card transit transactions increased from 4.0 billion to 4.7 billion, or at an annual rate of 5.2 percent, while the value increased from $5.1 billion to $7.9 billion, or at an annual rate of 16.2 percent. During the same period, the average value of private-label prepaid card transit transactions grew from $1.25 to $1.69. The private-label prepaid cards used for transit systems grew more rapidly in value than the number of transactions, likely because of increasing fares.

##### *3.3.4.2.2 Far-Field RFID Toll Collections*

Far-field RFID payments include toll transactions authorized via a far-field RFID transponder, which is used to collect payments from a prepaid account which typically has funds automatically replenished via ACH or a card. The 2013 NPIPS collected information on this

---

[72] Health benefits cards include pre-tax benefit cards linked to health savings accounts, flexible spending accounts, or healthcare reimbursement accounts (HRAs). Like EBT cards, payments with these cards are only for qualified purchases.

type of payment from the 18 known toll operators, but there may be other toll authorities that were missed. Therefore, like private-label prepaid card transit transactions, the estimated far-field RFID toll collections should also be viewed as lower bounds for the national far-field RFID toll collections.

From 2009 to 2012, far-field RFID payments measured increased 13.9 percent per year to 5.2 billion transactions and 15.1 percent per year to $9.9 billion by value. Although a large number of toll transactions would have been collected in cash, some of the increase in far-field RFID payments might be the result of achieving greater participation—the 2010 study only collected from 10 toll operators.

In 2012, more than 94 percent of far-field RFID transponder accounts were funded via ACH or cards. And credit card and ACH were the two most often used funding methods, while cash and debit card were the two methods with the highest average values—$33 and $21, respectively.

In 2012, more than 99 percent of the far-field RFID toll collections were less than $5—increased from 97 percent in 2009. Meanwhile, 90 percent of the value of the far-field RFID toll collections was from the category of less than $5—a huge jump from 75 percent in 2009.

### 3.4 AUTOMATED CLEARINGHOUSE (ACH)

Transactions over the ACH network may come from a number of sources, including both traditional ACH payments and new payment technologies that use ACH. These can include the following:

- Direct deposits, such as payroll, dividends, interest, trust disbursements, IRS tax refunds, pension benefits, commission disbursements, expense reimbursements, child support disbursements, and government disbursements and payments
- Direct payments, such as insurance premiums, mortgage payments, loan payments, rents/leases, utility bills, subscription/membership dues, monthly pledges, and tuition payments
- Corporate payments, federal and state tax, royalty payments, invoice payments, trade payments, and debt repayments
- Electronic bill payments transactions settled through the ACH such as those conducted by Fiserv (CheckFree) and ACI (ORCC)

- Most check electronification methods, such as check truncation and conversion of bill payments to ACH at a lockbox (account receivable conversions or ARC). These types of payments are categorized separately to track conversions of one primary payment type to another
- ACH debit cards, such as those being developed by the National Payment Card Association, large retailers like Target (REDcard) and petroleum chains like Speedway and Shell
- P2P payments sent over the ACH network

The transaction data were obtained from the two ACH network operators (EPN operated by The Clearing House and FedACH operated by the Federal Reserve Banks). This information was compiled by NACHA-The Electronic Payment Association.

Payment definitions were based on Standard Entry Classification (SEC) codes. A small number of ACH transactions, such as non-value transactions, were excluded on a basis equivalent to those used for the previous studies.

### 3.4.1 Participation

Both ACH network operators participated in the survey. NACHA collects annual statistics from these networks. NACHA's data for 2012 was used to validate and verify data from The Clearing House and the Federal Reserve Banks for the 2013 NPIPS.

### 3.4.2 ACH Data Considerations

- **Debits and credits:** All ACH transactions are classified as an ACH debit or an ACH credit, depending on whether the originator is crediting an account or debiting an account.
- **Returns:** Analogous to a credit card or debit card transaction, ACH transactions can be returned by a receiving depository financial institution (RDFI) and also subsequently re-presented by the originating depository financial institution (ODFI). However, the reporting of returned transactions is more complex within the ACH system, and each operator reported returns differently, with the FedACH providing more detailed data than EPN.



IPR2025-01151
Apple EX1037 Page 132

### 3.4.3 SEC Codes

All ACH transactions are routed using one of several SEC codes defined by the ACH operating rules. There were 23 such codes effective during 2012. Among these SEC codes, 16 are for payments; others are for informational (non-value transfer) purposes (e.g., ENR, DNE, NOC, etc.). The SEC codes that have been included in the 2013 NPIPS are shown in Exhibit 39.

**Exhibit 39: SEC Codes Included in ACH Aggregates**

| Code | Description |
|---|---|
| ARC | Accounts Receivable Check Conversion |
| BOC | Back Office Conversion |
| CCD | Cash Concentration or Disbursement |
| CIE | Consumer Initiated Entry |
| CTX | Corporate Trade Exchange |
| IAT | International Transfer |
| MTE | Machine Transfer |
| POP | Point-of-Purchase Entry |
| POS | Point-of-Sale Entry |
| PPD | Prearranged Payment and Deposit Entry |
| RCK | Re-Presented Check Entry |
| SHR | Shared Network Transaction |
| TEL | Telephone e-Check |
| TRC | Truncated Entry |
| WEB | Web e-Check |
| XCK | Destroyed Check Entry |



IPR2025-01151
Apple EX1037 Page 133

## 3.5 ALTERNATIVE PAYMENT INITIATION METHODS

Several alternative payment products are new or non-traditional payment initiation methods primarily for consumer customers but use traditional funding and settlement systems, typically with ACH, debit and credit card networks behind the scenes. One of the examples is far-field RFID toll collections which was discussed above, a few other examples include: person-to-person (P2P) and money transfers, online bill payments, walk-in bill payments, deferred payments, private-label ACH debit cards, secure online payments, and mobile wallet. The 2013 NPIPS tracked these alternative payment initiation methods separately. Reported totals for these transactions are lower bounds.

### 3.5.1 Person-to-Person (P2P) and Money Transfers

Person-to-person (P2P) and money transfer payment organizations specialize in processing transfers of funds between two individuals. The techniques usually feature an online or e-mail-based system which provides payment instructions with notification to the beneficiary that funds have been received from the payer. P2P has been used in online auction community environments and for casual payments between parties, although this model is expanding into new areas such as airlines and mainstream online merchants. Depository institutions have reentered the electronic P2P payment space, after previously leaving it, by adding offerings (e.g., CashEdge, PayNet, and clearXchange).

There were 14 qualified P2P and money transfer processors included in the 2013 NPIPS. From 2009 to 2012, the number of P2P and money transfers increased from 146.6 million to 205.3 million at an annual rate of 11.9 percent. During the same time period, the value increased from $45.4 billion to $91.5 billion at an annual rate of 26.4 percent.

Among all P2P and money transfer payments in 2012, only 8 percent were for payment amounts less than $25, while 9 percent were for payment amounts between $25 and $50, and the remaining 83 percent were for payment amounts greater than $50.

More than half of the P2P and money transfer payments (53 percent) in 2012 were reported to be to foreign payees while slightly less than two-thirds of the dollar value (63 percent) was reported to be to domestic US payees.



IPR2025-01151
Apple EX1037 Page 134

In 2012, the majority (76 percent) of the P2P and money transfer payments were cleared through 'Other', which included mostly agent-based systems. Cash and book transfers were the next most common clearing approaches. P2P and money transfer payments cleared through agent-based systems had the highest average value of $575 per transaction, followed by ACH with average value of $338 per transaction.

Almost two-thirds of the P2P and money transfer payments in 2012 were originated in person, followed by a website (24 percent) and then with a mobile phone (8 percent) which had experienced a tremendous growth from 2009.

In both 2009 and 2012, the bulk of the P2P and money transfer payments were for transactions valued $25 or more. On the other hand, from 2009 to 2012, the P2P and money transfer payments had the fasted growth for payments valued under $25.

### 3.5.2 Bill Payments

Electronic bill payment transactions continued to grow since 2009 with the combined online bill pay and walk-in bill pay categories increasing from 2.7 billion in 2009 to 3.4 billion transactions in 2012. Processors reported 3.1 billion online bill payment transactions and an additional 286 million walk-in bill payments in 2012.

While the online bill payments reported by processors is useful, it only partially represents total bill payments. The biller-direct channel has primarily utilized paper checks, walk-in locations for cash payments, recurring and one-time ACH payments (including CSR and IVR telephone payment authorizations), but in recent years billers have been accepting credit and debit card payments as well. Debit card networks reported 981 million PIN-less payments used for bill pay applications and processed over single-message networks, although this does not account for all debit card bill payments. General-purpose credit, debit, and prepaid cards can all be used to pay some types of bills online over dual-message networks, and, while partial information is informative, bill payments comprise an unknown portion of card-not-present payments.

#### 3.5.2.1 Online Bill Payments

The 2013 NPIPS gathered data from 14 leading bill payment processors to measure the number and value of online bill payment transactions.



IPR2025-01151
Apple EX1037 Page 135

In both 2009 and 2012, the majority of the online bill payments reported by these processors were bank/intermediary online bill payment transactions for both the number and value. But from 2009 to 2012, the annual growth rates for biller direct online bill payments (40.0 percent by number and 32.6 percent by value) were much higher than those of bank/intermediary online bill payments (6.1 percent by number and 6.6 percent by value).

Most online bill payments in 2012 were reported to have value of $50 or more: 80.5 percent of the transactions and 98.5 percent of the value for bank/intermediary online bill payments, and 92 percent of the transactions and 99.6 percent of the value for biller direct online bill payments.

Among the bank/intermediary online bill payments made in 2012, more than half (55 percent) was settled by ACH and approximately 16 percent was settled by checks. Other settlement methods included book transfers, wires and network/agent settlement funds. Overall, the average payment size for online bill payments was $381.

#### 3.5.2.2 Walk-In Bill Payments

The 2013 NPIPS included 14 large processors for walk-in bill payments. A few small processors did not respond to the survey. Meanwhile the billers that operated their own walk-in payment locations were not included in the study. Over the past two decades, most large billers have contracted with processors and local organizations to support cash and in-person payments.

The number of walk-in bill payment increased from 247.4 million in 2009 to 285.6 million in 2012 at an annual rate of 4.9 percent. During the same time period, the value increased at annual rate of 7.2 percent from $35.6 billion to $43.8 billion.

In 2012, most of the walk-in bill payments were settled via ACH and cash was the most frequently used method of payment for walk-in payments.

### 3.5.3 Deferred Payments

Deferred payment products, such as PayPal's Bill Me Later, allow a customer to complete a transaction upfront with a merchant, and then pay the balance later via a deferred payment program through the provider's product. It allows a customer to make purchases online or over the phone without using a credit card. The initial transaction is conducted by the deferred



IPR2025-01151
Apple EX1037 Page 136

payment provider, and the balance is paid later by the customer or initiator. Because of the limited amount of primary source data available, details about the transactions are not reported.

### 3.5.4 Private-Label ACH Debit Card Payments

Private-label ACH debit cards, which work similarly to a PIN debit card but route transactions through the ACH system rather than a card network, continued to exist with limited popularity. Many of the supermarkets that had offered ACH card payments to their customers wound down their services, after PIN debit card became widely available in the late 1990's. However, some larger chain stores still offer ACH payment options.

In 2012, there were approximately 105 million private-label ACH debit card payments with a value of $7.4 billion and an average value of $71 per transaction.

### 3.5.5 Secure Online Payments

The secure online payments category includes methods that have been developed to simplify online purchases and to minimize fraud that might occur with a traditional card-not-present transaction or ACH payment.

The 2013 NPIPS collected secure online payments data from 9 processors. At least 1.8 billion secure online payments with a value of $93.0billion were made in 2012, and at least 1.5 billion involved redirection from the merchant or biller site to secure a card payment.

Among all the transaction value categories, secure online payments with value between $5 and $10 had the largest share (27 percent) of all secure online payments made in 2012, followed by transactions with value under $5 (19 percent). The category for transactions with value between $10 and $15 had the lowest share by both number and value.

### 3.5.6 Mobile Wallets

Mobile wallets included transactions where the buyer made a payment using SMS messaging, a mobile application, virtual-cloud-based account or near-field RFID technology connected with a mobile device. As this is the first time data on mobile wallets was collected, evidence that the category is growing is based on industry projections. Overall, this payment category had a low participation rate, although 10 respondents including several large processors provided data.



IPR2025-01151
Apple EX1037 Page 137

Based on the responses gathered, there were at least 250.6 million mobile wallet payments with a value of at least $9.5 billion made during 2012.

In 2012, among organizations that provided transaction value distribution data, more than two-thirds of the mobile wallet transactions were for payments less than $10.

## 3.6 METHODOLOGY

### 3.6.1 Survey Design

The 2013 NPIPS included a set of 15 census-style voluntary surveys. The surveys were designed to collect information on electronic payment transactions made in the United States during the year 2012, including electronic payments made by credit card, debit card, prepaid card, automated clearinghouse (ACH), as well as alternative payment initiation methods including person-to-person (P2P) and money transfers, online and walk-in bill payments, deferred payments, far-field RFID payments, secure online payments, and mobile wallets. The survey instruments were sent to 272 payment organizations including payment network operators and processors, various card associations, electronic funds transfer (EFT) networks, and federal and state government agencies in the United States. The data collection and estimation methods used for this year's study were consistent with those used in the Electronic Payments Studies in previous years.

The survey process was managed by payment type, and some organizations received several different surveys.

#### 3.6.1.1 Scope of Research

The 2013 NPIPS collected data in three primary areas:

- Electronic payment options used by buyers of goods or services, including in-person point-of-sale (POS) and remote transactions.
- Electronic payment products used on the 'back-end' to effect final settlement for purchase transactions, including P2P bill payment and other alternative payment initiation methods.
- Electronic payment options used by employers, federal and state agencies, and others for disbursement of income payments, such as payroll and benefit disbursement transactions.



IPR2025-01151
Apple EX1037 Page 138

There are variations of payment instruments, as well as components of the payments value chain, that were considered to be outside the scope of the present study. Each payment transaction has a unique, and sometimes complex, transaction flow involving the exchange of information, issuer-to-acquirer settlement, and customer-to-issuer settlement.

The following transaction information was considered outside the scope of work for the 2013 NPIPS:

- Cash and check deposits and payments
- Electronic bill presentment transactions
- EDI and Non-financial ACH transactions
- Bill payment transactions which are:
  - Initiated and settled via paper (cash or check)
  - Initiated electronically, paid via paper
- Loyalty-based accounts (e.g., airline frequent flier accounts)
- Phone cards
- Campus cards that do not have payment network connectivity (e.g., meal tickets)
- Consumer and business wire transfers via Fedwire® and CHIPS
- Issuer-to-acquirer settlement transactions (e.g., book entry or direct net settlement)

### 3.6.2 Survey Recruitment

The methodology for identifying organizations for the 2013 NPIPS was consistent with the 2001 through 2009 Electronic Payments Studies. Organizations engaged in the business of originating, switching and/or processing electronic payment instruments and remittances were identified based on information from industry directories, lists of prior participants, the Federal Reserve Bank of Philadelphia's Payment Cards Center 's list of prepaid card processors, the Network Branded Prepaid Card Association (NBPCA), the Federal Reserve Bank of Boston's Mobile Payments Industry Workgroup (MPIW), Blueflame Consulting, and MH Consulting Partners.

As this study focuses on payments made in the United States in 2012, only unique payment instruments and their final settlement were counted for the purpose of computing totals. Therefore organizations were selected on their ability to monitor transaction and dollar volume data on a non-duplicative counting basis for the core payment methods. For example, there is



IPR2025-01151
Apple EX1037 Page 139

some overlap among prepaid card processors using branded networks, therefore network totals are used for the primary counts of prepaid transactions.

### 3.6.3 Survey Participation

Of the 272 organizations that were requested to participate the 2013 NPIPS, 205 organizations provided data, including 79 of the largest payment organizations that process core transactions including ACH, credit cards, debit cards and prepaid cards. The response rates are provided at the tables attached at the end of this section. Two measures of response rate are given: percentage of organizations that responded weighted by size as measured by net purchase transactions (NPT) or total transactions (TOT), and the percentage of organizations that responded for each survey item.

## 3.7 DATA COLLECTION PROCESS

Participation in the study was voluntary, but was highly encouraged by the Federal Reserve through industry-wide communications, personalized letters and over 2000 follow-up calls to large organizations by Blueflame Consulting and MH Consulting.

The primary data collection method was a set of questionnaires or survey instruments that were provided in both paper and MS-Excel formats. One or more senior executives at each organization on the potential participant list were mailed a personalized survey invitation, a copy of a letter from the Vice Chair of the Federal Reserve Board of Governors, and a data contact form with instructions to specify the types of transactions that their organization handled in 2012. Blueflame Consulting then distributed survey instructions and survey forms to the designated data contact for each payment organization.

Reminder calls were made to non-responding organizations. Personalized letters and e-mails were also sent to follow up with the organizations that had been invited to participate in the study. In addition, follow-up clarification calls were made to each participant to request clarifications about misclassified or incomplete data.



IPR2025-01151
Apple EX1037 Page 140

### 3.7.1 Survey Instruments

The primary type survey instrument was electronic spreadsheets, which contained some formulas and error-checking ability. Survey instructions included definitions of the data items to be reported because of the broad range of transaction types that could be processed by an organization. It was important to avoid double counting of transactions which can occur when multiple networks are involved in a transaction authorization through a “gateway” switch.

### 3.7.2 Communications Plan

The approach was similar to prior studies, including recruitment letters, follow up, and escalation of efforts for non-respondents. Earlier studies confirmed that effective communications are a critical element in achieving a high participation rate for this census-style study, especially since it required gaining voluntary participation from leading electronic funds transfer organizations.

The purpose of the communications plan was to outline the specific actions that needed to be used to build awareness of the study and to encourage organizations to share their transaction data. There were two audiences for the communications: senior executives in the electronic payments industry and managers in EFT payments organizations who have access to pertinent data.

#### 3.7.2.1 Announcements to the Electronic Payments Industry

Multiple communications methods were used to build awareness within the electronic payments industry about the study, including:

- Press release by the Federal Reserve announcing the study (January 17, 2013)
- Industry newspaper coverage
- Speeches, meetings, e-mails and other communications

#### 3.7.2.2 Communications with EFT Payment Organizations

Gaining the participation of networks, processors and issuers was achieved through the joint efforts of the Federal Reserve staff and Blueflame Consulting. Communications were conducted by mail with telephone and e-mail follow up that provided information about why each organization had been invited to participate in the study and how the survey results would be used.



IPR2025-01151
Apple EX1037 Page 141

There were five components in the communications plan:

1. Pre-survey letter
2. Pre-survey follow-up letter
3. Survey administration
4. Survey follow up
5. Thank you letter and a summary of results

#### 3.7.2.3 Pre-Survey Letter

The objective of the pre-survey letter sent primarily during January through March 2013 was to obtain agreement by a senior manager in each organization to participate in the study, and to identify the correct person for providing the required transaction data. The pre-survey letter consisted of three components:

- **Letter from the FRB.** A PDF letter from the Vice Chair of the Federal Reserve Board of Governors was mailed to executives at electronic payments organizations.
- **Personalized letter from Blueflame Consulting.** A second letter was included on Blueflame Consulting letterhead and signed by Edward Bachelder, Director of Research. The letter was personally addressed to the executives explaining:
  - The process for participating in the 2013 NPIPS
  - That survey participants will receive a summary report of the results as an incentive to participate
  - A request to send a completed contact form to Blueflame Consulting via web registration form, as well as fax and e-mail response options for letter
- **Contact Form.** The contact form asked the executives to provide (or verify) the name and contact information for the individual(s) in the organization who should receive the survey package.

#### 3.7.2.4 Pre-Survey Letter Follow Up

Blueflame Consulting made follow-up calls to organizations that did not respond to the pre-survey invitation letter. If the original contact could not be reached, Blueflame Consulting contacted other appropriate individuals within the organization. If they declined to participate in the survey, Blueflame Consulting noted the reasons and sought assistance from the Federal Reserve project team.



IPR2025-01151
Apple EX1037 Page 142

#### 3.7.2.5 Survey Administration

During April through August 2013, Blueflame Consulting compiled a mailing list of individuals who should be providing data based on the forms returned from the pre-survey mailing and prior participation. Each individual was sent a package including a personalized letter or e-mail with the appropriate survey instruments to complete (and which could be returned by e-mail, fax, or postal mail). Survey administration was complex because of the number of survey instruments that may need to be completed by a larger organization.

#### 3.7.2.6 Survey Follow Up

During May through November 2013, organizations that did not return completed survey forms within three weeks were called. Organizations that still did not respond to the reminder e-mails and follow-up phone calls were resent letters in USPS Priority Mail envelopes. The calls and e-mails stressed the importance of their participation. If information from the primary contact could not be obtained, attempts were made to contact other people within the organization and the survey materials were re-sent to another individual as appropriate. To encourage participation and ensure the accuracy of the data submissions the following steps were taken:

- Submitted data was reviewed for reasonableness, completeness and potential for double counting if their volume might be included in another processor or network's submission.
- Non-respondents were re-contacted, providing them with our estimate and request that they participate or confirm our estimate based on publicly available information and comparative data gathered from comparable participants in the study.

Large organizations that did not respond were identified and in several cases assistance was provided by Federal Reserve staff. From June through September 2013, all non-respondents were called in multiple attempts to obtain their information over the phone and/or via e-mail. Overall, at least eight attempts were made to contact each non-responding organization.

#### 3.7.2.7 Thank You Letters and Summary of Results

At the conclusion of the data collection and analysis efforts, Blueflame Consulting sent to each respondent a letter thanking them for their participation and copy of the summary of findings.

### 3.7.3 Data Validation

The data were obtained directly from primary sources whenever possible. Responses were reviewed for consistency and compared with other submissions. In addition, secondary sources for data were considered. Where feasible, the findings were validated through existing relationships with electronic payments industry sources and other available research and reports.

### 3.7.4 Data Imputation and Estimation

In cases where organizations chose not to participate, data were generally imputed based on ratios between the data of interest reported by comparable organizations and available public information including public reports, industry statistics, and Securities and Exchange Commission filings. Reported and imputed data were then used to construct annual estimates of electronic payments in the U.S. for 2012. These methods and procedures are based on experience gained from the earlier surveys formerly call the Electronic Payments Surveys. In all cases, the non-participating organizations were called and asked to validate the reasonableness of our estimates. On a few occasions, non-respondents at that point chose to provide actual data for the study. In other cases, organizations would give guidance regarding the accuracy of the estimates.

