

The Federal Reserve Payments Study: 2017 Annual Supplement

A Federal Reserve System publication



Since 2001, the Federal Reserve System has conducted a triennial *Federal Reserve Payments Study* (FRPS) to estimate aggregate trends in noncash payments in the United States. After the completion of the most recent FRPS in 2016, which reported on trends from 2012 to 2015, a smaller and more targeted annual supplementary data collection was launched to keep information current between the triennial studies.¹ This brief reviews some early results from the 2017 annual update, which contains new estimates of trends for selected core payment instruments from 2015 to 2016. In addition to new estimates for 2016, many 2015 estimates are restated because of data revisions received during the 2017 FRPS data collection.

As with previous studies, the results are based on survey data collected from depository and financial institutions, general-purpose card networks and processors, and issuers of various private-label payment instruments.² The surveys covered the number and value of payments for the three types of debit cards: non-prepaid, general-purpose prepaid, and private-label prepaid; payments that involved the use of two types of credit cards: general-purpose and private-label; electronic benefits transfer (EBT) payments supporting certain government assistance programs; electronic credit and debit transfers using the automated clearinghouse (ACH) system; and payments made by checks. These are the core noncash payment types and systems used by U.S. consumers and businesses, including for-profit and not-for-profit enterprises and local, state, and federal governments.³

Highlights

- Total card payments grew from 103.5 billion with a value of \$5.65 trillion in 2015 to 111.1 billion with a value of \$5.98 trillion in 2016. Total card payments increased at an annual rate of 7.4 percent by number and 5.8 percent by value from 2015 to 2016. This growth is down slightly from the corresponding annual growth rates recorded from the previous measurement period, 2012 to 2015.⁴
- Credit card payments registered the highest growth rate by number (10.2 percent) among the core payment types from 2015 to 2016, up from a growth rate of 8.1 percent from 2012 to 2015. Debit card payments registered the second highest growth rate by number (6.0 percent) from 2015 to 2016, but this rate was down from a growth rate of 7.2 percent from 2012 to 2015.
- Compared with growth in the number of payments, growth in the value for credit and debit card payments was slower, rising at rates of 6.3 and 5.3 percent, respectively, from 2015 to 2016, down from growth rates of 6.6 and 6.9 percent, respectively, from 2012 to 2015.

¹ For more information, see the Federal Reserve Payments Study web page at www.federalreserve.gov/paymentsystems/fr-payments-study.htm.

² The Federal Reserve System appreciates the efforts of survey respondents who provided the information summarized in this brief. This information enables policymakers, the payments industry, and the public to better understand payment trends and inform strategies to foster further improvements in the payments infrastructure.

³ Payments over wire transfer systems, which are typically used for a relatively small number of large-value interbank financial transactions, and cash are not discussed in this brief. Virtual currencies were not included in the study. Due to ongoing study of the composition of non-network ACH transactions, trends in the portion of ACH transfers that depository institutions processed internally are also not included in this brief.

⁴ From 2012 to 2015, total card payments grew at rates of 7.5 percent by number and 6.7 percent by value. Annual growth rates over multiple years are computed using the compound annual growth rate formula. The compound annual growth rate is the average annual growth rate over a multiyear period of interest, assuming the growth rate is the same in each year.