The tables include information to help assess the quality of the estimates, including the percentage of organizations that responded weighted by size as measured by net purchase transactions (NPT) or total transactions (TOT), and the percentage of organizations that responded for each survey item. Even in cases where there were confirmed, they were not counted toward these percentages unless actual figures were provided by the responding organization.



IPR2025-01151
Apple EX1037 Page 144

## 3.8 TABULAR RESULTS

### 3.8.1 Estimates for 2012 with Shares and Response Rates

**General-Purpose Credit Cards - Networks**

| Number of organizations | 2012 |
|---|---|
| included in census | 7 |
| responded | 7 |
| included in estimated totals | 7 |

| Survey Item | Totals[1] Num (BN) | Totals[1] Val ($TR) | Avg Val ($) | Item Shares of NPT (%) Num | Item Shares of NPT (%) Val | Response Rates[2] NPT (%) Num | Response Rates[2] NPT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **3. Net purchase transactions (NPT)** | 23.8 | 2.21 | 93 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| **4. NPT by type of card** | 23.8 | 2.21 | 93 | | | | | | |
| 4a. Charge card transactions | 21.5 | 1.80 | 84 | 90.2 | 81.5 | 92.4 | 94.9 | 71.4 | 71.4 |
| 4b. Credit card transactions | 2.3 | 0.41 | 175 | 9.8 | 18.5 | 19.2 | 27.7 | 42.9 | 42.9 |
| **5. NPT by payment initiation and authorization method** | 23.8 | 2.21 | 93 | | | | | | |
| 5a. Transactions at the point of sale | 18.0 | 1.23 | 68 | 75.8 | 55.6 | 100.0 | 100.0 | 100.0 | 100.0 |
| 5a.1. Chip | 0.0 | 0.00 | 47 | 0.1 | 0.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 5a.1.1. Signature acquired | 0.0 | 0.00 | 47 | 0.0 | 0.0 | 99.9 | 99.7 | 85.7 | 85.7 |
| 5a.1.2. Dynamic data only | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 99.9 | 99.7 | 85.7 | 85.7 |
| 5a.1.3. EMV using compliant card and terminal | 0.0 | 0.00 | 145 | 0.0 | 0.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 5a.1.4. Other | 0.0 | 0.00 | 37 | 0.0 | 0.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 5a.2. No chip (including magnetic stripe) | 18.0 | 1.23 | 68 | 75.7 | 55.6 | 100.0 | 100.0 | 100.0 | 100.0 |
| 5b. Card-not-present/remote transactions | 5.8 | 0.98 | 170 | 24.2 | 44.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| 5b.1. Static card data only | 5.8 | 0.98 | 170 | 24.2 | 44.3 | 99.9 | 99.7 | 85.7 | 85.7 |
| 5b.2. Network-sponsored online verification system | 0.0 | 0.00 | 341 | 0.0 | 0.1 | 99.9 | 99.7 | 85.7 | 85.7 |
| 5b.3. Other | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 99.9 | 99.7 | 85.7 | 85.7 |
| **6. POS Transactions by type of device** | 18.0 | 1.23 | 68 | | | | | | |
| 6a. Transactions initiated from or via a mobile device | 0.0 | 0.00 | 24 | 0.0 | 0.0 | 19.2 | 27.7 | 42.9 | 42.9 |
| 6b. Transactions not initiated with a mobile device | 18.0 | 1.23 | 68 | 75.8 | 55.6 | 19.2 | 27.7 | 42.9 | 42.9 |
| **7. NPT by type of payer** | 23.8 | 2.21 | 93 | | | | | | |
| 7a. Consumer transactions | 20.4 | 1.55 | 76 | 85.8 | 70.1 | 100.0 | 100.0 | 100.0 | 100.0 |
| 7b. Business/government transactions | 3.4 | 0.66 | 196 | 14.2 | 29.9 | 100.0 | 100.0 | 100.0 | 100.0 |
| 7b.1. Procurement cards | 0.7 | 0.20 | 300 | 2.8 | 8.9 | 92.5 | 95.1 | 85.7 | 85.7 |
| 7b.2. Fleet cards for fueling and vehicle expenses | 0.1 | 0.02 | 167 | 0.5 | 1.0 | 92.5 | 95.1 | 85.7 | 85.7 |
| 7b.3. Other | 2.6 | 0.44 | 171 | 10.9 | 20.0 | 92.5 | 95.1 | 85.7 | 85.7 |
| **8. NPT by payee location** | 23.8 | 2.21 | 93 | | | | | | |
| 8a. Transactions with U.S. payees | 23.5 | 2.15 | 92 | 98.8 | 97.5 | 100.0 | 99.9 | 85.7 | 85.7 |
| 8b. Transactions with payees outside the U.S. | 0.3 | 0.06 | 187 | 1.2 | 2.5 | 100.0 | 99.9 | 85.7 | 85.7 |
| **9. NPT by transaction value range** | 23.8 | 2.21 | 93 | | | | | | |
| 9a. Transactions authorized less than $5.00 in total value | 2.1 | 0.01 | 3 | 8.7 | 0.3 | 99.9 | 99.6 | 71.4 | 71.4 |
| 9b. Transactions authorized $5.00 to $9.99 in total value | 2.7 | 0.02 | 8 | 11.2 | 0.9 | 99.9 | 99.6 | 71.4 | 71.4 |
| 9c. Transactions authorized $10.00 to $14.99 in total value | 2.2 | 0.03 | 12 | 9.1 | 1.2 | 99.9 | 99.6 | 71.4 | 71.4 |
| 9d. Transactions authorized $15.00 to $24.99 in total value | 3.3 | 0.07 | 20 | 13.9 | 3.0 | 99.9 | 99.6 | 71.4 | 71.4 |
| 9e. Transactions authorized $25.00 to $49.99 in total value | 5.3 | 0.19 | 36 | 22.2 | 8.7 | 99.9 | 99.6 | 71.4 | 71.4 |
| 9f. Transactions authorized $50.00 or greater in total value | 8.3 | 1.89 | 228 | 34.9 | 85.9 | 99.9 | 99.6 | 71.4 | 71.4 |

*Figures may not sum because of rounding. NPT represents net purchase transactions.*

[1] *The total number of transactions are in billions while the total value of transactions are in trillions of USD.*

[2] *Two measures of response rate are given: 1) percentage of NPT from organizations that responded and 2) percentage of organizations that responded.*



IPR2025-01151
Apple EX1037 Page 145

## Debit Cards - Networks

| Number of organizations | |
|---|---|
| included in census | 14 |
| responded | 12 |
| included in estimated totals | 14 |

**2012**

| Survey Item | Totals[1] Num (BN) | Totals[1] Val ($TR) | Avg Val ($) | Item Shares of NPT (%) Num | Item Shares of NPT (%) Val | Response Rates[2] NPT (%) Num | Response Rates[2] NPT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **4. Net purchase transactions (NPT)** | 47.0 | 1.82 | 39 | 100.0 | 100.0 | 99.6 | 99.6 | 85.7 | 85.7 |
| **5. NPT by payment initiation and authorization method** | 47.0 | 1.82 | 39 | | | | | | |
| 5a. Transactions at the point of sale | 41.4 | 1.42 | 34 | 88.2 | 78.3 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5a.1. Chip | 0.0 | 0.00 | 14 | 0.1 | 0.0 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5a.1.1. Signature acquired | 0.0 | 0.00 | 14 | 0.1 | 0.0 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5a.1.2. PIN entry at merchant terminal | 0.0 | 0.00 | 39 | 0.0 | 0.0 | 99.6 | 99.6 | 85.7 | 85.7 |
| (a) EMV using compliant card and terminal | 0.0 | 0.00 | 156 | 0.0 | 0.0 | 99.6 | 99.6 | 85.7 | 85.7 |
| (b) Other chip-and-PIN transactions | 0.0 | 0.00 | 38 | 0.0 | 0.0 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5a.1.3. Dynamic data only | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5a.1.4. Other | 0.0 | 0.00 | 9 | 0.0 | 0.0 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5a.2. No chip (including magnetic stripe) | 41.4 | 1.42 | 34 | 88.2 | 78.2 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5a.2.1. Signature acquired | 22.2 | 0.65 | 29 | 47.3 | 35.5 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5a.2.2. PIN entry at merchant terminal | 16.9 | 0.69 | 41 | 36.1 | 37.9 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5a.2.3. Other | 2.3 | 0.09 | 39 | 4.8 | 4.8 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5b. Card-not-present/remote transactions | 5.5 | 0.40 | 71 | 11.8 | 21.7 | 99.6 | 99.6 | 85.7 | 85.7 |
| 5b.1. Static card data | 4.6 | 0.34 | 74 | 9.7 | 18.5 | 99.4 | 99.4 | 78.6 | 78.6 |
| 5b.2. Network-sponsored online verification system | 0.0 | 0.00 | 144 | 0.0 | 0.1 | 99.4 | 99.4 | 78.6 | 78.6 |
| 5b.3. PIN-less debit | 1.0 | 0.06 | 60 | 2.0 | 3.2 | 99.4 | 99.4 | 78.6 | 78.6 |
| 5b.4. Other | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 99.4 | 99.4 | 78.6 | 78.6 |
| **6. POS Transactions by type of device** | 41.4 | 1.42 | 34 | | | | | | |
| 6a. Transactions initiated from or via a mobile device | 0.0 | 0.00 | 3 | 0.0 | 0.0 | 5.5 | 5.6 | 42.9 | 42.9 |
| 6b. Transactions not initiated with a mobile device | 41.4 | 1.42 | 34 | 88.2 | 78.3 | 11.1 | 11.6 | 50.0 | 50.0 |
| **7. NPT by type of payer** | 47.0 | 1.82 | 39 | | | | | | |
| 7a. Consumer transactions | 45.5 | 1.68 | 37 | 96.8 | 92.5 | 93.5 | 92.4 | 71.4 | 71.4 |
| 7b. Business/government transactions | 1.5 | 0.14 | 91 | 3.2 | 7.5 | 93.5 | 92.4 | 71.4 | 71.4 |
| **8. NPT by payee location** | 47.0 | 1.82 | 39 | | | | | | |
| 8a. Transactions with U.S. payees | 46.8 | 1.80 | 39 | 99.6 | 99.2 | 99.6 | 99.6 | 85.7 | 85.7 |
| 8b. Transactions with payees outside the U.S. | 0.2 | 0.01 | 70 | 0.4 | 0.8 | 99.6 | 99.6 | 85.7 | 85.7 |
| **9. NPT by transaction value range** | 47.0 | 1.82 | 39 | | | | | | |
| 9a. Transactions authorized less than $5.00 in total value | 6.0 | 0.02 | 3 | 12.8 | 1.0 | 93.1 | 92.1 | 50.0 | 50.0 |
| 9b. Transactions authorized $5.00 to $9.99 in total value | 8.4 | 0.06 | 7 | 17.9 | 3.3 | 93.1 | 92.1 | 50.0 | 50.0 |
| 9c. Transactions authorized $10.00 to $14.99 in total value | 5.7 | 0.07 | 12 | 12.1 | 3.7 | 93.1 | 92.1 | 50.0 | 50.0 |
| 9d. Transactions authorized $15.00 to $24.99 in total value | 7.6 | 0.15 | 19 | 16.2 | 8.1 | 93.1 | 92.1 | 50.0 | 50.0 |
| 9e. Transactions authorized $25.00 to $49.99 in total value | 9.8 | 0.34 | 35 | 20.9 | 18.9 | 93.1 | 92.1 | 50.0 | 50.0 |
| 9f. Transactions authorized $50.00 or greater in total value | 9.4 | 1.18 | 126 | 20.0 | 64.9 | 93.1 | 92.1 | 50.0 | 50.0 |
| **NPT by network type** | 47.0 | 1.82 | 39 | | | | | | |
| Dual-message transactions[3] | 30.2 | 1.13 | 37 | 64.3 | 62.0 | | | | |
| Single-message transactions[3] | 16.8 | 0.69 | 41 | 35.7 | 38.0 | | | | |

*Figures may not sum because of rounding. NPT represents net purchase transactions.*

[1] *The total number of transactions are in billions while the total value of transactions are in trillions of USD.*

[2] *Two measures of response rate are given: 1) percentage of NPT from organizations that responded and 2) percentage of organizations that responded.*

[3] *The blanks in the response rate columns indicate derived items.*



IPR2025-01151
Apple EX1037 Page 146

## General-Purpose Prepaid Cards - Networks

| Number of organizations | | 2012 |
|---|---|---|
| included in census | 7 | |
| responded | 7 | |
| included in estimated totals | 7 | |

| Survey Item | Totals[1] Num (BN) | Totals[1] Val ($TR) | Avg Val ($) | Item Shares of NPT (%) Num | Item Shares of NPT (%) Val | Response Rates[2] NPT (%) Num | Response Rates[2] NPT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **3. Net purchase transactions (NPT)** | 3.1 | 0.10 | 34 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| **4. NPT by payment initiation and authorization method** | 3.1 | 0.10 | 34 | | | | | | |
| 4a. Transactions at the point of sale | 2.7 | 0.08 | 30 | 87.8 | 78.7 | 100.0 | 100.0 | 100.0 | 100.0 |
| 4a.1. Chip | 0.0 | 0.00 | 9 | 0.0 | 0.0 | 97.1 | 96.1 | 71.4 | 71.4 |
| 4a.1.1 . Signature acquired | 0.0 | 0.00 | 13 | 0.0 | 0.0 | 97.1 | 96.1 | 71.4 | 71.4 |
| 4a.1.2. PIN entry at merchant terminal | 0.0 | 0.00 | 34 | 0.0 | 0.0 | 97.1 | 96.1 | 71.4 | 71.4 |
| (a) EMV using compliant card and terminal | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 15.3 | 15.9 | 42.9 | 42.9 |
| (b) Other chip-and-PIN transactions | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 15.3 | 15.9 | 42.9 | 42.9 |
| 4a.1.3. Dynamic data only | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 97.1 | 96.1 | 71.4 | 71.4 |
| 4a.1.4. Other | 0.0 | 0.00 | 3 | 0.0 | 0.0 | 97.1 | 96.1 | 71.4 | 71.4 |
| 4a.2. No chip (including magnetic stripe) | 2.7 | 0.08 | 30 | 87.8 | 78.7 | 97.1 | 96.1 | 71.4 | 71.4 |
| 4a.2.1. Signature acquired | 1.5 | 0.04 | 25 | 47.9 | 35.6 | 97.1 | 96.1 | 71.4 | 71.4 |
| 4a.2.2. PIN entry at merchant terminal | 1.2 | 0.04 | 36 | 38.3 | 41.6 | 97.1 | 96.1 | 71.4 | 71.4 |
| 4a.2.3. Other | 0.1 | 0.00 | 30 | 1.7 | 1.5 | 97.1 | 96.1 | 71.4 | 71.4 |
| 4b. Card-not-present/remote transactions | 0.4 | 0.02 | 59 | 12.2 | 21.3 | 92.5 | 93.2 | 85.7 | 85.7 |
| 4b.1. Static card data | 0.3 | 0.02 | 60 | 11.0 | 19.5 | 89.8 | 89.3 | 71.4 | 71.4 |
| 4b.2. Network-sponsored online verification system | 0.0 | 0.00 | 66 | 0.0 | 0.0 | 89.8 | 89.3 | 71.4 | 71.4 |
| 4b.3. PIN-less debit | 0.0 | 0.00 | 51 | 1.2 | 1.8 | 89.8 | 89.3 | 71.4 | 71.4 |
| 4b.4. Other | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 89.8 | 89.3 | 71.4 | 71.4 |
| **5. POS Transactions by type of device** | 2.7 | 0.08 | 30 | | | | | | |
| 5a. Transactions initiated from or via a mobile device | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 5.5 | 7.0 | 14.3 | 14.3 |
| 5b. Transactions not initiated with a mobile device | 2.7 | 0.08 | 30 | 87.8 | 78.7 | 5.5 | 7.0 | 14.3 | 14.3 |
| **6. NPT by payee location** | 3.1 | 0.10 | 34 | | | | | | |
| 6a. Transactions with U.S. payees | 3.1 | 0.10 | 34 | 99.4 | 99.3 | 87.0 | 86.2 | 71.4 | 71.4 |
| 6b. Transactions with payees outside the U.S. | 0.0 | 0.00 | 37 | 0.6 | 0.7 | 87.0 | 86.2 | 71.4 | 71.4 |
| **7. NPT by transaction value range** | 3.1 | 0.10 | 34 | | | | | | |
| 7a. Transactions authorized less than $5.00 in total value | 0.6 | 0.00 | 3 | 19.9 | 1.6 | 89.6 | 89.2 | 57.1 | 57.1 |
| 7b. Transactions authorized $5.00 to $9.99 in total value | 0.6 | 0.00 | 7 | 20.1 | 4.3 | 89.6 | 89.2 | 57.1 | 57.1 |
| 7c. Transactions authorized $10.00 to $14.99 in total value | 0.4 | 0.00 | 12 | 12.7 | 4.5 | 89.6 | 89.2 | 57.1 | 57.1 |
| 7d. Transactions authorized $15.00 to $24.99 in total value | 0.5 | 0.01 | 19 | 15.0 | 8.6 | 89.6 | 89.2 | 57.1 | 57.1 |
| 7e. Transactions authorized $25.00 to $49.99 in total value | 0.5 | 0.02 | 34 | 16.1 | 16.4 | 89.6 | 89.2 | 57.1 | 57.1 |
| 7f. Transactions authorized $50.00 or greater in total value | 0.5 | 0.07 | 133 | 16.3 | 64.6 | 89.6 | 89.2 | 57.1 | 57.1 |
| **NPT by network type** | 3.1 | 0.10 | 34 | | | | | | |
| Dual-message transactions[3] | 2.0 | 0.07 | 34 | 63.3 | 63.8 | | | | |
| Single-message transactions[3] | 1.1 | 0.04 | 34 | 36.7 | 36.2 | | | | |

*Figures may not sum because of rounding. NPT represents net purchase transactions. POS represents point-of-sale.*

[1] *The total number of transactions are in billions while the total value of transactions are in trillions of USD.*

[2] *Two measures of response rate are given: 1) percentage of NPT from organizations that responded and 2) percentage of organizations that responded.*

[3] *The blanks in the response rate columns indicate derived items.*



IPR2025-01151
Apple EX1037 Page 147

## Private-Label Credit Cards - Retail Merchant Issuer Survey

**2012**

| Number of organizations | |
|---|---|
| included in census | 10 |
| responded | 8 |
| included in estimated totals | 10 |

| Survey Item | Totals[1] Num (BN) | Totals[1] Val ($TR) | Avg Val ($) | Item Shares of NPT (%) Num | Item Shares of NPT (%) Val | Response Rates[2] NPT (%) Num | Response Rates[2] NPT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **5. Net purchase transactions (NPT)** | 0.3 | 0.03 | 100 | 100.0 | 100.0 | 90.2 | 91.0 | 80.0 | 80.0 |
| **6. NPY by payment initiation method** | 0.3 | 0.03 | 100 | | | | | | |
| 6a. Transactions at the point of sale | 0.2 | 0.02 | 98 | 97.6 | 96.3 | 90.2 | 91.0 | 80.0 | 80.0 |
| 6a.1. Chip | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 50.2 | 38.3 | 50.0 | 50.0 |
| 6a.2. No chip (including magnetic stripe) | 0.2 | 0.02 | 98 | 97.6 | 96.3 | 50.2 | 38.3 | 50.0 | 50.0 |
| 6b. Card-not-present/remote transactions | 0.0 | 0.00 | 153 | 2.4 | 3.7 | 90.2 | 91.0 | 80.0 | 80.0 |
| **7. POS Transactions by type of device** | 0.2 | 0.02 | 98 | | | | | | |
| 7a. Transactions initiated from or via a mobile device | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 52.6 | 43.8 | 70.0 | 70.0 |
| 7b. Transactions not initiated with a mobile device | 0.2 | 0.02 | 98 | 97.6 | 96.3 | 52.6 | 43.8 | 70.0 | 70.0 |
| **8. NPT by type of payer** | 0.3 | 0.03 | 100 | | | | | | |
| 8a. Consumer transactions | 0.2 | 0.02 | 102 | 92.1 | 93.8 | 89.5 | 90.6 | 70.0 | 70.0 |
| 8b. Business/government transactions | 0.0 | 0.00 | 77 | 7.9 | 6.2 | 89.5 | 90.6 | 70.0 | 70.0 |
| 8b.1. Procurement cards | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 89.5 | 90.6 | 70.0 | 70.0 |
| 8b.2. Fleet cards for fueling and vehicle expenses | 0.0 | 0.00 | 77 | 7.9 | 6.2 | 89.5 | 90.6 | 70.0 | 70.0 |
| 8b.3. Other | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 89.5 | 90.6 | 70.0 | 70.0 |
| **9. NPT by transaction value range** | 0.3 | 0.03 | 100 | | | | | | |
| 9a. Transactions authorized less than $5.00 in total value | 0.0 | 0.00 | 3 | 5.9 | 0.2 | 40.2 | 35.1 | 50.0 | 50.0 |
| 9b. Transactions authorized $5.00 to $9.99 in total value | 0.0 | 0.00 | 8 | 5.5 | 0.5 | 40.2 | 35.1 | 50.0 | 50.0 |
| 9c. Transactions authorized $10.00 to $14.99 in total value | 0.0 | 0.00 | 13 | 5.4 | 0.7 | 40.2 | 35.1 | 50.0 | 50.0 |
| 9d. Transactions authorized $15.00 to $24.99 in total value | 0.0 | 0.00 | 21 | 11.2 | 2.4 | 40.2 | 35.1 | 50.0 | 50.0 |
| 9e. Transactions authorized $25.00 to $49.99 in total value | 0.1 | 0.00 | 39 | 22.5 | 8.8 | 40.2 | 35.1 | 50.0 | 50.0 |
| 9f. Transactions authorized $50.00 or greater in total value | 0.1 | 0.02 | 176 | 49.5 | 87.5 | 40.2 | 35.1 | 50.0 | 50.0 |

*Figures may not sum because of rounding. NPT represents net purchase transactions.*

[1] *The total number of transactions are in billions while the total value of transactions are in trillions of USD.*

[2] *Two measures of response rate are given: 1) percentage of NPT from organizations that responded and 2) percentage of organizations that responded.*



IPR2025-01151
Apple EX1037 Page 148

## Private-Label Credit Cards - Processors

**2012**

| Number of organizations | |
|---|---|
| included in census | 16 |
| responded | 11 |
| included in estimated totals | 16 |

| Survey Item | Totals[1] Num (BN) | Totals[1] Val ($TR) | Avg Val ($) | Item Shares of NPT (%) Num | Item Shares of NPT (%) Val | Response Rates[2] NPT (%) Num | Response Rates[2] NPT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **4. Net purchase transactions (NPT)** | 2.1 | 0.24 | 113 | 100.0 | 100.0 | 64.4 | 53.3 | 68.8 | 68.8 |
| **5. NPT by payment initiation method** | 2.1 | 0.24 | 113 | | | | | | |
| 5a. Transactions at the point of sale | 2.1 | 0.23 | 110 | 98.7 | 96.7 | 42.7 | 34.9 | 50.0 | 50.0 |
| 5a.1. Chip | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 41.4 | 34.4 | 25.0 | 25.0 |
| 5a.2. No chip (including magnetic stripe) | 2.1 | 0.23 | 110 | 98.7 | 96.7 | 41.4 | 34.4 | 25.0 | 25.0 |
| 5b. Card-not-present/remote transactions | 0.0 | 0.01 | 295 | 1.3 | 3.3 | 42.7 | 34.9 | 50.0 | 50.0 |
| **6. POS Transactions by type of device** | 2.1 | 0.23 | 110 | | | | | | |
| 6a. Transactions initiated from or via a mobile device | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 41.4 | 34.4 | 25.0 | 25.0 |
| 6b. Transactions not initiated with a mobile device | 2.1 | 0.23 | 110 | 98.7 | 96.7 | 41.4 | 34.4 | 25.0 | 25.0 |
| **7. NPT by type of payer** | 2.1 | 0.24 | 113 | | | | | | |
| 7a. Consumer transactions | 1.3 | 0.14 | 105 | 61.8 | 57.7 | 61.9 | 44.5 | 56.3 | 56.3 |
| 7b. Business/government transactions | 0.8 | 0.10 | 125 | 38.2 | 42.3 | 61.9 | 44.5 | 56.3 | 56.3 |
| 7b.1. Procurement cards | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 40.6 | 27.2 | 43.8 | 43.8 |
| 7b.2. Fleet cards for fueling and vehicle expenses | 0.8 | 0.10 | 125 | 38.2 | 42.3 | 40.6 | 27.2 | 43.8 | 43.8 |
| **8. NPT by transaction value range** | 2.1 | 0.24 | 113 | | | | | | |
| 8a. Transactions authorized less than $5.00 in total value | 0.1 | 0.00 | 27 | 3.1 | 0.7 | 41.5 | 36.7 | 31.3 | 31.3 |
| 8b. Transactions authorized $5.00 to $9.99 in total value | 0.1 | 0.00 | 9 | 3.0 | 0.2 | 41.5 | 36.7 | 31.3 | 31.3 |
| 8c. Transactions authorized $10.00 to $14.99 in total value | 0.1 | 0.00 | 13 | 3.4 | 0.4 | 41.5 | 36.7 | 31.3 | 31.3 |
| 8d. Transactions authorized $15.00 to $24.99 in total value | 0.2 | 0.00 | 21 | 8.7 | 1.6 | 41.5 | 36.7 | 31.3 | 31.3 |
| 8e. Transactions authorized $25.00 to $49.99 in total value | 0.6 | 0.02 | 40 | 27.9 | 10.0 | 41.5 | 36.7 | 31.3 | 31.3 |
| 8f. Transactions authorized $50.00 or greater in total value | 1.2 | 0.21 | 181 | 54.0 | 87.0 | 41.5 | 36.7 | 31.3 | 31.3 |

*Figures may not sum because of rounding. NPT represents net purchase transactions.*

[1] *The total number of transactions are in billions while the total value of transactions are in trillions of USD.*

[2] *Two measures of response rate are given: 1) percentage of NPT from organizations that responded and 2) percentage of organizations that responded.*



IPR2025-01151
Apple EX1037 Page 149

## Private-Label Prepaid Cards - Non-transit

**2012**

| Number of organizations | |
|---|---|
| included in census | 29 |
| responded | 21 |
| included in estimated totals | 29 |

| Survey Item | Totals[1] Num (BN) | Totals[1] Val ($TR) | Avg Val ($) | Item Shares of NPT (%) Num | Item Shares of NPT (%) Val | Response Rates[2] NPT (%) Num | Response Rates[2] NPT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **3. Net purchase transactions (NPT)** | 3.6 | 0.05 | 13 | 100.0 | 100.0 | 95.8 | 89.9 | 72.4 | 72.4 |
| **4. NPT by payment initiation method** | 3.6 | 0.05 | 13 | | | | | | |
| 4a. Transactions at the point of sale | 3.6 | 0.05 | 13 | 99.3 | 98.7 | 22.1 | 18.0 | 20.7 | 24.1 |
| 4a.1. Chip | 0.0 | 0.00 | 39 | 0.1 | 0.2 | 19.3 | 12.6 | 24.1 | 24.1 |
| 4a.2. No chip (including magnetic stripe) | 3.6 | 0.05 | 13 | 99.3 | 98.5 | 18.6 | 10.1 | 17.2 | 17.2 |
| 4b. Card-not-present/remote transactions | 0.0 | 0.00 | 24 | 0.7 | 1.3 | 22.1 | 15.6 | 20.7 | 20.7 |
| **5. POS Transactions by type of device** | 3.6 | 0.05 | 13 | | | | | | |
| 5a. Transactions initiated from or via a mobile device | 0.2 | 0.00 | 9 | 6.2 | 4.3 | 19.6 | 12.0 | 13.8 | 13.8 |
| 5b. Transactions not initiated with a mobile device | 3.4 | 0.04 | 13 | 93.1 | 94.4 | 20.3 | 14.7 | 20.7 | 20.7 |
| **6. NPT by type of card** | 3.6 | 0.05 | 13 | | | | | | |
| 6a. Gift card transactions | 3.6 | 0.05 | 13 | 99.8 | 99.5 | 57.8 | 56.2 | 31.0 | 31.0 |
| 6b. Transit card transactions | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 57.6 | 55.9 | 27.6 | 27.6 |
| 6c. Customer refund & incentive card transactions | 0.0 | 0.00 | 34 | 0.2 | 0.5 | 57.6 | 55.9 | 27.6 | 27.6 |
| 6d. Other private-label prepaid card transactions | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 57.6 | 55.9 | 27.6 | 27.6 |
| **7. NPT by transaction value range** | 3.6 | 0.05 | 13 | | | | | | |
| 7a. Transactions authorized less than $5.00 in total value | 2.1 | 0.01 | 5 | 59.3 | 23.1 | 19.7 | 12.3 | 17.2 | 17.2 |
| 7b. Transactions authorized $5.00 to $9.99 in total value | 0.9 | 0.01 | 11 | 24.5 | 21.8 | 19.7 | 12.3 | 17.2 | 17.2 |
| 7c. Transactions authorized $10.00 to $14.99 in total value | 0.2 | 0.00 | 20 | 6.2 | 9.5 | 19.7 | 12.3 | 17.2 | 17.2 |
| 7d. Transactions authorized $15.00 to $24.99 in total value | 0.2 | 0.01 | 32 | 4.6 | 11.4 | 19.7 | 12.3 | 17.2 | 17.2 |
| 7e. Transactions authorized $25.00 to $49.99 in total value | 0.1 | 0.01 | 52 | 3.8 | 15.3 | 19.7 | 12.3 | 17.2 | 17.2 |
| 7f. Transactions authorized $50.00 or greater in total value | 0.1 | 0.01 | 143 | 1.7 | 18.9 | 19.7 | 12.3 | 17.2 | 17.2 |
| **Card funding** | | | | | | | | | |
| **8. Total credits/loads** | 2.8 | 0.05 | 16 | 77.5 | 98.5 | 57.3 | 57.2 | 37.9 | 41.4 |
| 8a. Initial loads | 1.9 | 0.03 | 16 | 53.1 | 66.1 | 58.4 | 57.2 | 34.5 | 34.5 |
| 8b. Reloads | 0.9 | 0.02 | 17 | 24.4 | 32.4 | 56.3 | 54.3 | 34.5 | 34.5 |
| 8c. Other credits/loads | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 56.0 | 53.9 | 31.0 | 31.0 |
| **9. Card funding method** | 2.8 | 0.05 | 16 | 77.5 | 98.5 | 55.2 | 54.9 | 24.1 | 27.6 |
| 9a. Cash | 2.8 | 0.02 | 6 | 77.5 | 38.2 | 0.7 | 2.6 | 6.9 | 6.9 |
| 9b. Check | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 0.1 | 0.2 | 3.4 | 3.4 |
| 9c. Credit card | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 0.1 | 0.2 | 3.4 | 3.4 |
| 9d. Debit card | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 0.1 | 0.2 | 3.4 | 3.4 |
| 9e. ACH | 0.0 | 0.03 | 0 | 0.0 | 60.3 | 0.1 | 2.6 | 3.4 | 6.9 |
| 9f. Other funding methods | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 0.1 | 0.2 | 3.4 | 3.4 |
| **Cash withdrawals** | | | | | | | | | |
| 10. CY 2012 Approved cash withdrawals | 0.0 | 0.00 | 356 | 0.0 | 0.5 | 55.8 | 55.1 | 31.0 | 31.0 |

*Figures may not sum because of rounding. NPT represents net purchase transactions.*

[1] *The total number of transactions are in billions while the total value of transactions are in trillions of USD.*

[2] *Two measures of response rate are given: 1) percentage of NPT from organizations that responded and 2) percentage of organizations that responded.*



IPR2025-01151
Apple EX1037 Page 150

## General-Purpose Prepaid Cards - Processors

**2012**

| Number of organizations | |
|---|---|
| included in census | 35 |
| responded | 26 |
| included in estimated totals | 35 |

| Survey Item | Totals[1] Num (MM) | Totals[1] Val ($BN) | Avg Val ($) | Item Shares of NPT (%) Num | Item Shares of NPT (%) Val | Response Rates[2] NPT (%) Num | Response Rates[2] NPT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **3. Net purchase transactions (NPT)** | 4,902.9 | 162.19 | 33 | 100.0 | 100.0 | 90.3 | 87.6 | 74.3 | 74.3 |
| **4. NPT by payment initiation method** | 4,902.9 | 162.19 | 33 | | | | | | |
| 4a. Transactions at the point of sale | 4,224.8 | 135.68 | 32 | 86.2 | 83.7 | 59.2 | 67.3 | 54.3 | 54.3 |
| 4a.1. Chip | 10.5 | 0.26 | 25 | 0.2 | 0.2 | 39.3 | 48.4 | 42.9 | 42.9 |
| 4a.2. No chip (including magnetic stripe) | 4,214.3 | 135.41 | 32 | 86.0 | 83.5 | 39.3 | 48.4 | 42.9 | 42.9 |
| 4b. Card-not-present/remote transactions | 678.2 | 26.51 | 39 | 13.8 | 16.3 | 58.5 | 66.7 | 45.7 | 45.7 |
| **5. POS Transactions by type of device** | 4,224.8 | 135.68 | 32 | | | | | | |
| 5a. Transactions initiated from or via a mobile device | 1.2 | 0.01 | 12 | 0.0 | 0.0 | 49.7 | 66.2 | 31.4 | 31.4 |
| 5b. Transactions not initiated with a mobile device | 4,223.6 | 135.66 | 32 | 86.1 | 83.6 | 49.5 | 65.6 | 31.4 | 31.4 |
| **6 NPT by payee location** | 4,902.9 | 162.19 | 33 | | | | | | |
| 6a. Transactions with U.S. payees | 4,737.4 | 145.55 | 31 | 96.6 | 89.7 | 54.9 | 71.0 | 48.6 | 48.6 |
| 6b. Transactions with payees outside the U.S. | 165.5 | 16.64 | 101 | 3.4 | 10.3 | 54.9 | 71.0 | 48.6 | 48.6 |
| **7. NPT by type of card** | 4,902.9 | 162.19 | 33 | | | | | | |
| 7a. General-purpose prepaid card transactions | 1,656.4 | 46.47 | 28 | 33.8 | 28.7 | 57.1 | 70.4 | 57.1 | 57.1 |
| 7b. Gift card transactions | 524.7 | 10.24 | 20 | 10.7 | 6.3 | 57.1 | 70.4 | 57.1 | 57.1 |
| 7c. Medical card transactions | 350.2 | 17.12 | 49 | 7.1 | 10.6 | 57.1 | 70.4 | 57.1 | 57.1 |
| 7d. Customer refund & incentive card transactions | 245.6 | 6.01 | 24 | 5.0 | 3.7 | 57.1 | 70.4 | 57.1 | 57.1 |
| 7e. Payroll card transactions | 743.6 | 17.18 | 23 | 15.2 | 10.6 | 57.1 | 70.4 | 57.1 | 57.1 |
| 7f. Government card transactions | 817.2 | 31.16 | 38 | 16.7 | 19.2 | 57.1 | 70.4 | 57.1 | 57.1 |
| 7g. Other general-purpose prepaid card transactions | 565.2 | 34.02 | 60 | 11.5 | 21.0 | 57.1 | 60.4 | 57.1 | 54.3 |
| **8. NPT by transaction value range** | 4,902.9 | 162.19 | 33 | | | | | | |
| 8a. Transactions authorized less than $5.00 in total value | 1,057.3 | 2.73 | 3 | 21.6 | 1.7 | 25.1 | 26.4 | 31.4 | 31.4 |
| 8b. Transactions authorized $5.00 to $9.99 in total value | 1,007.2 | 6.78 | 7 | 20.5 | 4.2 | 25.1 | 26.4 | 31.4 | 31.4 |
| 8c. Transactions authorized $10.00 to $14.99 in total value | 640.6 | 9.06 | 14 | 13.1 | 5.6 | 25.1 | 26.4 | 31.4 | 31.4 |
| 8d. Transactions authorized $15.00 to $24.99 in total value | 655.4 | 10.36 | 16 | 13.4 | 6.4 | 25.1 | 26.4 | 31.4 | 31.4 |
| 8e. Transactions authorized $25.00 to $49.99 in total value | 741.1 | 23.99 | 32 | 15.1 | 14.8 | 25.1 | 26.4 | 31.4 | 31.4 |
| 8f. Transactions authorized $50.00 or greater in total value | 801.4 | 109.28 | 136 | 16.3 | 67.4 | 25.1 | 26.4 | 31.4 | 31.4 |
| **Card funding** | | | | | | | | | |
| **9. Total credits/loads** | 1,145.3 | 282.84 | 247 | 23.4 | 174.4 | 55.3 | 63.1 | 54.3 | 54.3 |
| 9a. Initial loads | 524.1 | 128.91 | 246 | 10.7 | 79.5 | 36.3 | 37.9 | 37.1 | 37.1 |
| 9b. Reloads | 612.7 | 153.30 | 250 | 12.5 | 94.5 | 36.8 | 38.2 | 40.0 | 40.0 |
| 9c. Other credits/loads | 8.5 | 0.64 | 75 | 0.2 | 0.4 | 36.4 | 37.8 | 40.0 | 37.1 |
| **10. Card funding method** | 1,145.3 | 282.84 | 247 | 23.4 | 174.4 | 55.3 | 63.1 | 54.3 | 54.3 |
| 10a. Cash | 423.9 | 60.24 | 142 | 8.6 | 37.1 | 27.5 | 25.3 | 34.3 | 34.3 |
| 10b. Check | 15.5 | 3.76 | 243 | 0.3 | 2.3 | 27.5 | 25.3 | 34.3 | 34.3 |
| 10c. Credit card | 1.3 | 0.11 | 86 | 0.0 | 0.1 | 27.5 | 25.3 | 34.3 | 34.3 |
| 10d. Debit card | 0.3 | 0.06 | 227 | 0.0 | 0.0 | 27.4 | 25.2 | 31.4 | 31.4 |
| 10e. ACH | 514.9 | 134.12 | 260 | 10.5 | 82.7 | 27.5 | 25.3 | 34.3 | 34.3 |
| 10f. Other | 189.5 | 84.57 | 446 | 3.9 | 52.1 | 27.5 | 25.3 | 34.3 | 34.3 |

*Figures may not sum because of rounding. NPT represents net purchase transactions.*

[1] *The total number of transactions are in millions while the total value of transactions are in billions of USD.*

[2] *Two measures of response rate are given: 1) percentage of NPT from organizations that responded and 2) percentage of organizations that responded.*



IPR2025-01151
Apple EX1037 Page 151

## Private-Label Prepaid Cards - Transit

**2012**

| Number of organizations | |
|---|---|
| included in census | 24 |
| responded | 20 |
| included in estimated totals | 24 |

| Survey Item | Totals[1,3] Num (MM) | Totals[1,3] Val ($BN) | Avg Val ($) | Item Shares of NPT (%) Num | Item Shares of NPT (%) Val | Response Rates[2] NPT (%) Num | Response Rates[2] NPT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **3. Net purchase transactions (NPT)** | 4,708.4 | 7.93 | 2 | 100.0 | 100.0 | 87.5 | 91.9 | 83.3 | 83.3 |
| **4. NPT by payment initiation method** | 4,708.4 | 7.93 | 2 | | | | | | |
| 4a. Transactions at the point of sale | 4,446.1 | 5.86 | 1 | 94.4 | 73.9 | 18.4 | 13.9 | 45.8 | 45.8 |
| 4a.1. Chip | 4,016.0 | 4.08 | 1 | 85.3 | 51.4 | 18.1 | 13.7 | 41.7 | 41.7 |
| 4a.2. No chip (including magnetic stripe) | 430.0 | 1.78 | 4 | 9.1 | 22.5 | 20.5 | 15.5 | 45.8 | 45.8 |
| 4b. Card-not-present/remote transactions | 262.3 | 2.07 | 8 | 5.6 | 26.1 | 20.8 | 15.8 | 50.0 | 50.0 |
| **5. POS Transactions by type of device** | 4,446.1 | 5.86 | 1 | | | | | | |
| 5a. Transactions initiated from or via a mobile device | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 7.4 | 8.0 | 20.8 | 20.8 |
| 5b. Transactions not initiated with a mobile device | 4,446.1 | 5.86 | 1 | 94.4 | 73.9 | 7.4 | 8.0 | 20.8 | 20.8 |
| **7. NPT by transaction value range** | 4,708.4 | 7.93 | 2 | | | | | | |
| 7a. Transactions authorized less than $5.00 in total value | 2,865.7 | 0.69 | 0 | 60.9 | 8.6 | 19.0 | 13.4 | 37.5 | 37.5 |
| 7b. Transactions authorized $5.00 to $9.99 in total value | 541.4 | 0.54 | 1 | 11.5 | 6.8 | 17.6 | 12.7 | 33.3 | 33.3 |
| 7c. Transactions authorized $10.00 to $14.99 in total value | 965.2 | 3.17 | 3 | 20.5 | 40.0 | 17.6 | 12.7 | 33.3 | 33.3 |
| 7d. Transactions authorized $15.00 to $24.99 in total value | 245.5 | 1.23 | 5 | 5.2 | 15.5 | 17.6 | 12.7 | 33.3 | 33.3 |
| 7e. Transactions authorized $25.00 to $49.99 in total value | 41.7 | 0.28 | 7 | 0.9 | 3.6 | 17.6 | 12.7 | 33.3 | 33.3 |
| 7f. Transactions authorized $50.00 or greater in total value | 48.9 | 2.02 | 41 | 1.0 | 25.5 | 17.6 | 12.7 | 33.3 | 33.3 |
| **Card funding** | | | | | | | | | |
| **8. Total credits/loads** | 486.3 | 8.32 | 17 | 10.3 | 104.9 | 72.1 | 55.9 | 50.0 | 50.0 |
| 8a. Initial loads | 216.4 | 4.50 | 21 | 4.6 | 56.7 | 59.6 | 45.6 | 25.0 | 25.0 |
| 8b. Reloads | 267.1 | 3.70 | 14 | 5.7 | 46.7 | 59.6 | 45.6 | 25.0 | 25.0 |
| 8c. Other credits/loads | 2.8 | 0.12 | 44 | 0.1 | 1.5 | 59.6 | 45.6 | 25.0 | 25.0 |
| **9. Card funding method** | 486.3 | 8.32 | 17 | 10.3 | 104.9 | 69.7 | 53.4 | 45.8 | 41.7 |
| 9a. Cash | 334.3 | 3.58 | 11 | 7.1 | 45.1 | 69.7 | 53.4 | 45.8 | 41.7 |
| 9b. Check | 4.1 | 0.36 | 88 | 0.1 | 4.5 | 69.7 | 53.4 | 45.8 | 41.7 |
| 9c. Credit card | 93.7 | 2.88 | 31 | 2.0 | 36.3 | 69.7 | 53.4 | 45.8 | 41.7 |
| 9d. Debit card | 53.5 | 1.29 | 24 | 1.1 | 16.3 | 69.7 | 53.4 | 45.8 | 41.7 |
| 9e. ACH | 0.1 | 0.21 | 1,393 | 0.0 | 2.6 | 69.7 | 53.4 | 45.8 | 41.7 |
| 9f. Other funding methods | 0.5 | 0.01 | 12 | 0.0 | 0.1 | 69.7 | 53.4 | 45.8 | 41.7 |
| **Cash withdrawals** | | | | | | | | | |
| 10. CY 2012 Approved cash withdrawals | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 15.8 | 11.5 | 29.2 | 29.2 |

*Figures may not sum because of rounding. NPT represents net purchase transactions.*

[1] *The total number of transactions are in millions while the total value of transactions are in billions of USD.*

[2] *Two measures of response rate are given: 1) percentage of NPT from organizations that responded and 2) percentage of organizations that responded.*