- For some time, the rate of growth of remote general-purpose card payments has outpaced the rate of growth of in-person card payments.⁵ For example, from 2015 to 2016, remote general-purpose credit card payments increased at a faster rate (16.6 percent) than in-person payments (7.9 percent). Similarly, over the same period, remote non-prepaid debit card payments increased at a faster rate (14.9 percent) than in-person payments (5.2 percent).
- Remote payments represented 22.2 percent of all general-purpose card payments in 2016, up 1.5 percentage points from an estimated 20.7 percent in 2015. By value, remote payments represented a much larger 44.0 percent of all general-purpose card payments, up 1.1 percentage points from an estimated 42.9 percent in 2015.
- The use of general-purpose cards that contain computer microchips for in-person payments increased sharply from 2015 to 2016, reflecting a coordinated effort and financial incentives to place the technology in cards and card-accepting terminals. In 2016, 19.1 percent of all in-person general-purpose card payments were made using chips (26.9 percent by value), compared with only 2.0 percent (3.4 percent by value) in 2015.⁶
- By value, the balance of general-purpose payment card fraud shifted from in-person fraud toward remote fraud over the 2015–16 period. The value of in-person fraud using these cards held the largest share in 2015, at 53.8 percent, while the value of remote fraud held the largest share in 2016, at 58.5 percent. This shift is consistent with the increase in share of remote card payments in general, and can also be attributed, in part, to the reduction in counterfeit card fraud, the main type of fraud that deployment and use of chips in cards and card-accepting terminals is designed to prevent.
- Growth in the number of ACH network credit and debit transfers accelerated in 2015 to 2016, increasing at rates of 5.2 percent and 5.3 percent, respectively, compared with annual growth rates of 5.0 percent and 4.8 percent, respectively, from 2012 to 2015.
- Restated estimates show that total commercial checks paid decreased 3.0 percent a year, by number, from 2012 to 2015, which is slower than the previously reported decline, and increased 2.2 percent a year by value, a reversal of the previously reported decline.⁷ More recent estimates for 2015 to 2016 show declines of 3.6 percent by number and 3.7 percent by value in commercial checks paid by a group of the largest depository institutions.

Recent Payment Trends

To emphasize how trends over the 2015 to 2016 period may differ from earlier trends, growth by instrument over this one-year (annual) period can be compared to annual growth from 2012 to 2015, a three-year period. (See [table 1](#) or [figure 1](#) for 2012–15 and 2015–16 growth rate estimates.) Trends for most of the payment instruments covered in this brief exhibited a similar direction of change between the 2012–15 and 2015–16 periods, although the magnitude of

⁵ General-purpose cards comprise general-purpose credit cards, non-prepaid debit cards, and general-purpose prepaid cards. Card payments can be made in person, typically using the card itself at a terminal, and, increasingly, with a mobile device. They can also be made remotely, typically using the card number, which can be entered into an e-commerce website or given over the telephone for one-time purchases or regular bill payments.

⁶ In the United States, cards have multiple ways of transmitting data to complete a payment, and card-accepting terminals have multiple ways of accepting cards. Most cards with chips still have magnetic stripes. The surveys request that in-person payments be allocated to chip technology if the chip is used and to the magnetic stripe if the stripe is used.

⁷ Commercial checks include all types of checks, except for U.S. Treasury checks and postal money orders, which are paid by the Federal Reserve Banks. The previous estimates of the 2012–15 rates of change for commercial checks paid were a decrease of 4.3 percent a year by number and a decrease of 0.4 percent a year by value.