[3] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national estimates.*



IPR2025-01151
Apple EX1037 Page 152

## Far-Field RFID Payments - Processors

| Number of organizations | 2012 |
|---|---|
| included in census | 18 |
| responded | 18 |
| included in estimated totals | 18 |

| Survey Item | Totals[1,3] Num (MM) | Totals[1,3] Val ($BN) | Avg Val ($) | Item Shares of TOT (%) Num | Item Shares of TOT (%) Val | Response Rates[2] TOT (%) Num | Response Rates[2] TOT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **1. Total transactions (TOT)** | 5,224.1 | 9.91 | 2 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| **2. TOT by transaction value range** | 5,224.1 | 9.91 | 2 | | | | | | |
| 2a. Transactions authorized less than $5.00 in total value | 5,176.7 | 8.93 | 2 | 99.1 | 90.1 | 47.2 | 25.8 | 61.1 | 61.1 |
| 2b. Transactions authorized $5.00 to $9.99 in total value | 36.9 | 0.39 | 11 | 0.7 | 3.9 | 47.2 | 25.8 | 61.1 | 61.1 |
| 2c. Transactions authorized $10.00 to $14.99 in total value | 0.5 | 0.01 | 22 | 0.0 | 0.1 | 47.2 | 25.8 | 61.1 | 61.1 |
| 2d. Transactions authorized $15.00 to $24.99 in total value | 3.5 | 0.13 | 37 | 0.1 | 1.3 | 47.2 | 25.8 | 61.1 | 61.1 |
| 2e. Transactions authorized $25.00 to $49.99 in total value | 5.8 | 0.37 | 64 | 0.1 | 3.7 | 47.2 | 25.8 | 61.1 | 61.1 |
| 2f. Transactions authorized $50.00 or greater in total value | 0.7 | 0.08 | 107 | 0.0 | 0.8 | 47.2 | 25.8 | 61.1 | 61.1 |
| **3. Funding method** | 1,186.4 | 11.72 | 10 | 22.7 | 118.3 | 38.0 | 31.6 | 61.1 | 77.8 |
| 3a. Cash | 5.1 | 0.17 | 33 | 0.1 | 1.7 | 31.1 | 22.3 | 50.0 | 55.6 |
| 3b. Check | 61.5 | 0.31 | 5 | 1.2 | 3.1 | 33.1 | 22.3 | 55.6 | 55.6 |
| 3c. Credit card | 851.5 | 9.68 | 11 | 16.3 | 97.7 | 31.9 | 22.6 | 50.0 | 61.1 |
| 3d. Debit card | 66.4 | 1.40 | 21 | 1.3 | 14.2 | 33.0 | 22.3 | 50.0 | 50.0 |
| 3e. ACH | 199.5 | 0.13 | 1 | 3.8 | 1.3 | 39.0 | 26.6 | 61.1 | 61.1 |
| 3f. Other | 2.5 | 0.03 | 11 | 0.0 | 0.3 | 33.9 | 22.6 | 61.1 | 61.1 |

*Figures may not sum because of rounding. TOT represents total transactions.*

[1] *The total number of transactions are in millions while the total value of transactions are in billions of USD.*

[2] *Two measures of response rate are given: 1) percentage of TOT from organizations that responded and 2) percentage of organizations that responded.*

[3] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national total estimates.*

## P2P & Money Transfers - Processors

| Number of organizations | 2012 |
|---|---|
| included in census | 14 |
| responded | 12 |
| included in estimated totals | 14 |

| Survey Item | Totals[1,3] Num (MM) | Totals[1,3] Val ($BN) | Avg Val ($) | Item Shares of TOT (%) Num | Item Shares of TOT (%) Val | Response Rates[2] TOT (%) Num | Response Rates[2] TOT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **1. Total transactions (TOT)** | 205.3 | 91.52 | 446 | 100.0 | 100.0 | 93.1 | 97.9 | 85.7 | 85.7 |
| **2. TOT by payee location** | 205.3 | 91.52 | 446 | | | | | | |
| 2a. Transactions with U.S. payees | 96.2 | 57.28 | 596 | 46.8 | 62.6 | 48.7 | 73.6 | 64.3 | 64.3 |
| 2b. Transactions with payees outside the U.S. | 109.1 | 34.24 | 314 | 53.2 | 37.4 | 48.7 | 73.6 | 64.3 | 64.3 |
| **3. TOT by transaction value range** | 205.3 | 91.52 | 446 | | | | | | |
| 3a. Transactions authorized less than $5.00 in total value | 2.9 | 0.01 | 3 | 1.4 | 0.0 | 57.6 | 37.8 | 64.3 | 64.3 |
| 3b. Transactions authorized $5.00 to $9.99 in total value | 2.6 | 0.03 | 10 | 1.2 | 0.0 | 57.6 | 37.8 | 64.3 | 64.3 |
| 3c. Transactions authorized $10.00 to $14.99 in total value | 3.8 | 0.06 | 17 | 1.8 | 0.1 | 57.6 | 37.8 | 64.3 | 64.3 |
| 3d. Transactions authorized $15.00 to $24.99 in total value | 7.9 | 0.23 | 29 | 3.9 | 0.3 | 57.6 | 37.8 | 64.3 | 64.3 |
| 3e. Transactions authorized $25.00 to $49.99 in total value | 18.3 | 0.97 | 53 | 8.9 | 1.1 | 57.6 | 37.8 | 64.3 | 64.3 |
| 3f. Transactions authorized $50.00 or greater in total value | 169.8 | 90.22 | 531 | 82.7 | 98.6 | 57.6 | 37.8 | 64.3 | 64.3 |
| **4. TOT by type of clearing system** | 205.3 | 91.52 | 446 | | | | | | |
| 4a. Credit card/signature debit networks | 16.2 | 2.09 | 129 | 7.9 | 2.3 | 35.4 | 62.5 | 57.1 | 57.1 |
| 4b. EFT PIN debit networks | 1.4 | 0.30 | 215 | 0.7 | 0.3 | 35.4 | 62.5 | 57.1 | 57.1 |
| 4c. ACH | 23.5 | 7.94 | 338 | 11.4 | 8.7 | 35.4 | 62.5 | 57.1 | 57.1 |
| 4d. Cash collected/book transfer | 32.4 | 5.43 | 168 | 15.8 | 5.9 | 35.4 | 62.5 | 57.1 | 57.1 |
| 4e. Other | 131.8 | 75.76 | 575 | 64.2 | 82.8 | 35.4 | 62.5 | 57.1 | 57.1 |
| **5. TOT by type of origination channel** | 205.3 | 91.52 | 446 | | | | | | |
| 5a. Website | 49.5 | 34.07 | 688 | 24.1 | 37.2 | 34.9 | 61.7 | 50.0 | 50.0 |
| 5b. Mobile phone | 16.6 | 2.15 | 129 | 8.1 | 2.3 | 34.9 | 61.7 | 50.0 | 50.0 |
| 5c. In-person | 135.1 | 54.58 | 404 | 65.8 | 59.6 | 35.4 | 62.5 | 57.1 | 57.1 |
| 5d. Other | 4.1 | 0.72 | 176 | 2.0 | 0.8 | 35.4 | 62.5 | 57.1 | 57.1 |

*Figures may not sum because of rounding. TOT represents total transactions.*

[1] *The total number of transactions are in millions while the total value of transactions are in billions of USD.*

[2] *Two measures of response rate are given: 1) percentage of TOT from organizations that responded and 2) percentage of organizations that responded.*

[3] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national total estimates.*



IPR2025-01151
Apple EX1037 Page 153

## Online Bill Payments - Processors

| Number of organizations | 2012 |
|---|---|
| included in census | 21 |
| responded | 12 |
| included in estimated totals | 14 |

| Survey Item | Totals[1,3] Num (MM) | Totals[1,3] Val ($BN) | Avg Val ($) | Item Shares of TOT (%) Num | Item Shares of TOT (%) Val | Response Rates[2] TOT (%) Num | Response Rates[2] TOT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **1. Bank/intermediary online bill payment transactions** | 2,836.1 | 1,050.17 | 370 | 91.6 | 89.0 | 98.8 | 98.1 | 57.1 | 57.1 |
| **2. Biller direct online bill payment transactions** | 261.3 | 130.22 | 498 | 8.4 | 11.0 | 98.8 | 98.1 | 57.1 | 57.1 |
| **Total online bill payments (TOT)** | 3,097.4 | 1,180.39 | 381 | 100.0 | 100.0 | 98.8 | 98.1 | 57.1 | 57.1 |
| **3. TOT by transaction value range – Bank/intermediary OLBP** | 2,836.1 | 1,050.17 | 370 | | | | | | |
| 3a. Transactions authorized less than $5.00 in total value | 16.4 | 0.04 | 2 | 0.5 | 0.0 | 81.1 | 81.7 | 38.1 | 38.1 |
| 3b. Transactions authorized $5.00 to $9.99 in total value | 24.1 | 0.17 | 7 | 0.8 | 0.0 | 81.1 | 81.7 | 38.1 | 38.1 |
| 3c. Transactions authorized $10.00 to $14.99 in total value | 41.6 | 0.50 | 12 | 1.3 | 0.0 | 81.1 | 81.7 | 38.1 | 38.1 |
| 3d. Transactions authorized $15.00 to $24.99 in total value | 111.9 | 2.20 | 20 | 3.6 | 0.2 | 81.1 | 81.7 | 38.1 | 38.1 |
| 3e. Transactions authorized $25.00 to $49.99 in total value | 359.8 | 12.64 | 35 | 11.6 | 1.1 | 81.1 | 81.7 | 38.1 | 38.1 |
| 3f. Transactions authorized $50.00 or greater in total value | 2,282.3 | 1,034.62 | 453 | 73.7 | 87.7 | 81.1 | 81.7 | 38.1 | 38.1 |
| **4. TOT by transaction value range – Biller direct OLBP** | 261.3 | 130.22 | 498 | | | | | | |
| 4a. Transactions authorized less than $5.00 in total value | 0.6 | 0.00 | 2 | 0.0 | 0.0 | 81.7 | 81.1 | 52.4 | 52.4 |
| 4b. Transactions authorized $5.00 to $9.99 in total value | 0.5 | 0.00 | 5 | 0.0 | 0.0 | 81.7 | 81.1 | 52.4 | 52.4 |
| 4c. Transactions authorized $10.00 to $14.99 in total value | 1.5 | 0.01 | 10 | 0.0 | 0.0 | 81.7 | 81.1 | 52.4 | 52.4 |
| 4d. Transactions authorized $15.00 to $24.99 in total value | 5.9 | 0.09 | 15 | 0.2 | 0.0 | 81.7 | 81.1 | 52.4 | 52.4 |
| 4e. Transactions authorized $25.00 to $49.99 in total value | 12.8 | 0.39 | 30 | 0.4 | 0.0 | 81.7 | 81.1 | 52.4 | 52.4 |
| 4f. Transactions authorized $50.00 or greater in total value | 240.1 | 129.72 | 540 | 7.8 | 11.0 | 81.7 | 81.1 | 52.4 | 52.4 |
| **5. TOT by type of settlement system - Bank/intermediary OLBP** | 2,836.1 | 1,050.17 | 370 | 91.6 | 89.0 | | | | |
| 5a. ACH | 1,550.6 | 519.25 | 335 | 50.1 | 44.0 | 91.6 | 95.2 | 38.1 | 38.1 |
| 5b. Check | 478.0 | 219.04 | 458 | 15.4 | 18.6 | 91.6 | 95.2 | 38.1 | 38.1 |
| 5c. Other | 807.6 | 311.88 | 386 | 26.1 | 26.4 | 91.6 | 95.2 | 38.1 | 38.1 |

*Figures may not sum because of rounding. TOT represents total online bill payments. OLBP represents online bill payments.*

[1] *The total number of transactions are in millions while the total value of transactions are in billions of USD.*

[2] *Two measures of response rate are given: 1) percentage of TOT from organizations that responded and 2) percentage of organizations that responded.*

[3] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national total estimates.*



IPR2025-01151
Apple EX1037 Page 154

## Walk-in Bill Payments - Processors

| Number of organizations | 2012 |
|---|---|
| included in census | 18 |
| responded | 10 |
| included in estimated totals | 14 |

| Survey Item | Totals[1,3] Num (MM) | Totals[1,3] Val ($BN) | Avg Val ($) | Item Shares of TOT (%) Num | Item Shares of TOT (%) Val | Response Rates[2] TOT (%) Num | Response Rates[2] TOT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **1. Total transactions (TOT)** | 285.6 | 43.81 | 153 | 100.0 | 100.0 | 82.6 | 89.0 | 55.6 | 55.6 |
| **2. TOT by transaction value range** | 285.6 | 43.81 | 153 | | | | | | |
| 2a. Transactions authorized less than $5.00 in total value | 1.3 | 0.00 | 3 | 0.4 | 0.0 | 48.8 | 43.5 | 27.8 | 27.8 |
| 2b. Transactions authorized $5.00 to $9.99 in total value | 3.6 | 0.03 | 9 | 1.2 | 0.1 | 48.8 | 43.5 | 27.8 | 27.8 |
| 2c. Transactions authorized $10.00 to $14.99 in total value | 6.1 | 0.08 | 14 | 2.1 | 0.2 | 48.8 | 43.5 | 27.8 | 27.8 |
| 2d. Transactions authorized $15.00 to $24.99 in total value | 16.4 | 0.37 | 23 | 5.7 | 0.9 | 48.8 | 43.5 | 27.8 | 27.8 |
| 2e. Transactions authorized $25.00 to $49.99 in total value | 46.9 | 1.96 | 42 | 16.4 | 4.5 | 48.8 | 43.5 | 27.8 | 27.8 |
| 2f. Transactions authorized $50.00 or greater in total value | 211.4 | 41.36 | 196 | 74.0 | 94.4 | 48.8 | 43.5 | 27.8 | 27.8 |
| **3. TOT by type of settlement system** | 285.6 | 43.81 | 153 | | | | | | |
| 3a. ACH | 276.9 | 41.39 | 149 | 96.9 | 94.5 | 46.7 | 41.9 | 22.2 | 22.2 |
| 3b. Check | 0.0 | 0.00 | 122 | 0.0 | 0.0 | 46.7 | 41.9 | 22.2 | 22.2 |
| 3c. Book transfer (cash payments) | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 46.7 | 41.9 | 22.2 | 22.2 |
| 3d. Other | 8.7 | 2.42 | 277 | 3.0 | 5.5 | 46.7 | 41.9 | 22.2 | 22.2 |
| **4. TOT by funding method** | 285.6 | 43.81 | 153 | | | | | | |
| 4a. Cash | 261.8 | 37.81 | 144 | 91.7 | 86.3 | 42.8 | 32.8 | 22.2 | 22.2 |
| 4b. Check | 22.9 | 5.83 | 254 | 8.0 | 13.3 | 42.8 | 32.8 | 22.2 | 22.2 |
| 4c. Credit card | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 42.8 | 32.8 | 22.2 | 22.2 |
| 4d. Debit card | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 42.8 | 32.8 | 22.2 | 22.2 |
| 4e. ACH | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 42.8 | 32.8 | 22.2 | 22.2 |
| 4f. Other | 0.9 | 0.18 | 202 | 0.3 | 0.4 | 42.8 | 32.8 | 22.2 | 22.2 |

*Figures may not sum because of rounding. TOT represents total transactions.*

[1] *The total number of transactions are in millions while the total value of transactions are in billions of USD.*

[2] *Two measures of response rate are given: 1) percentage of TOT from organizations that responded and 2) percentage of organizations that responded.*

[3] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national total estimates.*

## Private-Label ACH Debit Cards - Processors

| Number of organizations | 2012 |
|---|---|
| included in census | 6 |
| responded | 5 |
| included in estimated totals | 6 |

| Survey Item | Totals[1,3] Num (MM) | Totals[1,3] Val ($BN) | Avg Val ($) | Item Shares of NPT (%) Num | Item Shares of NPT (%) Val | Response Rates[2] NPT (%) Num | Response Rates[2] NPT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **3. Net purchase transactions (NPT)** | 104.5 | 7.37 | 71 | 100.0 | 100.0 | 78.5 | 62.1 | 83.3 | 83.3 |
| **4. NPT by transaction value range** | 104.5 | 7.37 | 71 | | | | | | |
| 4a. Transactions authorized less than $5.00 in total value | 15.4 | 0.06 | 4 | 14.8 | 0.8 | 75.3 | 59.7 | 50.0 | 50.0 |
| 4b. Transactions authorized $5.00 to $9.99 in total value | 9.4 | 0.09 | 10 | 9.0 | 1.3 | 75.3 | 59.7 | 50.0 | 50.0 |
| 4c. Transactions authorized $10.00 to $14.99 in total value | 7.3 | 0.12 | 17 | 7.0 | 1.7 | 75.3 | 59.7 | 50.0 | 50.0 |
| 4d. Transactions authorized $15.00 to $24.99 in total value | 12.6 | 0.34 | 27 | 12.0 | 4.7 | 75.3 | 59.7 | 50.0 | 50.0 |
| 4e. Transactions authorized $25.00 to $49.99 in total value | 23.0 | 1.16 | 50 | 22.0 | 15.7 | 75.3 | 59.7 | 50.0 | 50.0 |
| 4f. Transactions authorized $50.00 or greater in total value | 36.8 | 5.59 | 152 | 35.2 | 75.9 | 75.3 | 59.7 | 50.0 | 50.0 |
| **5. NPT by merchant settlement method** | 104.5 | 7.37 | 71 | | | | | | |
| 5a. ACH | 104.5 | 7.37 | 71 | 100.0 | 100.0 | 75.3 | 59.7 | 50.0 | 50.0 |
| 5b. Wire | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 75.3 | 59.7 | 50.0 | 50.0 |
| 5c. Other | 0.0 | 0.00 | 0 | 0.0 | 0.0 | 75.3 | 59.7 | 50.0 | 50.0 |

*Figures may not sum because of rounding. NPT represents net purchase transactions.*

[1] *The total number of transactions are in millions while the total value of transactions are in billions of USD.*

[2] *Two measures of response rate are given: 1) percentage of NPT from organizations that responded and 2) percentage of organizations that responded.*

[3] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national total estimates.*



IPR2025-01151
Apple EX1037 Page 155

## Secure Online Payments - Processors

| Number of organizations | 2012 |
|---|---|
| included in census | 12 |
| responded | 7 |
| included in estimated totals | 9 |

| Survey Item | Totals[1,3] Num (MM) | Totals[1,3] Val ($BN) | Avg Val ($) | Item Shares of TOT (%) Num | Item Shares of TOT (%) Val | Response Rates[2] TOT (%) Num | Response Rates[2] TOT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **1. Total transactions (TOT)** | 1,819.5 | 93.03 | 51 | 100.0 | 100.0 | 91.2 | 91.4 | 58.3 | 58.3 |
| 1a. Redirected from the merchant or biller site | 1,539.2 | 70.14 | 46 | 84.6 | 75.4 | 34.4 | 12.7 | 33.3 | 33.3 |
| 1a.1. eCommerce secure online credit card payments | 1,537.1 | 69.21 | 45 | 84.5 | 74.4 | 34.4 | 12.7 | 33.3 | 33.3 |
| 1a.2. eCommerce secure online PIN debit payments | 2.1 | 0.93 | 442 | 0.1 | 1.0 | 34.4 | 12.7 | 33.3 | 33.3 |
| 1b. Secure online prepaid/escrow-account e.g., PayPal | 51.8 | 0.98 | 19 | 2.8 | 1.1 | 34.4 | 12.7 | 33.3 | 33.3 |
| 1c. Other secure eCommerce payments | 228.6 | 21.90 | 96 | 12.6 | 23.5 | 34.4 | 12.7 | 33.3 | 33.3 |
| **2. NPT by transaction value range** | 1,819.5 | 93.03 | 51 | | | | | | |
| 2a. Transactions authorized less than $5.00 in total value | 353.7 | 0.94 | 3 | 19.4 | 1.0 | 90.2 | 87.7 | 33.3 | 33.3 |
| 2b. Transactions authorized $5.00 to $9.99 in total value | 493.9 | 2.83 | 6 | 27.1 | 3.0 | 90.2 | 87.7 | 33.3 | 33.3 |
| 2c. Transactions authorized $10.00 to $14.99 in total value | 69.4 | 0.80 | 12 | 3.8 | 0.9 | 90.2 | 87.7 | 33.3 | 33.3 |
| 2d. Transactions authorized $15.00 to $24.99 in total value | 324.7 | 6.24 | 19 | 17.8 | 6.7 | 90.2 | 87.7 | 33.3 | 33.3 |
| 2e. Transactions authorized $25.00 to $49.99 in total value | 251.1 | 9.15 | 36 | 13.8 | 9.8 | 90.2 | 87.7 | 33.3 | 33.3 |
| 2f. Transactions authorized $50.00 or greater in total value | 326.7 | 73.08 | 224 | 18.0 | 78.6 | 90.2 | 87.7 | 33.3 | 33.3 |

*Figures may not sum because of rounding. TOT represents total transactions.*

[1] *The total number of transactions are in millions while the total value of transactions are in billions of USD.*

[2] *Two measures of response rate are given: 1) percentage of TOT from organizations that responded and 2) percentage of organizations that responded.*

[3] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national total estimates.*

## Mobile Wallets - Processors

| Number of organizations | 2012 |
|---|---|
| included in census | 18 |
| responded | 6 |
| included in estimated totals | 10 |

| Survey Item | Totals[1,3] Num (MM) | Totals[1,3] Val ($BN) | Avg Val ($) | Item Shares of TOT (%) Num | Item Shares of TOT (%) Val | Response Rates[2] TOT (%) Num | Response Rates[2] TOT (%) Val | Response Rates[2] Organizations (%) Num | Response Rates[2] Organizations (%) Val |
|---|---|---|---|---|---|---|---|---|---|
| **1. Total transactions (TOT)** | 250.6 | 9.48 | 38 | 100.0 | 100.0 | 28.6 | 20.6 | 33.3 | 33.3 |
| **2. TOT by transaction value range** | 250.6 | 9.48 | 38 | | | | | | |
| 2a. Transactions authorized less than $5.00 in total value | 106.2 | 0.47 | 4 | 42.4 | 5.0 | 28.5 | 20.5 | 16.7 | 16.7 |
| 2b. Transactions authorized $5.00 to $9.99 in total value | 66.2 | 0.60 | 9 | 26.4 | 6.4 | 28.5 | 20.5 | 16.7 | 16.7 |
| 2c. Transactions authorized $10.00 to $14.99 in total value | 8.3 | 0.14 | 17 | 3.3 | 1.5 | 28.5 | 20.5 | 16.7 | 16.7 |
| 2d. Transactions authorized $15.00 to $24.99 in total value | 25.3 | 0.62 | 24 | 10.1 | 6.5 | 28.5 | 20.5 | 16.7 | 16.7 |
| 2e. Transactions authorized $25.00 to $49.99 in total value | 18.7 | 0.95 | 51 | 7.5 | 10.0 | 28.5 | 20.5 | 16.7 | 16.7 |
| 2f. Transactions authorized $50.00 or greater in total value | 25.9 | 6.70 | 259 | 10.3 | 70.7 | 28.5 | 20.5 | 16.7 | 16.7 |

*Figures may not sum because of rounding. TOT represents total transactions.*

[1] *The total number of transactions are in millions while the total value of transactions are in billions of USD.*

[2] *Two measures of response rate are given: 1) percentage of TOT from organizations that responded and 2) percentage of organizations that responded.*

[3] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national total estimates.*



IPR2025-01151
Apple EX1037 Page 156

**Number of Network ACH transactions by Standard Entry Class Code 2012**

| Standard Entry Class Code | Network Debit Transactions | Network Credit Transactions | Total Transaction Volume | Percent of Network Total |
|---|---|---|---|---|
| ARC | 1,862,877,188 | 14,011 | 1,862,891,199 | 11.1% |
| BOC | 191,706,568 | 30,941 | 191,737,509 | 1.1% |
| CCD | 735,035,378 | 1,548,121,330 | 2,283,156,708 | 13.6% |
| CIE | 31,958 | 167,972,543 | 168,004,501 | 1.0% |
| CTX | 8,855,881 | 77,085,158 | 85,941,039 | 0.5% |
| IAT | 38,700,280 | 5,243,728 | 43,944,008 | 0.3% |
| MTE | 9,156,920 | 821,067 | 9,977,987 | 0.1% |
| POP | 454,342,824 | 38,949 | 454,381,773 | 2.7% |
| POS | 90,498,998 | 4,458,210 | 94,957,208 | 0.6% |
| PPD | 3,080,359,217 | 5,143,048,252 | 8,223,407,469 | 49.2% |
| RCK | 5,662,410 | 3,383 | 5,665,793 | 0.0% |
| SHR | 1,470,617 | 16,356 | 1,486,973 | 0.0% |
| TEL | 349,011,999 | 58,678 | 349,070,677 | 2.1% |
| TRC | 3,872 | 0 | 3,872 | 0.0% |
| WEB | 2,952,848,585 | 93,160 | 2,952,941,745 | 17.7% |
| XCK | 8,664 | 0 | 8,664 | 0.0% |
| Network Total | 9,780,571,359 | 6,947,005,766 | 16,727,577,125 | 100% |

Note: Excludes non-value Standard Entry Class codes.