Table 1. Growth rates by payment type, 2015–16 and 2012–15, with 2015 totals

Numbers in billions. Values in trillions of U.S. dollars

| Noncash payment type | 2015 totals | | | CAGR (percent) | | | |
|---|--------------|--------------|--------------|----------------|------------|-------------|-------------|
| | | | | 2012–15 | | 2015–16 | |
| | Number | Value | Average | Number | Value | Number | Value |
| Card payments | 103.5 | 5.65 | 55 | 7.5 | 6.7 | 7.4 | 5.8 |
| Debit cards | 69.6 | 2.56 | 37 | 7.2 | 6.9 | 6.0 | 5.3 |
| Non-prepaid | 59.0 | 2.27 | 38 | 7.7 | 6.6 | 6.8 | 6.1 |
| In person | 49.5 | 1.58 | 32 | 5.9 | 2.5 | 5.2 | 5.0 |
| Remote | 9.5 | 0.69 | 73 | 19.5 | 19.4 | 14.9 | 8.9 |
| Prepaid | 10.6 | 0.30 | 28 | 4.4 | 8.7 | 1.7 | -1.3 |
| General purpose | 4.3 | 0.15 | 35 | 11.3 | 11.1 | 2.7 | 0.7 |
| In person | 3.6 | 0.10 | 29 | 8.2 | 4.1 | 0.7 | -0.8 |
| Remote | 0.8 | 0.05 | 63 | 34.2 | 36.9 | 12.3 | 3.9 |
| Private label | 3.6 | 0.07 | 20 | -0.3 | 15.0 | 5.0 | 1.0 |
| Electronic benefits transfers (EBT) | 2.6 | 0.08 | 29 | 1.7 | 0.2 | -4.4 | -7.3 |
| Credit cards | 33.9 | 3.08 | 91 | 8.1 | 6.6 | 10.2 | 6.3 |
| General purpose | 31.0 | 2.80 | 90 | 8.4 | 7.3 | 10.5 | 7.0 |
| In person | 21.7 | 1.30 | 60 | 5.5 | 1.1 | 7.9 | 4.1 |
| Remote | 9.3 | 1.50 | 161 | 16.4 | 14.2 | 16.6 | 9.6 |
| Private label | 2.8 | 0.28 | 98 | 4.9 | 0.2 | 7.5 | -1.6 |
| Network automated clearinghouse payments | 19.3 | 41.64 | 2,159 | 4.9 | 4.1 | 5.3 | 5.1 |
| Credit transfers | 8.0 | 26.78 | 3,333 | 5.0 | 5.7 | 5.2 | 5.1 |
| Debit transfers | 11.3 | 14.86 | 1,321 | 4.8 | 1.4 | 5.3 | 5.2 |
| Check payments | 17.9 | 28.97 | 1,614 | -3.1 | 2.1 | | |
| U.S. Treasury checks | 0.1 | 0.14 | 2,413 | -21.0 | -10.3 | -2.6 | 6.0 |
| Postal money orders | 0.1 | 0.02 | 226 | -5.2 | -1.8 | -4.0 | -0.4 |
| Commercial checks ¹ | 17.8 | 28.80 | 1,618 | -3.0 | 2.2 | -3.6 | -3.7 |
| Interbank ¹ | 13.3 | 20.92 | 1,573 | -1.5 | 6.7 | -3.4 | -3.8 |
| On-us ¹ | 4.5 | 7.88 | 1,751 | -7.1 | -6.9 | -4.2 | -3.3 |

Note: Card payments are defined as net, authorized and settled transactions. Figures may not sum because of rounding. CAGR is compound annual growth rate. Some figures are restated from previous reports, including 2012 general-purpose prepaid and non-prepaid card payments, 2015 card payments except for private-label prepaid and EBT, 2012 and 2015 U.S. Treasury checks and postal money orders, 2015 commercial check payments, and corresponding 2012–15 growth rates.

¹ The 2015–16 growth rates for commercial check payments are based only on information from the largest institutions included in the 2017 Depository and Financial Institutions Payments Survey.

growth was meaningfully different in many cases. Several differences in the direction of trends, however, are also evident. By number, private-label prepaid card payments decreased from 2012 to 2015, but increased from 2015 to 2016. EBTs, which had been increasing, on average, over the previous three years by both number and value, decreased from 2015 to 2016.⁸ By value, payments made by commercial checks and private-label credit cards increased from 2012 to 2015 but declined from 2015 to 2016. Trends for these and the other payment instruments are discussed in more detail below.

⁸ Evidence from another study suggests that the decline in EBT payments began before 2015. (See table 1 in the 2017 Government Prepaid Debit Card Study, www.federalreserve.gov/publications/government-prepaid-executive.htm).

Figure 1. Compound annual growth rates for noncash payments, by number and value, 2012–15, 2015–16



Table 2. Total card payments, 2015 and 2016

Numbers in billions. Values in trillions of U.S. dollars

| Card payment type | 2015 | | | 2016 | | | 2015–16 | | | |
|--|--------------|-------------|-----------|--------------|-------------|-----------|------------|-------------|----------------|-------------|
| | Number | Value | Average | Number | Value | Average | Change | | CAGR (percent) | |
| | | | | | | | Number | Value | Number | Value |
| Total card payments | 103.5 | 5.65 | 55 | 111.1 | 5.98 | 54 | 7.6 | 0.33 | 7.4 | 5.8 |
| Debit cards | 69.6 | 2.56 | 37 | 73.8 | 2.70 | 37 | 4.2 | 0.14 | 6.0 | 5.3 |
| Non-prepaid | 59.0 | 2.27 | 38 | 63.0 | 2.41 | 38 | 4.0 | 0.14 | 6.8 | 6.1 |
| In person | 49.5 | 1.58 | 32 | 52.1 | 1.66 | 32 | 2.6 | 0.08 | 5.2 | 5.0 |
| Chip | 0.4 | 0.02 | 48 | 8.4 | 0.37 | 44 | 8.0 | 0.35 | 1,849.5 | 1,673.0 |
| No chip | 49.1 | 1.56 | 32 | 43.7 | 1.29 | 29 | -5.4 | -0.27 | -11.0 | -17.2 |
| Remote | 9.5 | 0.69 | 73 | 10.9 | 0.75 | 69 | 1.4 | 0.06 | 14.9 | 8.9 |
| Prepaid | 10.6 | 0.30 | 28 | 10.7 | 0.29 | 27 | 0.2 | 0.00 | 1.7 | -1.3 |
| General purpose | 4.3 | 0.15 | 35 | 4.4 | 0.15 | 34 | 0.1 | 0.00 | 2.7 | 0.7 |
| In person | 3.6 | 0.10 | 29 | 3.6 | 0.10 | 28 | 0.0 | 0.00 | 0.7 | -0.8 |
| Chip | 0.0 | 0.00 | 36 | 0.1 | 0.01 | 39 | 0.1 | 0.01 | 3,443.2 | 3,722.7 |
| No chip | 3.6 | 0.10 | 29 | 3.5 | 0.10 | 28 | -0.1 | -0.01 | -3.1 | -6.0 |
| Remote | 0.8 | 0.05 | 63 | 0.8 | 0.05 | 59 | 0.1 | 0.00 | 12.3 | 3.9 |
| Private label | 3.6 | 0.07 | 20 | 3.8 | 0.07 | 19 | 0.2 | 0.00 | 5.0 | 1.0 |
| Electronic benefits transfers (EBT) | 2.6 | 0.08 | 29 | 2.5 | 0.07 | 28 | -0.1 | -0.01 | -4.4 | -7.3 |
| Credit cards | 33.9 | 3.08 | 91 | 37.3 | 3.27 | 88 | 3.5 | 0.19 | 10.2 | 6.3 |
| General purpose | 31.0 | 2.80 | 90 | 34.3 | 3.00 | 88 | 3.2 | 0.20 | 10.5 | 7.0 |
| In person | 21.7 | 1.30 | 60 | 23.4 | 1.36 | 58 | 1.7 | 0.05 | 7.9 | 4.1 |
| Chip | 1.0 | 0.08 | 77 | 6.6 | 0.47 | 71 | 5.6 | 0.39 | 538.3 | 482.9 |
| No chip | 20.7 | 1.22 | 59 | 16.8 | 0.89 | 53 | -3.8 | -0.33 | -18.6 | -27.1 |
| Remote | 9.3 | 1.50 | 161 | 10.9 | 1.64 | 151 | 1.5 | 0.14 | 16.6 | 9.6 |
| Private label | 2.8 | 0.28 | 98 | 3.1 | 0.27 | 90 | 0.2 | 0.00 | 7.5 | -1.6 |
| General-purpose card payments¹ | 94.4 | 5.22 | 55 | 101.7 | 5.56 | 55 | 7.4 | 0.34 | 7.8 | 6.5 |
| In person | 74.8 | 2.98 | 40 | 79.1 | 3.11 | 39 | 4.3 | 0.13 | 5.7 | 4.4 |
| Chip | 1.5 | 0.10 | 69 | 15.1 | 0.84 | 55 | 13.7 | 0.74 | 932.2 | 731.9 |
| No chip | 73.3 | 2.88 | 39 | 64.0 | 2.28 | 36 | -9.4 | -0.61 | -12.8 | -21.0 |
| Remote | 19.6 | 2.24 | 114 | 22.6 | 2.45 | 108 | 3.1 | 0.21 | 15.6 | 9.3 |