**Value of Network ACH transactions by Standard Entry Class Code 2012**

| Standard Entry Class Code | Network Debit Transactions ($, in thousands) | Network Credit Transactions ($, in thousands) | Total Dollar Value ($, in thousands) | Percent of Total Value |
|---|---|---|---|---|
| ARC | 504,774,533 | 5,574 | 504,780,107 | 1.4% |
| BOC | 18,817,503 | 4,551 | 18,822,054 | 0.1% |
| CCD | 9,296,134,900 | 11,691,081,241 | 20,987,216,141 | 56.9% |
| CIE | 2,882 | 106,205,206 | 106,208,088 | 0.3% |
| CTX | 165,180,778 | 3,257,544,035 | 3,422,724,813 | 9.3% |
| IAT | 15,076,527 | 67,810,034 | 82,886,561 | 0.2% |
| MTE | 4,934,242 | 4,306,719 | 9,240,961 | 0.0% |
| POP | 45,506,587 | 3,295 | 45,509,882 | 0.1% |
| POS | 6,036,684 | 202,894 | 6,239,578 | 0.0% |
| PPD | 2,766,669,508 | 7,516,011,798 | 10,282,681,306 | 27.9% |
| RCK | 1,195,428 | 1,053 | 1,196,481 | 0.0% |
| SHR | 55,931 | 56,024 | 111,955 | 0.0% |
| TEL | 121,020,375 | 25,727 | 121,046,102 | 0.3% |
| TRC | 212 | 0 | 212 | 0.0% |
| WEB | 1,290,330,028 | 32,131 | 1,290,362,159 | 3.5% |
| XCK | 3,447 | 1 | 3,448 | 0.0% |
| Network Total | 14,235,739,565 | 22,643,290,283 | 36,879,029,848 | 100% |



IPR2025-01151
Apple EX1037 Page 158

## 3.8.2 Estimates for 2009 and 2012 with Growth Rates

### General-Purpose Credit Cards - Networks

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 5 | 7 |

| | 2009 Estimates[1] | | | 2012 Estimates[1] | | | CAGR (%) | |
|---|---|---|---|---|---|---|---|---|
| Survey Item | Num (Bn) | Val ($TR) | Avg Val ($) | Num (Bn) | Val ($TR) | Avg Val ($) | Num | Val |
| **3. Net purchase transactions (NPT)** | 19.5 | 1.69 | 87 | 23.8 | 2.21 | 93 | 6.8 | 9.3 |
| **4. NPT by type of card** | 19.5 | 1.69 | 87 | 23.8 | 2.21 | 93 | 6.8 | 9.3 |
| 4a. Credit card transactions | 13.0 | 1.13 | 87 | 21.5 | 1.80 | 84 | 18.1 | 16.9 |
| 4b. Charge card transactions | 6.5 | 0.56 | 87 | 2.3 | 0.41 | 175 | -29.0 | -10.3 |
| **5. NPT by payment initiation and authorization method** | 19.5 | 1.69 | 87 | 23.8 | 2.21 | 93 | 6.8 | 9.3 |
| 5a. Transactions at the point of sale | 15.8 | 1.19 | 76 | 18.0 | 1.23 | 68 | 4.6 | 1.0 |
| 5b. Card-not-present/remote transactions | 3.8 | 0.50 | 132 | 5.8 | 0.98 | 170 | 15.2 | 25.2 |
| **7. NPT by type of payer** | 19.5 | 1.69 | 87 | 23.8 | 2.21 | 93 | 6.8 | 9.3 |
| 7a. Consumer transactions | 17.2 | 1.27 | 74 | 20.4 | 1.55 | 76 | 5.9 | 6.7 |
| 7b. Business/government transactions | 2.3 | 0.42 | 178 | 3.4 | 0.66 | 196 | 12.9 | 16.4 |
| **9. NPT by transaction value range** | 19.5 | 1.69 | 87 | 23.8 | 2.21 | 93 | 6.8 | 9.3 |
| 9a. Transactions authorized less than $5.00 in total value | 2.1 | 0.00 | 2 | 2.1 | 0.01 | 3 | -0.3 | 9.2 |
| 9b. Transactions authorized $5.00 to $9.99 in total value | 3.6 | 0.04 | 10 | 2.7 | 0.02 | 8 | 10.1 | 10.1 |
| 9c. Transactions authorized $10.00 to $14.99 in total value | | | | 2.2 | 0.03 | 12 | | |
| 9d. Transactions authorized $15.00 to $24.99 in total value | 2.8 | 0.06 | 20 | 3.3 | 0.07 | 20 | 5.2 | 5.8 |
| 9e. Transactions authorized $25.00 to $49.99 in total value | 11.0 | 1.60 | 145 | 5.3 | 0.19 | 36 | 7.3 | 9.4 |
| 9f. Transactions authorized $50.00 or greater in total value | | | | 8.3 | 1.89 | 228 | | |

*Figures may not sum because of rounding. CAGR is compound annual growth rate.*

[1] *The number of transactions are in billions while the value of transactions are in trillions of USD.*

### Debit Cards - Networks

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 13 | 14 |

| | 2009 Estimates[1] | | | 2012 Estimates[1] | | | CAGR (%) | |
|---|---|---|---|---|---|---|---|---|
| Survey Item | Num (Bn) | Val ($TR) | Avg Val ($) | Num (Bn) | Val ($TR) | Avg Val ($) | Num | Val |
| **4. Net purchase transactions (NPT)** | 37.5 | 1.40 | 37 | 47.0 | 1.82 | 39 | 7.7 | 9.0 |
| **5. NPT by payment initiation and authorization method** | 37.5 | 1.40 | 37 | 47.0 | 1.82 | 39 | 7.7 | 9.0 |
| 5a. Transactions at the point of sale | 32.4 | 1.02 | 32 | 41.4 | 1.42 | 34 | 8.6 | 11.6 |
| 5b. Card-not-present/remote transactions | 5.2 | 0.38 | 74 | 5.5 | 0.40 | 71 | 2.4 | 1.2 |
| **7. NPT by type of payer** | 37.5 | 1.40 | 37 | 47.0 | 1.82 | 39 | 7.7 | 9.0 |
| 7a. Consumer transactions | 36.3 | 1.30 | 36 | 45.5 | 1.68 | 37 | 7.8 | 8.8 |
| 7b. Business/government transactions | 1.2 | 0.10 | 82 | 1.5 | 0.14 | 91 | 7.4 | 11.1 |
| **9. NPT by transaction value range** | 37.5 | 1.40 | 37 | 47.0 | 1.82 | 39 | 7.7 | 9.0 |
| 9a. Transactions authorized less than $5.00 in total value | 4.8 | 0.01 | 3 | 6.0 | 0.02 | 3 | 7.6 | 11.0 |
| 9b. Transactions authorized $5.00 to $9.99 in total value | 10.7 | 0.10 | 9 | 8.4 | 0.06 | 7 | 9.6 | 9.8 |
| 9c. Transactions authorized $10.00 to $14.99 in total value | | | NR | 5.7 | 0.07 | 12 | | |
| 9d. Transactions authorized $15.00 to $24.99 in total value | 6.5 | 0.12 | 19 | 7.6 | 0.15 | 19 | 5.2 | 5.8 |
| 9e. Transactions authorized $25.00 to $49.99 in total value | 15.4 | 1.17 | 76 | 9.8 | 0.34 | 35 | 7.6 | 9.2 |
| 9f. Transactions authorized $50.00 or greater in total value | | | NR | 9.4 | 1.18 | 126 | | |
| **NPT by network type** | 37.5 | 1.40 | 37 | 47.0 | 1.82 | 39 | 7.7 | 9.0 |
| dual-message | 23.1 | 0.84 | 36 | 30.2 | 1.13 | 37 | 9.3 | 10.2 |
| single-message | 14.4 | 0.56 | 39 | 16.8 | 0.69 | 41 | 5.2 | 7.1 |

*Figures may not sum because of rounding. CAGR is compound annual growth rate.*

[1] *The number of transactions are in billions while the value of transactions are in trillions of USD.*



IPR2025-01151
Apple EX1037 Page 159

## General-Purpose Prepaid Cards - Networks

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 6 | 7 |

| Survey Item | 2009 Estimates[1] Num (Bn) | 2009 Estimates[1] Val ($TR) | 2009 Estimates[1] Avg Val ($) | 2012 Estimates[1] Num (Bn) | 2012 Estimates[1] Val ($TR) | 2012 Estimates[1] Avg Val ($) | CAGR (%) Num | CAGR (%) Val |
|---|---|---|---|---|---|---|---|---|
| **3. Net purchase transactions (NPT)** | 1.3 | 0.04 | 32 | 3.1 | 0.10 | 34 | 33.9 | 36.6 |
| **7. NPT by transaction value range** | 1.3 | 0.04 | 32 | 3.1 | 0.10 | 34 | 33.9 | 36.6 |
| 7a. Transactions authorized less than $5.00 in total value | 0.2 | 0.00 | 3 | 0.6 | 0.00 | 3 | 36.4 | 38.4 |
| 7b. Transactions authorized $5.00 to $9.99 in total value | 0.4 | 0.00 | 9 | 0.6 | 0.00 | 7 | 34.4 | 35.8 |
| 7c. Transactions authorized $10.00 to $14.99 in total value | | | | 0.4 | 0.00 | 12 | | |
| 7d. Transactions authorized $15.00 to $24.99 in total value | 0.2 | 0.00 | 19 | 0.5 | 0.01 | 19 | 31.2 | 32.9 |
| 7e. Transactions authorized $25.00 to $49.99 in total value | 0.4 | 0.03 | 77 | 0.5 | 0.02 | 34 | 33.1 | 37.0 |
| 7f. Transactions authorized $50.00 or greater in total value | | | | 0.5 | 0.07 | 133 | | |

*Figures may not sum because of rounding. CAGR is compound annual growth rate.*

[1] *The number of transactions are in billions while the value of transactions are in trillions of USD.*

## Private-Label Credit Cards - Retail Merchant Issuer Survey

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 8 | 10 |

| Survey Item | 2009 Estimates[1] Num (Bn) | 2009 Estimates[1] Val ($TR) | 2009 Estimates[1] Avg Val ($) | 2012 Estimates[1] Num (Bn) | 2012 Estimates[1] Val ($TR) | 2012 Estimates[1] Avg Val ($) | CAGR (%) Num | CAGR (%) Val |
|---|---|---|---|---|---|---|---|---|
| **5. Net purchase transactions (NPT)** | 0.1 | 0.01 | 75 | 0.3 | 0.03 | 100 | 41.4 | 55.3 |
| **6. NPT by payment initiation method** | 0.1 | 0.01 | 75 | 0.3 | 0.03 | 100 | 41.4 | 55.3 |
| 6a. Transactions at the point of sale | 0.1 | 0.01 | 74 | 0.2 | 0.02 | 98 | 42.0 | 56.3 |
| 6b. Card-not-present/remote transactions | 0.0 | 0.00 | 119 | 0.0 | 0.00 | 153 | 24.2 | 35.3 |
| **8. NPT by type of payer** | 0.1 | 0.01 | 75 | 0.3 | 0.03 | 100 | 41.4 | 55.3 |
| 8a. Consumer transactions | 0.1 | 0.01 | 75 | 0.2 | 0.02 | 102 | 38.4 | 52.9 |
| 8b. Business/government transactions | 0.0 | 0.00 | 70 | 0.0 | 0.00 | 77 | 132.4 | 140.6 |
| **9. NPT by transaction value range** | 0.1 | 0.01 | 75 | 0.3 | 0.03 | 100 | 41.4 | 55.3 |
| 9a. Transactions authorized less than $5.00 in total value | 0.0 | 0.00 | 3 | 0.0 | 0.00 | 3 | 58.1 | 69.0 |
| 9b. Transactions authorized $5.00 to $9.99 in total value | 0.0 | 0.00 | 8 | 0.0 | 0.00 | 8 | 38.4 | 50.4 |
| 9c. Transactions authorized $10.00 to $14.99 in total value | | | | 0.0 | 0.00 | 13 | | |
| 9d. Transactions authorized $15.00 to $24.99 in total value | 0.0 | 0.00 | 16 | 0.0 | 0.00 | 21 | 30.7 | 42.5 |
| 9e. Transactions authorized $25.00 to $49.99 in total value | 0.1 | 0.01 | 103 | 0.1 | 0.00 | 39 | 42.7 | 55.7 |
| 9f. Transactions authorized $50.00 or greater in total value | | | | 0.1 | 0.02 | 176 | | |

*Figures may not sum because of rounding. CAGR is compound annual growth rate.*

[1] *The number of transactions are in billions while the value of transactions are in trillions of USD.*

## Private-Label Credit Cards - Processors

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 21 | 16 |

| Survey Item | 2009 Estimates[1] Num (Bn) | 2009 Estimates[1] Val ($TR) | 2009 Estimates[1] Avg Val ($) | 2012 Estimates[1] Num (Bn) | 2012 Estimates[1] Val ($TR) | 2012 Estimates[1] Avg Val ($) | CAGR (%) Num | CAGR (%) Val |
|---|---|---|---|---|---|---|---|---|
| **4. Net purchase transactions (NPT)** | 1.5 | 0.18 | 126 | 2.1 | 0.24 | 113 | 14.0 | 9.7 |
| **5. NPT by payment initiation method** | 1.5 | 0.18 | 126 | 2.1 | 0.24 | 113 | 14.0 | 9.7 |
| 5a. Transactions at the point of sale | 1.4 | 0.17 | 126 | 2.1 | 0.23 | 110 | 15.4 | 10.5 |
| 5b. Card-not-present/remote transactions | 0.1 | 0.01 | 143 | 0.0 | 0.01 | 295 | -26.4 | -6.4 |
| **7. NPT by type of payer** | 1.5 | 0.18 | 126 | 2.1 | 0.24 | 113 | 14.0 | 9.7 |
| 7a. Consumer transactions | 0.7 | 0.10 | 129 | 1.3 | 0.14 | 105 | 21.2 | 13.3 |
| 7b. Business/government transactions | 0.7 | 0.09 | 124 | 0.8 | 0.10 | 125 | 5.3 | 5.5 |
| **8. NPT by transaction value range** | 1.5 | 0.18 | 126 | 2.1 | 0.24 | 113 | 14.0 | 9.7 |
| 8a. Transactions authorized less than $5.00 in total value | 0.0 | 0.00 | 2 | 0.1 | 0.00 | 27 | 12.8 | 150.9 |
| 8b. Transactions authorized $5.00 to $9.99 in total value | 0.1 | 0.00 | 15 | 0.1 | 0.00 | 9 | 13.4 | 2.1 |
| 8c. Transactions authorized $10.00 to $14.99 in total value | | | | 0.1 | 0.00 | 13 | | |
| 8d. Transactions authorized $15.00 to $24.99 in total value | 0.1 | 0.00 | 30 | 0.2 | 0.00 | 21 | 11.2 | -0.4 |
| 8e. Transactions authorized $25.00 to $49.99 in total value | 1.2 | 0.18 | 151 | 0.6 | 0.02 | 40 | 14.5 | 9.7 |
| 8f. Transactions authorized $50.00 or greater in total value | | | | 1.2 | 0.21 | 181 | | |

*Figures may not sum because of rounding. CAGR is compound annual growth rate.*

[1] *The number of transactions are in billions while the value of transactions are in trillions of USD.*



IPR2025-01151
Apple EX1037 Page 160

## Private-Label Prepaid Cards - Non-transit

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 21 | 29 |

| | 2009 Estimates[1] | | | 2012 Estimates[1] | | | CAGR (%) | |
|---|---|---|---|---|---|---|---|---|
| Survey Item | Num (Bn) | Val ($TR) | Avg Val ($) | Num (Bn) | Val ($TR) | Avg Val ($) | Num | Val |
| **3. Net purchase transactions (NPT)** | 2.7 | 0.04 | 16 | 3.6 | 0.05 | 13 | 10.8 | 2.4 |
| **6. NPT by type of card** | 2.7 | 0.04 | 16 | 3.6 | 0.05 | 13 | 10.8 | 2.4 |
| 6a. Gift card transactions | 2.6 | 0.04 | 16 | 3.6 | 0.05 | 13 | 12.0 | 4.5 |
| 6b. Transit card transactions | 0.0 | 0.00 | 0 | 0.0 | 0.00 | 0 | 0.0 | 0.0 |
| 6c. Customer refund & incentive card transactions | 0.0 | 0.00 | 27 | 0.0 | 0.00 | 34 | -48.6 | -44.1 |
| 6d. Other private-label prepaid card transactions | 0.0 | 0.00 | 41 | 0.0 | 0.00 | 0 | -100.0 | -100.0 |
| **7. NPT by transaction value range** | 2.7 | 0.04 | 16 | 3.6 | 0.05 | 13 | 10.8 | 2.4 |
| 7a. Transactions authorized less than $5.00 in total value | 1.2 | 0.00 | 3 | 2.1 | 0.01 | 5 | 20.4 | 43.3 |
| 7b. Transactions authorized $5.00 to $9.99 in total value | 0.7 | 0.01 | 10 | 0.9 | 0.01 | 11 | 16.0 | 29.1 |
| 7c. Transactions authorized $10.00 to $14.99 in total value | | | | 0.2 | 0.00 | 20 | | |
| 7d. Transactions authorized $15.00 to $24.99 in total value | 0.3 | 0.01 | 22 | 0.2 | 0.01 | 32 | -16.9 | -5.0 |
| 7e. Transactions authorized $25.00 to $49.99 in total value | 0.4 | 0.03 | 63 | 0.1 | 0.01 | 52 | -22.7 | -15.9 |
| 7f. Transactions authorized $50.00 or greater in total value | | | | 0.1 | 0.01 | 143 | | |

*Figures may not sum because of rounding. CAGR is compound annual growth rate.*

[1] *The number of transactions are in billions while the value of transactions are in trillions of USD.*

## General-Purpose Prepaid Cards - Processors

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 15 | 35 |

| | 2009 Estimates[1] | | | 2012 Estimates[1] | | | CAGR (%) | |
|---|---|---|---|---|---|---|---|---|
| Survey Item | Num (MM) | Val ($BN) | Avg Val ($) | Num (MM) | Val ($BN) | Avg Val ($) | Num | Val |
| **3. Net purchase transactions (NPT)** | 1,640.5 | 71.68 | 44 | 4,902.9 | 162.19 | 33 | 44.0 | 31.3 |
| **7. NPT by type of card** | 1,640.5 | 71.68 | 44 | 4,902.9 | 162.19 | 33 | 44.0 | 31.3 |
| 7a. General-purpose prepaid card transactions | 594.1 | 26.16 | 44 | 1,656.4 | 46.47 | 28 | 40.7 | 21.1 |
| 7b. Gift card transactions | 197.6 | 5.82 | 29 | 524.7 | 10.24 | 20 | 38.5 | 20.7 |
| 7c. Medical card transactions | 92.1 | 5.97 | 65 | 350.2 | 17.12 | 49 | 56.1 | 42.1 |
| 7d. Customer refund & incentive card transactions | 87.3 | 2.05 | 24 | 245.6 | 6.01 | 24 | 41.2 | 43.1 |
| 7e. Payroll card transactions | 448.0 | 19.07 | 43 | 743.6 | 17.18 | 23 | 18.4 | -3.4 |
| 7f. Government card transactions | 210.2 | 12.32 | 59 | 817.2 | 31.16 | 38 | 57.2 | 36.3 |
| 7g. Other general-purpose prepaid card transactions | 32.7 | 1.38 | 42 | 565.2 | 34.02 | 60 | 158.5 | 191.4 |
| **8. NPT by transaction value range** | 1,640.5 | 71.68 | 44 | 4,902.9 | 162.19 | 33 | 44.0 | 31.3 |
| 8a. Transactions authorized less than $5.00 in total value | 204.2 | 0.73 | 4 | 1,057.3 | 2.73 | 3 | 73.0 | 55.1 |
| 8b. Transactions authorized $5.00 to $9.99 in total value | 316.5 | 3.43 | 11 | 1,007.2 | 6.78 | 7 | 73.3 | 66.5 |
| 8c. Transactions authorized $10.00 to $14.99 in total value | | | | 640.6 | 9.06 | 14 | | |
| 8d. Transactions authorized $15.00 to $24.99 in total value | 269.3 | 5.96 | 22 | 655.4 | 10.36 | 16 | 34.5 | 20.2 |
| 8e. Transactions authorized $25.00 to $49.99 in total value | 850.4 | 61.56 | 72 | 741.1 | 23.99 | 32 | 22.0 | 29.4 |
| 8f. Transactions authorized $50.00 or greater in total value | | | | 801.4 | 109.28 | 136 | | |

*Figures may not sum because of rounding. CAGR is compound annual growth rate.*

[1] *The number of transactions are in millions while the value of transactions are in billions of USD.*

## Private-Label Prepaid Cards - Transit

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 19 | 24 |

| | 2009 Estimates[1,2] | | | 2012 Estimates[1,2] | | | CAGR (%) | |
|---|---|---|---|---|---|---|---|---|
| Survey Item | Num (MM) | Val ($BN) | Avg Val ($) | Num (MM) | Val ($BN) | Avg Val ($) | Num | Val |
| **3. Net purchase transactions (NPT)** | 4,047.4 | 5.06 | 1 | 4,708.4 | 7.93 | 2 | 5.2 | 16.2 |
| **7. NPT by transaction value range** | 4,047.4 | 5.06 | 1 | 4,708.4 | 7.93 | 2 | 5.2 | 16.2 |
| 7a. Transactions authorized less than $5.00 in total value | 4,037.2 | 5.05 | 1 | 2,865.7 | 0.69 | 0 | -10.8 | -48.6 |
| 7b. Transactions authorized $5.00 to $9.99 in total value | 10.1 | 0.01 | 1 | 541.4 | 0.54 | 1 | 430.9 | 574.5 |
| 7c. Transactions authorized $10.00 to $14.99 in total value | | | | 965.2 | 3.17 | 3 | | |
| 7d. Transactions authorized $15.00 to $24.99 in total value | 0.2 | 0.00 | 14 | 245.5 | 1.23 | 5 | 1,059.4 | 715.1 |
| 7e. Transactions authorized $25.00 to $49.99 in total value | 0.0 | 0.00 | 0 | 41.7 | 0.28 | 7 | | |
| 7f. Transactions authorized $50.00 or greater in total value | | | | 48.9 | 2.02 | 41 | NR | NR |

*Figures may not sum because of rounding. CAGR is compound annual growth rate.*

[1] *The number of transactions are in millions while the value of transactions are in billions of USD.*

[2] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national estimates.*



IPR2025-01151
Apple EX1037 Page 161

## Far-Field RFID Payments - Processors

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 10 | 18 |

| | 2009 Estimates[1,2] | | | 2012 Estimates[1,2] | | | CAGR (%) | |
|---|---|---|---|---|---|---|---|---|
| Survey Item | Num (MM) | Val ($BN) | Avg Val ($) | Num (MM) | Val ($BN) | Avg Val ($) | Num | Val |
| **1. Total transactions (TOT)** | 3,538.3 | 6.49 | 2 | 5,224.1 | 9.91 | 2 | 13.9 | 15.1 |
| **2. TOT by transaction value range** | 3,538.3 | 6.49 | 2 | 5,224.1 | 9.91 | 2 | 13.9 | 15.1 |
| 2a. Transactions authorized less than $5.00 in total value | 3,443.0 | 4.86 | 1 | 5,176.7 | 8.93 | 2 | 14.6 | 22.4 |
| 2b. Transactions authorized $5.00 to $9.99 in total value | 77.5 | 0.93 | 12 | 36.9 | 0.39 | 11 | -21.6 | -24.3 |
| 2c. Transactions authorized $10.00 to $14.99 in total value | | | | 0.5 | 0.01 | 22 | | |
| 2d. Transactions authorized $15.00 to $24.99 in total value | 5.6 | 0.15 | 27 | 3.5 | 0.13 | 37 | -14.4 | -5.4 |
| 2e. Transactions authorized $25.00 to $49.99 in total value | 12.2 | 0.55 | 45 | 5.8 | 0.37 | 64 | -18.9 | -6.3 |
| 2f. Transactions authorized $50.00 or greater in total value | | | | 0.7 | 0.08 | 107 | | |

*Figures may not sum because of rounding. CAGR is compound annual growth rate.*

[1] *The number of transactions are in millions while the value of transactions are in billions of USD.*

[2] *The totals for each item only represent the lower bounds for national estimates.*

## P2P & Money Transfers - Processors

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 7 | 14 |

| | 2009 Estimates[1,2] | | | 2012 Estimates[1,2] | | | CAGR (%) | |
|---|---|---|---|---|---|---|---|---|
| Survey Item | Num (MM) | Val ($BN) | Avg Val ($) | Num (MM) | Val ($BN) | Avg Val ($) | Num | Val |
| **1. Total transactions (TOT)** | 146.6 | 45.36 | 309 | 205.3 | 91.52 | 446 | 11.9 | 26.4 |
| **3. TOT by transaction value range** | 146.6 | 45.36 | 309 | 205.3 | 91.52 | 446 | 11.9 | 26.4 |
| 3a. Transactions authorized less than $5.00 in total value | 0.8 | 0.00 | 2 | 2.9 | 0.01 | 3 | 54.5 | 91.2 |
| 3b. Transactions authorized $5.00 to $9.99 in total value | 1.6 | 0.02 | 13 | 2.6 | 0.03 | 10 | 57.5 | 63.3 |
| 3c. Transactions authorized $10.00 to $14.99 in total value | | | | 3.8 | 0.06 | 17 | | |
| 3d. Transactions authorized $15.00 to $24.99 in total value | 2.7 | 0.07 | 24 | 7.9 | 0.23 | 29 | 43.9 | 52.8 |
| 3e. Transactions authorized $25.00 to $49.99 in total value | 141.5 | 45.27 | 320 | 18.3 | 0.97 | 53 | 10.0 | 26.3 |
| 3f. Transactions authorized $50.00 or greater in total value | | | | 169.8 | 90.22 | 531 | | |
| **4. TOT by type of clearing system** | 146.6 | 45.36 | 309 | 205.3 | 91.52 | 446 | 11.9 | 26.4 |
| 4a. Credit card/signature (dual-message) debit networks | 6.4 | 1.48 | 231 | 16.2 | 2.09 | 129 | 36.2 | 12.2 |
| 4b. EFT/PIN (single-message) debit networks | 0.0 | 0.00 | 0 | 1.4 | 0.30 | 215 | NR | NR |
| 4c. ACH | 0.4 | 0.90 | 2,116 | 23.5 | 7.94 | 338 | 280.7 | 106.6 |
| 4d. Cash collected/book transfer | 0.0 | 0.00 | 0 | 32.4 | 5.43 | 168 | NR | NR |
| 4e. Other | 139.8 | 42.98 | 308 | 131.8 | 75.76 | 575 | -1.9 | 20.8 |
| **5. TOT by type of origination channel** | 146.6 | 45.36 | 309 | 205.3 | 91.52 | 446 | 11.9 | 26.4 |
| 5a. Website | 3.4 | 1.52 | 443 | 49.5 | 34.07 | 688 | 143.6 | 182.1 |
| 5b. Mobile phone | 0.0 | 0.00 | 54 | 16.6 | 2.15 | 129 | 1,366.1 | 1,862.7 |
| 5c. In-person | 143.2 | 43.84 | 306 | 135.1 | 54.58 | 404 | -1.9 | 7.6 |
| 5d. Other | 0.0 | 0.00 | 0 | 4.1 | 0.72 | 176 | NR | NR |

*Figures may not sum because of rounding. CAGR is compound annual growth rate. TOT represents total transactions.*

[1] *The number of transactions are in millions while the value of transactions are in billions of USD.*

[2] *The totals for each item only represent the lower bounds for national estimates.*



IPR2025-01151
Apple EX1037 Page 162

## Online Bill Payments - Processors

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 5 | 14 |

| | 2009 Estimates[1,2] | | | 2012 Estimates[1,2] | | | CAGR (%) | |
|---|---|---|---|---|---|---|---|---|
| Survey Item | Num (MM) | Val ($BN) | Avg Val ($) | Num (MM) | Val ($BN) | Avg Val ($) | Num | Val |
| **1. Bank/intermediary online bill payment transactions** | 2,371.3 | 867.92 | 366 | 2,836.1 | 1,050.17 | 370 | 6.1 | 6.6 |
| **2. Biller direct online bill payment transactions** | 95.3 | 55.83 | 586 | 261.3 | 130.22 | 498 | 40.0 | 32.6 |
| **Total online bill payment** | 2,466.6 | 923.74 | 374 | 3,097.4 | 1,180.39 | 381 | 7.9 | 8.5 |
| **3. Bank/intermediary OLBP by transaction value range** | 2,371.3 | 867.92 | 366 | 2,836.1 | 1,050.17 | 370 | 6.1 | 6.6 |
| 3a. Transactions authorized less than $5.00 in total value | 14.1 | 0.04 | 3 | 16.4 | 0.04 | 2 | 5.1 | -0.1 |
| 3b. Transactions authorized $5.00 to $9.99 in total value | 67.5 | 0.69 | 10 | 24.1 | 0.17 | 7 | -0.9 | -0.9 |
| 3c. Transactions authorized $10.00 to $14.99 in total value | | | | 41.6 | 0.50 | 12 | | |
| 3d. Transactions authorized $15.00 to $24.99 in total value | 115.4 | 2.26 | 20 | 111.9 | 2.20 | 20 | -1.0 | -0.9 |
| 3e. Transactions authorized $25.00 to $49.99 in total value | 2,174.3 | 864.93 | 398 | 359.8 | 12.64 | 35 | 6.7 | 6.6 |
| 3f. Transactions authorized $50.00 or greater in total value | | | | 2,282.3 | 1,034.62 | 453 | | |
| **4. Biller direct OLBP by transaction value range** | 95.3 | 55.83 | 586 | 261.3 | 130.22 | 498 | 40.0 | 32.6 |
| 4a. Transactions authorized less than $5.00 in total value | 0.8 | 0.00 | 2 | 0.6 | 0.00 | 2 | -7.6 | -15.8 |
| 4b. Transactions authorized $5.00 to $9.99 in total value | 1.1 | 0.01 | 9 | 0.5 | 0.00 | 5 | 23.0 | 23.3 |
| 4c. Transactions authorized $10.00 to $14.99 in total value | | | | 1.5 | 0.01 | 10 | | |
| 4d. Transactions authorized $15.00 to $24.99 in total value | 2.9 | 0.04 | 15 | 5.9 | 0.09 | 15 | 26.7 | 25.8 |
| 4e. Transactions authorized $25.00 to $49.99 in total value | 90.5 | 55.77 | 616 | 12.8 | 0.39 | 30 | 40.8 | 32.6 |
| 4f. Transactions authorized $50.00 or greater in total value | | | | 240.1 | 129.72 | 540 | | |
| **5. Settlement system - Bank/intermediary OLBP** | 2,371.3 | 867.92 | 366 | 2,836.1 | 1,050.17 | 370 | 6.1 | 6.6 |
| 5a. ACH | 1,312.3 | 446.37 | 340 | 1,550.6 | 519.25 | 335 | 5.7 | 5.2 |
| 5b. Check | 385.9 | 160.84 | 417 | 478.0 | 219.04 | 458 | 7.4 | 10.8 |
| 5c. Other | 673.1 | 260.70 | 387 | 807.6 | 311.88 | 386 | 6.3 | 6.2 |

*Figures may not sum because of rounding. CAGR is compound annual growth rate. OLBP represents online bill payments.*

[1] *The number of transactions are in millions while the value of transactions are in billions of USD.*

[2] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national estimates.*

## Walk-in Bill Payments - Processors

| | 2009 | 2012 |
|---|---|---|
| Number of organizations included in estimated totals | 8 | 14 |

| | 2009 Estimates[1,2] | | | 2012 Estimates[1,2] | | | CAGR (%) | |
|---|---|---|---|---|---|---|---|---|
| Survey Item | Num (MM) | Val ($BN) | Avg Val ($) | Num (MM) | Val ($BN) | Avg Val ($) | Num | Val |
| **1. Total transactions (TOT)** | 247.4 | 35.60 | 144 | 285.6 | 43.81 | 153 | 4.9 | 7.2 |
| **2. TOT by transaction value range** | 247.4 | 35.60 | 144 | 285.6 | 43.81 | 153 | 4.9 | 7.2 |
| 2a. Transactions authorized less than $5.00 in total value | 0.8 | 0.00 | 2 | 1.3 | 0.00 | 3 | 17.7 | 26.8 |
| 2b. Transactions authorized $5.00 to $9.99 in total value | 5.0 | 0.05 | 10 | 3.6 | 0.03 | 9 | 24.4 | 30.8 |
| 2c. Transactions authorized $10.00 to $14.99 in total value | | | | 6.1 | 0.08 | 14 | | |
| 2d. Transactions authorized $15.00 to $24.99 in total value | 8.1 | 0.15 | 18 | 16.4 | 0.37 | 23 | 26.6 | 37.0 |
| 2e. Transactions authorized $25.00 to $49.99 in total value | 233.5 | 35.41 | 152 | 46.9 | 1.96 | 42 | 3.4 | 7.0 |
| 2f. Transactions authorized $50.00 or greater in total value | | | | 211.4 | 41.36 | 196 | | |
| **3. TOT by type of settlement system** | 247.4 | 35.60 | 144 | 285.6 | 43.81 | 153 | 4.9 | 7.2 |
| 3a. ACH | 157.2 | 19.11 | 122 | 276.9 | 41.39 | 149 | 20.8 | 29.4 |
| 3b. Check | 6.1 | 0.59 | 96 | 0.0 | 0.00 | 122 | -92.8 | -92.2 |
| 3c. Book transfer (cash payments) | 0.0 | 0.00 | 0 | 0.0 | 0.00 | 0 | 0.0 | 0.0 |
| 3d. Other | 84.1 | 15.90 | 189 | 8.7 | 2.42 | 277 | -53.0 | -46.6 |

*Figures may not sum because of rounding. CAGR is compound annual growth rate.*

[1] *The number of transactions are in millions while the value of transactions are in billions of USD.*

[2] *The totals for each item are the direct sum of organizations that responded and only represent the lower bounds for national estimates.*

# 4 Check Sample Survey (CSS)

## 4.1 INTRODUCTION

The 2013 Check Sample Survey (2013 CSS) estimated the distribution of checks by counterparty and purpose for calendar year 2012.[73] Survey data are based on a random sample of checks written and processed by 11 large commercial banks in 2012. The final sample consists of 41,097 checks.

## 4.2 FINDINGS

Section 4.2.1 provides estimates for the distribution of 2012 checks written by counterparty and purpose. Section 4.2.2 provides trend analysis by comparing the estimates for 2009 to the estimates for 2012.

### 4.2.1 Estimates for Checks Written in 2012

For payer and payee categorization, the sampled checks were grouped as consumer, business, or unknown. The unknown category included checks written that could not be definitely identified as consumer or business. Throughout the study, the business category included businesses; federal, state, and local government agencies; and nonprofit organizations. (See Section 4.3.3.1 for details about payer and payee categories.)

The sampled checks were also classified into four defined purpose categories: income, casual, bill payment (BP), and point-of-sale (POS).[74] Combining counterparty and purpose categories, the 2013 CSS had nine discrete categories of checks. Checks written by businesses to consumers (B2C) or by consumers to consumers (C2C) were defined as income or casual

---

[73] The figures reported here are revised. The revisions are discussed in Section 4.3.5.2.
[74] Bill payment was called remittance, or REM, in previous iterations of the Check Sample Survey.



IPR2025-01151
Apple EX1037 Page 164

payments, respectively. Checks written to businesses were categorized as either bill payment (BP), point-of-sale (POS) or, in cases where the purpose of a check written to a business could not be determined, BP/POS. See Section 4.3.3.2 for details about purpose categories.

#### 4.2.1.1 Distribution of the Number of Checks Written

In 2012, more than half (53.2 percent) of the checks were written by consumers but almost three-quarters (74.9 percent) of the checks written were payable to businesses (Exhibit 40 and Exhibit 41).

**Exhibit 40: Distribution of the Number of Checks Written in 2012, by Payer**

| Payer | Distribution | | 95% Confidence Interval |
|---|---|---|---|
| Consumer | 53.2% | +/- | 0.5% |
| Business | 46.8% | +/- | 0.5% |
| Unknown* | <0.1% | +/- | <0.1% |
| Total | 100.0% | | |

* The unknown category included checks written that the payer could not be definitely identified as consumer or business.
Figures may not sum because of rounding.

**Exhibit 41: Distribution of the Number of Checks Written in 2012, by Payee**

| Payee | Distribution | | 95% Confidence Interval |
|---|---|---|---|
| Consumer | 25.1% | +/- | 0.4% |
| Business | 74.9% | +/- | 0.4% |
| Unknown* | 0.0% | +/- | 0.0% |
| Total | 100.0% | | |

* The unknown category included checks written that the payee could not be definitely identified as consumer or business.

Combining payer and payee types into counterparty combinations, Exhibit 42 shows that consumer-to-business checks (C2B) had the largest share of checks written in 2012 (43.0 percent), followed by business-to-business checks (B2B) at 31.9 percent, then business-to-consumer checks (B2C), and lastly consumer-to-consumer checks (C2C).

**Exhibit 42: Distribution of the Number of Checks Written in 2012, by Counterparty**

| Counterparty | Distribution | | 95% Confidence Interval |
|---|---|---|---|
| C2B | 43.0% | +/- | 0.5% |
| C2C | 10.2% | +/- | 0.3% |
| B2B | 31.9% | +/- | 0.5% |
| B2C | 14.9% | +/- | 0.3% |
| Unknown* | <0.1% | +/- | <0.1% |

* The unknown category included checks written that either the payer, payee, or both the payer and payee could not be definitely identified as consumer or business.
Figures may not sum because of rounding.

In 2012, more than half (55.2 percent) of the checks written were for bill payment (BP) including 31.5 percent for C2B checks and 23.7 percent for B2B checks. The next largest category of checks written by purpose was checks for income (that is, B2C checks) which had 14.9 percent of all checks written in 2012 (Exhibit 43).

**Exhibit 43: Distribution of the Number of Checks Written in 2012, by Counterparty and Purpose**

| | Distribution* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Purpose \ Counterparty | C2C | +/- | C2B | +/- | B2B | +/- | B2C | +/- | Unknown** | +/- | Total | +/- |
| Income | | | | | | | 14.9% | 0.3% | | | 14.9% | 0.3% |
| Casual | 10.2% | 0.3% | | | | | | | | | 10.2% | 0.3% |
| BP | | | 31.5% | 0.4% | 23.7% | 0.4% | | | | | 55.2% | 0.5% |
| POS | | | 4.5% | 0.2% | 1.9% | 0.1% | | | | | 6.4% | 0.2% |
| BP/POS | | | 7.0% | 0.2% | 6.3% | 0.2% | | | | | 13.3% | 0.3% |
| Unknown*** | | | | | | | | | <0.1% | <0.1% | <0.1% | <0.1% |
| Total | 10.2% | 0.3% | 43.0% | 0.5% | 31.9% | 0.5% | 14.9% | 0.3% | <0.1% | <0.1% | 100.0% | |

* Point estimate +/- half-width of the 95% confidence interval.
** The unknown category included checks written that either the payer, payee, or both the payer and payee could not be definitely identified as consumer or business.
*** The unknown category included checks written that had an indeterminate purpose.
Figures may not sum because of rounding.

#### 4.2.1.2 Number of Checks Written by Counterparty and Purpose

Although the sampled checks written in 2012 were from 11 large commercial banks, because many of them 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.

Therefore, under the assumption that the estimated check distributions from the 2013 CSS represented the true distributions among checks processed by all depository institutions in the United States in 2012, the estimated 21.1 billion checks written in 2012 can be allocated to various counterparty and purpose categories.[75]

Using this approach, the 2013 CSS estimated that there were 11.6 billion BP checks written in 2012: 6.6 billion were C2B and 5.0 billion were B2B. Consumers wrote approximately 1.1 billion more checks to each other (2.1 billion) than to merchants at the point of sale (1.0 billion). Businesses wrote 3.1 billion checks to consumers (Exhibit 44).

**Exhibit 44: Number of Checks Written in 2012, by Counterparty and Purpose**

| Number of Checks *(billions)* * | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Purpose** \ **Counterparty** | C2C | +/- | C2B | +/- | B2B | +/- | B2C | +/- | Unknown** | +/- | Total | +/- |
| Income | | | | | | | 3.1 | <0.1 | | | 3.1 | <0.1 |
| Casual | 2.1 | <0.1 | | | | | | | | | 2.1 | <0.1 |
| BP | | | 6.6 | <0.1 | 5.0 | <0.1 | | | | | 11.6 | <0.1 |
| POS | | | 1.0 | <0.1 | 0.4 | <0.1 | | | | | 1.4 | <0.1 |
| BP/POS | | | 1.5 | <0.1 | 1.3 | <0.1 | | | | | 2.8 | <0.1 |
| Unknown*** | | | | | | | | | <0.1 | <0.1 | <0.1 | <0.1 |
| Total | 2.1 | <0.1 | 9.0 | <0.1 | 6.7 | <0.1 | 3.1 | <0.1 | <0.1 | <0.1 | 21.1 | |

* Point estimate +/- half-width of the 95% confidence interval.
** The unknown category included checks written that either the payer, payee, or both the payer and payee could not be definitely identified as consumer or business.
*** The unknown category included checks written that had an indeterminate purpose.
Figures may not sum because of rounding.

#### 4.2.1.3 Distribution of the Value of Checks Written

Although more than 50 percent of checks were written by consumers in 2012, they accounted for only 21.5 percent of the value (Exhibit 45). Checks written by businesses, on the other hand, accounted for 78.5 percent of the total check value. Meanwhile, 82.7 percent of the total check value was received by businesses (Exhibit 46).

[75] The estimated number of checks written was taken from the 2013 Depository and Financial Institutions Payments Survey.

**Exhibit 45: Distribution of the Value of Checks Written in 2012, by Payer**

| Payer | Distribution | | 95% Confidence Interval |
|---|---|---|---|
| Consumer | 21.5% | +/- | 0.4% |
| Business | 78.5% | +/- | 0.4% |
| Unknown* | <0.1% | +/- | <0.1% |
| Total | 100.0% | | |

* The unknown category included checks written that the payer could not be definitely identified as consumer or business.
Figures may not sum because of rounding.

**Exhibit 46: Distribution of the Value of Checks Written in 2012, by Payee**

| Payee | Distribution | | 95% Confidence Interval |
|---|---|---|---|
| Consumer | 17.3% | +/- | 0.4% |
| Business | 82.7% | +/- | 0.4% |
| Unknown* | 0.0% | +/- | 0.0% |
| Total | 100.0% | | |

* The unknown category included checks written that the payee could not be definitely identified as consumer or business.

In 2012, B2B checks accounted for nearly two-thirds (66.2 percent) of the total value of checks written. C2B checks were the second largest category with a share of 16.5 percent of the total value (Exhibit 47).

**Exhibit 47: Distribution of the Value of Checks Written in 2012, by Counterparty**

| Counterparty | Distribution | | 95% Confidence Interval |
|---|---|---|---|
| C2B | 16.5% | +/- | 0.4% |
| C2C | 5.0% | +/- | 0.2% |
| B2B | 66.2% | +/- | 0.5% |
| B2C | 12.3% | +/- | 0.3% |
| Unknown* | <0.1% | +/- | <0.1% |

* The unknown category included checks written that either the payer, payee, or both the payer and payee could not be definitely identified as consumer or business.
Figures may not sum because of rounding.

In 2012, the value of checks written was heavily concentrated in bill payment checks. This category accounted for almost two-thirds (65.5 percent) of the total check value: 52.5 percent

for B2B and 13.1 percent for C2B.[76] The true distribution may have favored checks for bill payment (BP) even more heavily because 15.1 percent of the total check value could not be determined as either BP or POS (Exhibit 48).

**Exhibit 48: Distribution of the Value of Checks Written in 2012, by Counterparty and Purpose**

| | Distribution* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Counterparty / Purpose | C2C | +/- | C2B | +/- | B2B | +/- | B2C | +/- | Unknown** | +/- | Total | +/- |
| Income | | | | | | | 12.3% | 0.3% | | | 12.3% | 0.3% |
| Casual | 5.0% | 0.2% | | | | | | | | | 5.0% | 0.2% |
| BP/POS | | | 13.1% | 0.3% | 52.5% | 0.5% | | | | | 65.5% | 0.5% |
| POS | | | 1.2% | 0.1% | 0.9% | 0.1% | | | | | 2.0% | 0.1% |
| BP/POS | | | 2.3% | 0.1% | 12.8% | 0.3% | | | | | 15.1% | 0.3% |
| Unknown*** | | | | | | | | | <0.1% | <0.1% | <0.1% | <0.1% |
| Total | 5.0% | 0.2% | 16.5% | 0.4% | 66.2% | 0.5% | 12.3% | 0.3% | <0.1% | <0.1% | 100.0% | |

* Point estimate +/- half-width of the 95% confidence interval.
** The unknown category included checks written that either the payer, payee, or both the payer and payee could not be definitely identified as consumer or business.
*** The unknown category included checks written that had an indeterminate purpose.
Figures may not sum because of rounding.

Based on the CSS sample, the average value for checks written in 2012 was estimated to be $1,317.[77]. The high average value was mostly driven by checks written by businesses with an average value of $2,208, which is 4 times of the average value of checks written by consumers ($533). Among counterparties, B2B checks had the highest average value of $2,732, and C2B checks had the lowest average value of $505—even lower than C2C checks, which averaged $650 (Exhibit 49).

[76] Figures do not sum because of rounding.

[77] The CSS estimate of the average value of checks written differs from the national estimate of $1,257 for 2012 which is from DFIPS. The difference is because the banks participating in both studies differ – DFIPS is a random sample of all DFIs in the US and the CSS is a study of 11 large DFIs. Despite the difference in sampling technique, the values are reasonably close.

**Exhibit 49: Average Value of Checks Written in 2012, by Counterparty**

| | Average Value* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Payer \ Payee | Consumer | +/- | Business | +/- | Unknown** | +/- | Total | +/- |
| Consumer | $650 | $27 | $505 | $56 | $0 | $0 | $533 | $52 |
| Business | $1,087 | $80 | $2,732 | $208 | $0 | $0 | $2,208 | $178 |
| Unknown*** | | | $1,295 | $29 | $0 | $0 | $1,295 | $29 |
| Total | $910 | $62 | $1,454 | $137 | $0 | $0 | $1,317 | $123 |

* Point estimate +/- half-width of the 95% confidence interval.
** The unknown category included checks written that the payee could not be definitely identified as consumer or business.
*** The unknown category included checks written that the payer could not be definitely identified as consumer or business.
The estimated average value of checks written from CSS differs from the national estimate of $1,257 for 2012.

#### 4.2.1.5 Average Value of Checks Written by Counterparty and Purpose

In 2012, the largest average values of checks written were for B2B BP checks ($2,914) and B2B BP/POS checks ($2,678). Given the relatively large average value of these B2B BP/POS checks—much larger than the B2B POS checks ($609)—it is likely that the majority of these BP/POS checks were BP items (Exhibit 50).

**Exhibit 50: Average Value of Checks Written in 2012, by Counterparty and Purpose**

| | Average Value* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Purpose \ Counterparty | C2C | +/- | C2B | +/- | B2B | +/- | B2C | +/- | Unknown** | +/- | TOTAL | +/- |
| Income | | | | | | | $1,087 | $80 | | | $1,087 | $80 |
| Casual | $650 | $27 | | | | | | | | | $650 | $27 |
| BP | | | $546 | $62 | $2,914 | $216 | | | | | $1,563 | $143 |
| POS | | | $337 | $53 | $609 | $21 | | | | | $416 | $46 |
| BP/POS | | | $429 | $17 | $2,678 | $216 | | | | | $1,500 | $142 |
| Unknown*** | | | | | | | | | $1,295 | $29 | $1,295 | $29 |
| Total | $650 | $27 | $505 | $56 | $2,732 | $208 | $1,087 | $80 | $1,295 | $29 | $1,317 | $123 |

* Point estimate +/- half-width of the 95% confidence interval.
** The unknown category included checks written that either the payer, payee, or both the payer and payee could not be definitely identified as consumer or business.
*** The unknown category included checks written that had an indeterminate purpose.

At an average of $650, C2C checks have the highest average value among all types of consumer checks—$104 higher than C2B BP checks. Also, consumers transfer value between multiple depository accounts. In fact, C2C checks identified as having the same payer as payee (that is, a consumer wrote a check to him/herself, indicative of moving money across accounts)

had an average value of $2,164 which was much higher than the average values of all other categories of checks written by consumers.

#### 4.2.1.6 Distribution of the Number of Checks Written by Check Value Range

The sampled checks were also grouped by the dollar value of checks. In 2012, approximately three out of every four checks (76.2 percent) were written for $500 or less, and close to half of the checks (44.1 percent) were written for $100 or less (Exhibit 51).

**Exhibit 51: Distribution of the Number of Checks Written in 2012, by Check Value Range**

| Check Value Range | Distribution | | 95% Confidence Interval |
|---|---|---|---|
| $0.01-$50 | 28.8% | +/- | 0.4% |
| $50.01-$100 | 15.3% | +/- | 0.3% |
| $100.01-$500 | 32.1% | +/- | 0.5% |
| $500.01-$1000 | 10.6% | +/- | 0.3% |
| $1000.01-$2500 | 7.1% | +/- | 0.2% |
| $2500.01-$5000 | 2.8% | +/- | 0.2% |
| $5000.01 + | 3.3% | +/- | 0.2% |

#### 4.2.1.7 Remotely Created Checks

Remotely created checks are demand drafts that have a typed statement in lieu of a signature, such as “No Signature Required,” “Signature on File,” “Authorized by the Depositor,” or “Authorized by the Payer.” Approximately 2.2 percent of the checks written in 2012 were estimated to be remotely created checks (RCCs). As discussed later in Section 4.3.6.1, the study did not estimate the number or value of other types of demand drafts.

#### 4.2.1.8 Checks Ineligible for ACH Conversion

Approximately 45.5 percent of the checks written in 2012 were estimated to be checks ineligible for ACH conversion, which tend to be business or government, and checks over $25,000, according to NACHA rules. (See Section 4.3.6.2 for details.)

### 4.2.2 Comparison between the Estimates for Checks Written in 2009 and 2012

This section compares the estimates for 2012 from the 2013 CSS to the revised estimates for 2009 using the survey data collected for the 2010 CSS.[78]

#### 4.2.2.1 Changes in the Distribution of the Number of Checks Written

From 2009 to 2012, the share of checks written by consumers decreased from 54.3 percent to 53.2 percent, while the share of checks written by businesses increased from 45.7 percent to 46.8 percent (Exhibit 52). During the same time period, the share of checks written to consumers decreased from 28.7 percent to 25.1 percent and the share of checks written to businesses increased from 71.2 percent to 74.9 percent (Exhibit 53).

**Exhibit 52: Changes in the Distribution of the Number of Checks Written, by Payer**

| Payer | 2009 | | | 2012 | | | Percentage Change |
|---|---|---|---|---|---|---|---|
| Consumer | 54.3% | +/- | 0.5% | 53.2% | +/- | 0.5% | -2.0% |
| Business | 45.7% | +/- | 0.5% | 46.8% | +/- | 0.5% | 2.5% |
| Unknown* | <0.1% | +/- | <0.1% | <0.1% | +/- | <0.1% | -27.7% |
| Total | 100.0% | | | 100.0% | | | |

* The unknown category included checks written that the payer could not be definitely identified as consumer or business.
Point estimate +/- half-width of the 95% confidence interval.
Figures may not sum because of rounding.

**Exhibit 53: Changes in the Distribution of the Number of Checks Written, by Payee**

| Payee | 2009 | | | 2012 | | | Percentage Change |
|---|---|---|---|---|---|---|---|
| Consumer | 28.7% | +/- | 0.4% | 25.1% | +/- | 0.4% | -12.6% |
| Business | 71.2% | +/- | 0.4% | 74.9% | +/- | 0.4% | 5.2% |
| Unknown* | 0.1% | +/- | <0.1% | 0.0% | +/- | 0.0% | -100.0% |
| Total | 100.0% | | | 100.0% | | | |

* The unknown category included checks written that the payee could not be definitely identified as consumer or business.
Point estimate +/- half-width of the 95% confidence interval.
Figures may not sum because of rounding.

[78] Revisions are discussed in Section 4.3.5.2.

#### 4.2.2.2 Changes in the Number of Checks Written by Counterparty and Purpose

The percentage estimates from the 2013 CSS and 2010 CSS can be applied to the estimated 21.1 billion checks written in 2012 and 27.8 billion checks written in 2009, respectively, to estimate changes in the number of checks written in the United States by counterparty and purpose.

Among checks written by consumers, C2B checks had the largest annual decline of 9.6 percent, as the number of C2B checks dropped from 12.2 billion in 2009 to 9.0 billion in 2012 (Exhibit 54). Despite the large decline, C2B checks remained the most common form of checks written in 2012.

**Exhibit 54: Changes in the Number of Checks Written 2009-2012, by Counterparty and Purpose**

| 2009 Number of Checks *(billions)* * | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Counterparty / Purpose | C2C | +/- | C2B | +/- | B2B | +/- | B2C | +/- | Unknown** | +/- | Total | +/- |
| Income | | | | | | | 5.1 | <0.1 | | | 5.1 | <0.1 |
| Casual | 2.8 | <0.1 | | | | | | | | | 2.8 | <0.1 |
| BP | | | 8.6 | <0.1 | 5.8 | <0.1 | | | | | 14.4 | <0.1 |
| POS | | | 2.0 | <0.1 | 0.6 | <0.1 | | | | | 2.5 | <0.1 |
| BP/POS | | | 1.7 | <0.1 | 1.2 | <0.1 | | | | | 2.9 | <0.1 |
| Unknown*** | | | | | | | | | <0.1 | <0.1 | <0.1 | <0.1 |
| Total | 2.8 | <0.1 | 12.2 | <0.1 | 7.5 | <0.1 | 5.1 | <0.1 | <0.1 | <0.1 | 27.8 | |

| 2012 Number of Checks *(billions)* * | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Counterparty / Purpose | C2C | +/- | C2B | +/- | B2B | +/- | B2C | +/- | Unknown** | +/- | Total | +/- |
| Income | | | | | | | 3.1 | <0.1 | | | 3.1 | <0.1 |
| Casual | 2.1 | <0.1 | | | | | | | | | 2.1 | <0.1 |
| BP | | | 6.6 | <0.1 | 5.0 | <0.1 | | | | | 11.6 | <0.1 |
| POS | | | 1.0 | <0.1 | 0.4 | <0.1 | | | | | 1.4 | <0.1 |
| BP/POS | | | 1.5 | <0.1 | 1.3 | <0.1 | | | | | 2.8 | <0.1 |
| Unknown*** | | | | | | | | | <0.1 | <0.1 | <0.1 | <0.1 |
| Total | 2.1 | <0.1 | 9.0 | <0.1 | 6.7 | <0.1 | 3.1 | <0.1 | - | <0.1 | 21.1 | |

| CAGR | | | | | | |
|---|---|---|---|---|---|---|
| Counterparty / Purpose | C2C | C2B | B2B | B2C | Unknown** | Total |
| Income | | | | -15.2% | | -15.2% |
| Casual | -8.8% | | | | | -8.8% |
| BP | | -8.2% | -4.8% | | | -6.8% |
| POS | | -21.4% | -10.8% | | | -18.8% |
| BP/POS | | -4.9% | 3.4% | | | -1.3% |
| Unknown*** | | | | | -42.7% | -42.7% |
| Total | -8.8% | -9.6% | -3.8% | -15.2% | -42.7% | -8.8% |

* Point estimate +/- half-width of the 95% confidence interval.
** The unknown category included checks written that either the payer, payee, or both the payer and payee could not be definitely identified as consumer or business.
*** The unknown category included checks written that had an indeterminate purpose.
Figures may not sum because of rounding. CAGR is compound annual growth rate.

From 2009 to 2012, C2B checks by all categories for purpose experienced declines, including checks written for BP, POS, and BP/POS. The decline in C2B check writing reflected, among other things, the replacement of consumer checks by electronic payments, such as online bill payments through ACH; debit card bill payments; or point-of-sale (POS) purchases with debit cards, credit cards, or prepaid cards.

Meanwhile, the number of C2C checks decreased from 2.8 billion in 2009 to 2.1 billion in 2012, at an annual decline of 8.8 percent, which was similar to the total decline of 8.8 percent.

Among all counterparty types, B2C checks had the largest annual percent decline (15.2 percent).[79] The number of B2C checks declined from 5.1 billion in 2009 to 3.1 billion in 2012. The decline in B2C checks were likely the result of income payment migration to ACH direct deposit and prepaid cards. On the other hand, B2B checks had the lowest annual percent decline (3.8 percent) among all counterparty types.[80]

#### 4.2.2.3 Changes in the Distribution of the Value of Checks Written

Between 2009 and 2012, the distribution of the value of checks shifted further toward checks written by consumers and away from checks written by businesses. Checks written by consumers increased from 16.9 percent of the total check value in 2009 to 21.5 percent in 2012 (Exhibit 55). On the other hand, the share of the value of checks written to consumers decreased from 20.2 percent in 2009 to 17.3 percent in 2012 (Exhibit 56). The rise in consumer check's share of value came from both an increase in C2B value share, from 12.8 percent in 2009 to 16.5 percent in 2012, as well as an increase in C2C value share, from 4.1 percent in 2009 to 5.0 percent in 2012 (Exhibit 57). These increases might have been attributable to the resilience of checks for large-ticket items such as rental payments, while checks for more transactional, small-ticket items have declined.

---

[79] Prior to the update of the estimates, the Summary Report released on December 19, 2013 reported an annual decline of 16.0 percent for B2C checks from 2009 to 2012.

[80] Prior to the update of the estimates, the Summary Report released on December 19, 2013 reported an annual decline of 9.2 percent for B2B checks from 2009 to 2012.

### Exhibit 55: Changes in the Distribution of the Value of Checks Written 2009-2012, by Payer

| Payer | 2009 | | | 2012 | | | Percent Change |
|---|---|---|---|---|---|---|---|
| Consumer | 16.9% | +/- | 0.3% | 21.5% | +/- | 0.4% | 27.3% |
| Business | 83.1% | +/- | 0.4% | 78.5% | +/- | 0.4% | -5.5% |
| Unknown* | <0.1% | +/- | <0.1% | <0.1% | +/- | <0.1% | -45.0% |
| Total | 100.0% | | | 100.0% | | | |

* The unknown category included checks written that the payer could not be definitely identified as consumer or business.
Point estimate +/- half-width of the 95% confidence interval.
Figures may not sum because of rounding.

### Exhibit 56: Changes in the Distribution of the Value of Checks Written 2009-2012, by Payee

| Payee | 2009 | | | 2012 | | | Percent Change |
|---|---|---|---|---|---|---|---|
| Consumer | 20.2% | +/- | 0.4% | 17.3% | +/- | 0.4% | -14.1% |
| Business | 79.8% | +/- | 0.4% | 82.7% | +/- | 0.4% | 3.6% |
| Unknown* | <0.1% | +/- | <0.1% | 0.0% | +/- | 0.0% | -100.0% |
| Total | 100.0% | | | 100.0% | | | |

* The unknown category included checks written that the payee could not be definitely identified as consumer or business.
Point estimate +/- half-width of the 95% confidence interval.
Figures may not sum because of rounding.



IPR2025-01151
Apple EX1037 Page 175

**Exhibit 57: Changes in the Distribution of the Value of Checks Written 2009-2012, by Counterparty and Purpose**

| 2009 Distribution* | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Purpose \ Counterparty | C2C | +/- | C2B | +/- | B2B | +/- | B2C | +/- | Unknown** | +/- | Total | +/- |
| Income | | | | | | | 16.1% | 0.3% | | | 16.1% | 0.3% |
| Casual | 4.1% | 0.2% | | | | | | | | | 4.1% | 0.2% |
| BP | | | 10.5% | 0.3% | 54.3% | 0.5% | | | | | 64.8% | 0.4% |
| POS | | | 0.7% | 0.1% | 1.3% | 0.1% | | | | | 2.0% | 0.1% |
| BP/POS | | | 1.7% | 0.1% | 11.4% | 0.3% | | | | | 13.0% | 0.3% |
| Unknown*** | | | | | | | | | 0.1% | <0.1% | 0.1% | <0.1% |
| Total | 4.1% | 0.2% | 12.8% | 0.3% | 67.0% | 0.4% | 16.1% | 0.3% | 0.1% | <0.1% | 100.0% | |

| 2012 Distribution* | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Purpose \ Counterparty | C2C | +/- | C2B | +/- | B2B | +/- | B2C | +/- | Unknown** | +/- | Total | +/- |
| Income | | | | | | | 12.3% | 0.3% | | | 12.3% | 0.3% |
| Casual | 5.0% | 0.2% | | | | | | | | | 5.0% | 0.2% |
| BP | | | 13.1% | 0.3% | 52.5% | 0.5% | | | | | 65.5% | 0.5% |
| POS | | | 1.2% | 0.1% | 0.9% | 0.1% | | | | | 2.0% | 0.1% |
| BP/POS | | | 2.3% | 0.1% | 12.8% | 0.3% | | | | | 15.1% | 0.3% |
| Unknown*** | | | | | | | | | <0.1% | <0.1% | <0.1% | <0.1% |
| Total | 5.0% | 0.2% | 16.5% | 0.4% | 66.2% | 0.5% | 12.3% | 0.3% | <0.1% | <0.1% | 100.0% | |

| Percent Change | | | | | | |
|---|---|---|---|---|---|---|
| Purpose \ Counterparty | C2C | C2B | B2B | B2C | Unknown** | Total |
| Income | | | | -23.4% | | -23.4% |
| Casual | 23.2% | | | | | 23.2% |
| BP | | 24.8% | -3.4% | | | 1.1% |
| POS | | 65.9% | -32.8% | | | 1.9% |
| BP/POS | | 37.2% | 13.0% | | | 16.0% |
| Unknown*** | | | | | -57.6% | -57.6% |
| Total | 23.2% | 28.6% | -1.2% | -23.4% | -57.6% | |

* Point estimate +/- half-width of the 95% confidence interval.
** The unknown category included checks written that either the payer, payee, or both the payer and payee could not be definitely identified as consumer or business.
*** The unknown category included checks written that had an indeterminate purpose.
Figures may not sum because of rounding.

in 2009 to 78.5 percent in 2012, but the share of the value of checks written to businesses increased from 79.8 percent to 82.7 percent in 2012. The decrease in business check's share of value mainly came from a drop in B2C value share, from 16.1 percent in 2009 to 12.3 percent in 2012.

#### 4.2.2.4 Changes in the Number of Remotely Created Checks

The 2013 CSS found that the incidence of remotely created checks remained consistent from 2009 to 2012 at 2.2 percent of all checks written. Applying this percentage to the estimated

number of checks written in 2009 and 2012, the number of remotely created checks was estimated to have declined from approximately 601 million in 2009 to approximately 470 million in 2012.

#### 4.2.2.5 Changes in the Number of Checks Ineligible for ACH Conversion

The 2010 CSS found that 43.3 percent of checks written in 2009 were written by businesses and ineligible for ACH conversion.[81] As discussed above, that percentage had increased to 45.5 percent in 2012, because of the increased share of business checks written from 2009 to 2012. In terms of the number of checks written, the number of checks ineligible for ACH conversion decreased from 12.0 billion in 2009 to 9.6 billion in 2012.

## 4.3 METHODOLOGY

The 2013 CSS estimates were based on a random sample of checks written and processed by 11 large commercial banks in the United States in 2012.[82]

### 4.3.1 Survey Design

The 2013 CSS was a voluntary survey. Nine of the 11 participating commercial banks were customers of the Viewpointe's check-image archive while the other two utilized their own check-image archive. To maintain consistency across study years, the same 11 banks in the 2010 CSS were requested to participate in the 2013 CSS. Only 9 of these 11 banks were included in the 2007 CSS. To avoid the inconsistency in the trend analysis, we only compared the estimates between 2010 CSS and 2013 CSS in this detailed report.

We assumed that the final sample represented the population of checks processed during 2012, including checks both drawn on and collected by the participating banks. The population of

---

[81] The 2010 CSS detailed report stated that 45.7 percent of checks were ineligible for ACH conversion. A revision was made to that number since the release of that 2010 CSS detailed report, which brought the percentage down to 43.3 percent. Only nine of the 11 banks from the 2010 CSS were included in the original analysis. The revision included the full set of 11 participating banks.

[82] The Check Sample Survey sampled "prime pass" checks, including both transit checks, which were deposited at a participating bank but drawn on another depository institution, and checks paid by the participating banks. Adjustments were made to account for sample bias from checks deposited at one of the participating banks and paid by another participating bank.

checks archived for these 11 participating banks in 2012 was estimated to account for approximately 52 percent of all "prime pass" items in the United States in 2012.[83] Meanwhile, these 11 banks held approximately 36 percent of deposit liabilities and paid roughly 57 percent of all checks paid in the United States in 2012.[84]

Although the population of checks archived for these 11 large commercial banks represented a significant share of checks in the United States in 2012, it is unclear how the results would have differed had the sample been drawn from a nationally representative sample of depository institutions.

#### 4.3.1.1 Sample Size and Sampling Technique

A sample size of at least 30,000 checks was determined to be sufficient to accurately characterize the distribution of checks written in 2012 with a 95 percent confidence interval of +/- 5 percent. The number of items sampled from each bank was proportional to its share of all items processed by participating banks in 2012.

To reach the target sample of 30,000 checks, archived items were oversampled. This allowed for duplicate checks and non-check items to be removed from the sample.[85] After oversampling and eliminating duplicate checks and non-check items, the final sample consisted of 41,097 checks. (See Section 4.3.2.2 for details about eliminating duplicate checks.)

#### 4.3.1.2 Weighting the Final Sample

Three weights were applied to data from each sampled check:

1. *Primary weighting.* Sample weights were applied to ensure the final sample was representative of the population of checks processed by participating banks.

---

[83] The fraction is based on the estimated number of checks from DFIPS. The number of prime pass items refers to the total number of discrete items processed, excluding any re-handling of checks for the purpose of sorting to paying bank endpoints, customer statements, etc. The estimated number of industry prime pass items excluded items processed by the Federal Reserve Banks.

[84] Deposit liabilities as of December 2012.

[85] Check-image archives house check and non-check items (e.g., deposit slips). Therefore, the method of over-sampling provided a cushion to cull out any non-check documents during data collection. Additionally, because the participating banks sent checks to one another, over-sampling allowed for the removal of any duplicate checks from the sample.

2. *Secondary weighting.* A second weight adjusted for the fact that an interbank check exchanged between two participating banks in the survey had a higher probability of random selection than an interbank check exchanged between a survey participant and a depository institution (DI) not participated in the survey.[86] Although each interbank check is a single paper item, it may be stored as discrete images in multiple banks' archives. To adjust for this, the research team weighted interbank checks between participating banks such that each interbank item in the final sample appeared to have the same probability of selection.[87]
3. *Tertiary weighting.* A third weight adjusted the sample population for the ratio of on-us checks (that is checks both written and paid by the same bank) to transit checks. This was to ensure that the final sample was representative of on-us to transit ratio among the population of checks processed by participating banks. This third weight is new to the CSS and was not previously applied in prior iterations of the CSS. To maintain consistency when comparing across studies, the 2010 CSS sample was weighted based on the ratio of on-us to transit checks processed in 2009 by participating banks. This weighting made negligible impact to the 2010 CSS results. In addition, although the 2007 CSS estimates were not included in this report, a re-weighting of the 2007 CSS sample based on the on-us to transit ratio was also performed. Like the 2010 CSS data, this weighting made negligible impact to the 2007 CSS results.

### 4.3.2 Data Collection

The data collection strategy was developed to gather non-sensitive information about each sampled check in an effort to categorize it by counterparty and purpose. Each sampled check was investigated at least twice during data collection. In each round, a different investigator surveyed each check. A third round of data collection, called the Reconcile CSS Survey, was used if and only if any response from the first two surveys—the CSS Long Survey and the CSS Short Survey—did not match. The Reconcile CSS Survey, which had an identical set of

---

[86] An interbank check is a check drawn on one depository institution and deposited at another.

[87] The weighting for interbank checks differed for each of the 11 banks depending on their percentage of checks found to be interbank.

questions to the CSS Short Survey, was taken by a third investigator. There were two primary reasons to investigate each check three times:

1. To improve the ability to confidently categorize each check based on multiple, independent observations about its payer, payee, and purpose
2. To provide a basis to reconcile discrepancies in categorization by any two investigators and to recognize and correct keying errors

A copy of the CSS Long Survey Instrument and the CSS Short Survey Instrument are available online. The CSS Long Survey consisted of 25 questions, and the CSS Short Survey consisted of 8 questions.[88]

The survey instruments collected Boolean data about the presence of specific attributes on each check, such as the following:

1. Organizational suffixes, e.g., Inc., LLC, LTD, Co., Corp., Corporation, Trust, Services, .com, or Association, in the name or address of the payer or payee
2. Indicators of government entities, e.g., State of, County of, City of, Town of, Township of, Bureau of, or Municipality, in the name or address of the payer or payee
3. Indicators of organizational departments, e.g., Treasury, Treasurer, Commissioner, Controller, Office of, or Accounts Payable, in the name or address of the payer or payee
4. Indicators of personal addresses, such as Apartment or Apt # in the payer or payee address
5. Whether the payee line or the front of the check contains an address for the payee
6. Whether the check contains an auxiliary on-us field
7. Whether the maker's signature or payee's endorsement is hand-written
8. Presence of handwritten information recorded at the time of tender, e.g., a driver's license number or date of birth.
9. Whether the payee's endorsement is vertical or horizontal

---

[88] Electronic copies of the survey forms are available for download at https://www.frbservices.org/news/research.html.

In addition to the above Boolean data, investigators also recorded other non-sensitive information from the front and back of the check, such as the following:

1. Date of the check
2. Dollar amount of the check
3. Nine-digit routing number (RTN) of the payer bank
4. Serial number of the check
5. Nine-digit routing number (RTN) of the endorsing bank
6. Payer's zip code (if present)

The survey instruments also asked the investigators to render an opinion about the type of payer and payee—*consumer*, *business*, *government, not consumer, or not government*—for each check based on all available information.

#### 4.3.2.1 Metadata

Some participating banks also provided metadata for the sampled checks. The amount of information stored in a metadata file varied by bank. For the purposes of the study, when metadata were available, the research team used them to automatically determine serial numbers of the checks, dollar amounts of the checks, and nine-digit routing numbers (RTNs) of the payer banks.

#### 4.3.2.2 Eliminating Duplicate Checks

Because the study required sampling checks from multiple banks' archives, and because checks deposited at one participating bank and drawn on another were part of the sample population, there was some risk that a check sampled from one bank's archive would be identical to a check sampled from another bank's archive. Additionally, the research team considered the possibility that random sampling may select the same check more than once from the same archive (e.g., a returned check that was subsequently re-presented). In order to eliminate duplicates from the sample, the research team systematically analyzed four fields of data recorded by participating banks about each check:

1. Date of the check
2. Dollar amount of the check

3. Nine-digit routing number (RTN) of the payer bank
4. Serial number of the check

If two or more items within the sample had the same data for each of the four fields, the research team would flag these items as potential duplicates. Through this method all duplicate items were systematically identified and removed from the final sample.

#### 4.3.2.3 Data Collection Training

McKinsey administered in-person training with each participating bank's investigation staff, which consisted of the following:

1. Describing the purpose of the study
2. Explaining the basic fields contained on a check
3. Providing examples of *consumer*, *business*, and *government* checks, and discussing important characteristics of each
4. Listing specific examples of payer and payee categories as well as types of checks (e.g., travelers checks) and how to appropriately categorize them
5. Walking the investigators through the process of gathering data from several example checks
6. Answering questions from investigators or team leaders about how to answer various types of questions

### 4.3.3 Categorization of Checks Written

Based on the data received from each bank, the research team employed a model to categorize each sampled check according to its payer, payee, and purpose.

#### 4.3.3.1 Payer and Payee Categories

The research team defined two categories for payer and payee: consumer and business, which included businesses; federal, state, and local government agencies; and nonprofit organizations. These two categories are commonly accepted in the industry and represent groups with a common set of behaviors and payment options available to them.

In general, the CSS analyzed checks based on the "flow of funds." Meaning, the payer and payee of a sampled check were identified based on who originally initiated the check or transaction and who ultimately received the check. For example, in the case of a money order, the payer was not considered the vendor of the money order such as the USPS, MoneyGram, or Western Union. Instead the payer was considered the person or entity that purchased the money order. The recipient of the money order was the payee. The same was true for a check draft created for an online bill payment. Banks will, at times, have a check created in lieu of sending an ACH transaction for an online bill payment. The CSS considered the initiator of that transaction as the payer, not the bank or the vendor of the check draft. The recipient of that check (that is, the person or entity the order was made to) was considered the payee.

Some small businesses, such as sole proprietorships, may resemble a consumer payer or payee more closely than a business in terms of availability and use of electronic payment alternatives. As a practical matter, the 2013 CSS effectively dealt with the commonality between consumers and sole proprietorships by assuming that any check written to or from an individual and having no characteristics on the check to indicate a business payer or payee was classified as consumer payer or payee, respectively.

Because the distinction between business, government, and nonprofit organization is largely immaterial for the purpose of evaluating substitution potential, they are grouped together as business entities. Generally, there are no particular impediments to a government/nonprofit entity accepting a payment type that a business might accept and vice versa. Likewise, business or government/nonprofit payers were assumed to have comparable access to payment alternatives, such as purchasing cards, financial EDI (an electronic format for exchanging financial business transaction data), or ACH-initiation capabilities.

#### 4.3.3.2 Purpose Categories

Considering all possible payment types and their various options for substitution of electronic for paper payments, the research team defined four primary purpose categories:

1. **Casual** – Payments from one individual to another. By definition, all consumer-to-consumer payments were categorized as Casual.



IPR2025-01151
Apple EX1037 Page 183

2. **Income** – Payments to an individual from either a business or government entity. By definition, all business-to-consumer and government-to-consumer payments were categorized as Income. The following are examples of such payments:
    a. Payrolls
    b. Pensions
    c. Benefits/entitlements
    d. Rebate/promotional/refund
    e. Expense reimbursements
    f. Tax refunds
    g. Investment disbursements
    h. Bill payments from a business entity to small businesses indistinguishable from consumers
3. **Bill payment** (BP)[89] – Payments from any type of payer to a business payee that did not occur at the point of sale. The following are examples of such payments:
    a. Recurring retail bill payment – Regular recurring payments. Examples included utility bill payments, insurance premiums, telecommunications charges, credit card bill payments, or loan payments.
    b. Non-recurring retail bill payment – Irregular payments made for products or services rendered for consumer consumption. Examples included medical bill payments; payments to service providers such as plumbers, contractors, or pest controls; and payments of legal or accountant fees.
    c. Commercial bill payment – Any B2B payments not made at the point of sale. Examples included purchases of raw materials, office supplies, business equipment, finished goods from wholesalers, or professional services.

[89] Bill payment was called remittance, or REM, in previous iterations of the Check Sample Survey.

4. **Point-of-sale** (POS) – Payments from any type of payer to a business payee that occurred in a storefront (that is, a traditional single or multi-lane retail environment), such as a department store, drugstore, clothing store, gas station, or dry cleaner.

Exhibit 58 illustrates the intersection of the two payer types, two payee types, and four purpose classifications. One objective of the 2013 CSS was to document the distribution of checks written in 2012 across this matrix. Note that dark shaded cells indicate check payment types that do not exist.[90]

**Exhibit 58: Check Categorization Matrix**

| Purpose | Payer | Payee | |
|---|---|---|---|
| | | Consumer (C) | Business (B) |
| Income | Consumer (C) | | |
| | Business (B) | | |
| Casual | Consumer (C) | | |
| | Business (B) | | |
| Bill payment (BP) | Consumer (C) | | |
| | Business (B) | | |
| Point-of-Sale (POS) | Consumer (C) | | |
| | Business (B) | | |

### 4.3.4 Check Categorization Model

The research team employed a categorization model based on conditional logic to assign a classification to each check. Judging from data recorded by the investigators, the model assigned a payer, payee, and purpose classification to each check.

[90] It was decided that dividend payments to corporate shareholders would not qualify as Income payments. From a substitution perspective —i.e., the ability to substitute electronic for paper payments—this type of dividend payments is indistinguishable from business-to-business bill payments and, therefore, should be categorized as such.

The model derived the classification categories (payer, payee, and purpose) for each check by first analyzing the objective data gathered from the survey instruments. If the responses yielded enough information without inconsistencies, the model produced a determinate response (e.g., consumer or business).

If the model could not definitively categorize the sampled check, it generated one of the two alternate responses: Indeterminate or Error. The model returned an Indeterminate outcome if the surveys were correctly completed but the logical chain did not contain enough information to yield a determinate response. Otherwise, if the surveys were incorrectly completed or provided inconsistent data, the model returned an Error outcome.

The model then combined this initial categorization for payer, payee, and purpose based on objective data with the subjective responses made by the investigators to determine a final categorization. The combination of the initial result based on objective data and subjective categorizations provided the study with well reconciled results to limit the number of indeterminate classifications.

#### 4.3.4.1 Categorization of Payer

Information on the face of a check determined its payer type. Checks were typically categorized as business for payer based on the characteristics of the MICR line (e.g., a federal government check's MICR line begins with 000, many business checks include an auxiliary on-us field), whether the check was machine-printed or hand-written, the method used to frank the check (e.g., typed or machine-printed "signature"), and the characteristics of the payer name and address. For example, the field for the name/address of the payer was useful in both subjective and objective categorizations, because it contained indicators such as Inc., LLC, LTD, Corp., Department of, City of, Town of, Bureau of, or Accounts Payable. The payee line (e.g., following "Pay to the order of…") was also useful in some cases, because business or government payers—unlike consumers—sometimes include the full mailing address of the payee (machine printed) on the face of the check.

Checks classified as consumer for payer generally included checks without characteristics in the MICR line or in the name/address field. It is entirely possible that some small businesses or sole proprietors might use their personal checks for business payments. Without any characteristics to indicate a business use, these checks would be classified as consumer. This risk of misclassification was deemed acceptable. With regard to payments substitution, small

businesses that are difficult to distinguish from consumers have similar payments preferences to consumers' and face many of the same payments choices.

#### 4.3.4.2 Categorization of Payee

The determination of the payee was made from information on both the front and back of the check: the payee line, the endorsement, and any other writing/stamp/print on the check (e.g., information on the memo line).

Investigators used the payee line to identify any obvious signs of a business payee, e.g., Inc., LLC, Corp., IRS, Tax Commissioner, Bureau of, Town of, County of, or Accounts Receivable. Investigators recorded the presence of unique printing or stamps on the checks written that might indicate a point-of-sale (POS) transaction, e.g., a driver's license number, store number, terminal number. The payee endorsement was also a significant determinant of payee type. Business payees tended to stamp or machine print their endorsements on the back of checks. Lockbox (that is, bill payment) transactions in particular tended to be endorsed along the length of the check (that is, parallel to text on the face of the check) rather than across the end of the check (that is, perpendicular to text on the face of the check).

#### 4.3.4.3 Categorization of Purpose

The categorization model determined the purpose of each check by combining information gathered directly from the check with the final categorization of its counterparty (that is, payer and payee combination).

The first step in determining the purpose of a check was to cross-reference the payer and payee final categorizations (Exhibit 59).

**Exhibit 59: Purpose by Counterparty Combinations**

| | | Payee Categorization | | |
|---|---|---|---|---|
| | | **Consumer** | **Business** | **Unknown** |
| Payer Categorization | **Consumer** | Casual | BP or POS | Unknown |
| | **Business** | Income | BP or POS | Unknown |
| | **Unknown** | Unknown | Unknown | Unknown |

Several cells in Exhibit 59 show that the relationship between payer and payee alone was enough to determine the purpose of some checks. For example, all B2C checks were classified as Income. As noted in Section 4.3.3.2, not all income payments as categorized by this study were payroll checks. Rebate checks, tax refunds, stock dividends are all examples of checks written that would fall into the Income category.

Similarly, all checks written from one individual to another individual were classified as Casual. Based on the examples discussed Section 4.3.3.1, the Casual category likely included payments to and from sole proprietorships or small businesses that used what were, or appeared to be, personal checks for business transactions. For instance, rental payments from tenants to individual landlords may be included as Casual unless the information on the check (e.g., statements on the memo line) indicated that the payer or payee was a business. The classification of some of these checks as Casual may not be entirely inappropriate. During 2012, these types of checks described above had a low probability of substitution by electronic instruments.

If the model classified a check's purpose as Income or Casual based on its counterparty (e.g., a B2C check), the algorithm automatically defined that as the final categorization for its purpose.

Any check written to a business payee was initially categorized as either bill payment (BP) or point-of-sale (POS). To go one step further and definitively categorize these items, the model evaluated other data about the payee, such as the endorsement or other information added to the check by the payee. If the endorsement included such information as a store number, a terminal number, or a customer's driver's license number, this suggested a point-of-sale (POS) transaction. Lockbox endorsements, apparent by their alignment across the length of the check in conjunction with the terms such as "absentee" or "absent endorsed," indicated a bill payment transaction.

The distinction between bill payment (BP) and point-of-sale (POS) was also based on information recorded by the investigators about the type of the payee. If an investigator reported that the payee was, for example a credit card issuer or a utility, this check would be classified as bill payment (BP). On the other hand, payments made to a convenience store, a restaurant, a drugstore, or a retail store suggested a point-of-sale (POS) payment.

If the distinction between bill payment (BP) and point-of-sale (POS) could not be determined through the data collected in the survey, the model ultimately classified the check as BP/POS.

### 4.3.5 Estimation

The results of the check categorization process yielded estimates for the distribution of checks written in the United States in 2012. To derive national point estimates for the number of checks written in a given category, the research team applied those distribution estimates to the estimated number and value of checks written in the United States in 2012, respectively.[91]

All the point estimates in the above exhibits included correspondingly estimated half-width of the 95 percent confidence intervals. The boundaries of a confidence interval were estimated as the point estimate plus or minus the half-width. Assuming the data were normally distributed and the sample was large, an estimate of the half-width is approximately 1.96 times the sampling standard error. The standard errors did not account for the possibility that the algorithm misclassified a check.

#### 4.3.5.1 Trend Analysis

The same 11 commercial banks that participated in the 2010 CSS also participated in the 2013 CSS. Both check samples in their entirety from the 2013 CSS and 2010 CSS are compared for the trend analysis.

In the detailed report for the 2010 CSS, all the 11 banks were included in the distribution analysis section (that is, the analysis of the distribution of checks written in 2009 by counterparty and purpose). However, for the comparison of 2009 estimates to 2006 estimates, a set of alternative estimates was constructed. The alternate group consisted of 9 of the 11 banks that had participated in both the 2010 CSS and 2007 CSS, and the alternative estimates adjusted for major acquisitions by some of the participating banks between the 2007 and 2010 studies.

Instead of continuing to use the alternate group of banks from the trend analysis in the 2010 CSS, the 2013 CSS used the full set of 11 banks to study the trend from 2009 to 2012. This provided not only a more consistent analysis between the 2010 CSS and 2013 CSS, but also created a better representation of the check market in terms of geographic, demographic, and check-volume coverage.

---

[91] It is recognized that the 11 participating commercial banks did not have the entire population of checks in the United States. However, the participating banks did process a sizeable portion of prime pass items; therefore, it is not unreasonable to assume that the checks in their archives had similar behavior/characteristics as the checks in the United States.

#### 4.3.5.2 Revisions

Data in this report reflects updated estimates since the Summary Report was released in December 2013. Section 2.4.1 in the Summary Report focused on the differences of checks written by counterparty and purpose from 2006 to 2012. (These data are also discussed in the overview section of this report.) Based on information that came to light after the release of the Summary Report, the data were reweighted to gain a more accurate comparison. In addition, the Summary Report used the 2010 CSS alternate group described above. Re-weighting the data and switching out the 2010 alternate group with the full set of 2010 CSS banks impacted the annual percent decline figures of the counterparties. Specifically, comparing to the Summary Report, checks written by consumers (including C2B and C2C checks) had a greater annual percent decline from 2009 to 2012 while B2B checks had a lower annual percent decline as described in this detailed report. Also, the estimate of the number of checks written was revised.

### 4.3.6 Additional Analysis

In addition to studying the distribution of checks written by payer, payee, and purpose, the research team sought to identify the incidence of certain demand drafts and checks ineligible for conversion to ACH.

#### 4.3.6.1 Demand Drafts

A demand draft is a check that does not require the account holder's handwritten signature and is issued by a third party under the purported authority of the customer for the purpose of charging the customer's bank account.[92] A demand draft may come in one of two varieties. The first variety contains the customer's printed or typewritten name or account number, and a notation that the customer authorized the draft. This includes checks written by check printers who process invoices for businesses. Banks and other third parties such as FIS, Fiserv, and RR Donnelley are industry providers of this service. These checks do not have any distinguishing characteristics that can be recorded without capturing sensitive information such as payer name or account number (a central requirement of this study was that no sensitive

[92] The third party creating a demand draft may have the account holder's electronic signature on file, and may include that signature on the draft.

information be collected). Therefore, the research team cannot estimate the incidence of this type of check from the data gathered by this study.

The second variety of demand drafts, which this report refers to as remotely created checks, consists of checks written that have a typed statement in lieu of a signature, such as “No Signature Required,” “Signature on File,” “Authorized by the Depositor,” or “Authorized by the Payer.” The study measured the incidence of remotely created checks.

#### 4.3.6.2 Checks Ineligible for ACH Conversion

Certain checks by agreement between the payer and payee can be converted to ACH for clearing and settlement, and other checks cannot be converted. The CSS aimed to identify the incidence of checks written that were ineligible for conversion to ACH, according to NACHA rules.[93] The determination was made based on the following conditions:

1. If the characteristics of the name and address indicated that the payer was a federal entity, such as the U.S. Treasury, Federal Reserve, Federal Home Loan, a mutual fund, or investment firm
2. If the amount of the check exceeded $25,000
3. If the leftmost portion of the MICR line, before the RTN, contained the optional number known as the auxiliary on-us field
4. If a signature was not present. This included blanks and statements in lieu of a signature such as “No Signature Required”

[93] NACHA manages the governance of the ACH network, and has set the rules for what types of checks can or cannot be converted to ACH.