Note: Card payments are defined as net, authorized and settled transactions. Figures may not sum because of rounding. CAGR is compound annual growth rate. The 2015 card payments are restated except for private-label prepaid and EBT cards.

¹ General-purpose cards include general-purpose credit, non-prepaid debit, and general-purpose prepaid debit cards.

Card Payments

Card payments are estimated from data gathered through surveys of the card networks, processors, and issuers, collectively called the *Networks, Processors, and Issuers Payments Surveys* (NPIPS). Most card payments are processed by a small number of relatively large networks, and the surveys are conducted as a census with every network included in the estimate of the aggregate totals.⁹ Because the 2017 NPIPS were conducted the same way as the triennial surveys, it was possible to estimate national totals for cards in 2016 along with 2015 to 2016 growth rates (table 2).

Overall, the use of payment cards has been growing rapidly since 2000, and, by number card payments have dominated the payments landscape for some time. Payment card transactions

⁹ When response data are missing, estimation requires imputation or interpolation. See About the Study for more information.

have continued growing rapidly in the more recent period as well, increasing from 103.5 billion in 2015 to 111.1 billion in 2016. The increase of 7.6 billion transactions corresponded to a growth rate of 7.4 percent, slightly lower than the 7.5 percent annual growth from 2012 to 2015.

Similarly, though total value of payment card transactions continues to be significantly lower than the total values of checks paid or ACH transfers, it has grown rapidly since 2000. By value, payment card transactions grew at a rate of 6.7 percent a year from 2012 to 2015. From 2015 to 2016, payment card transaction value increased at a slightly lower rate of 5.8 percent.

From 2012 to 2015, general-purpose credit card payments grew at a rate of 8.4 percent per year by number and 7.3 percent per year by value. Growth from 2015 to 2016 increased to 10.5 percent by number and slowed somewhat to 7.0 percent by value. In 2016, the number of general-purpose credit card payments had increased to 34.3 billion, compared with 31.0 billion in 2015. By value, these payments reached \$3.00 trillion in 2016, compared with \$2.80 trillion in 2015. The average value of general-purpose credit card payments decreased, modestly, from \$90 in 2015 to \$88 in 2016.

Private-label credit card transactions experienced periods of both growth and decline in number from 2000 to 2012 driven in part by the business cycle, the use of retailer card-based sales promotions, and a shift toward co-branded credit cards, which have resulted in some formerly private-label transactions being processed through the general-purpose card networks. From 2012 to 2015, the number of private-label credit card transactions increased by 4.9 percent a year, while the value of these payments grew by 0.2 percent a year.¹⁰ Growth by number accelerated from 2015 to 2016, with transactions rising 7.5 percent, while the value of transactions declined, falling 1.6 percent over the same period. These changes in number and value are reflected in the substantial decrease in the average value of private-label credit card transactions from \$98 in 2015 to \$90 in 2016.

Revisions to the data for general-purpose prepaid and non-prepaid debit for some networks required the restatement of totals for 2012 and 2015 and the implied growth rates for this brief. The restatements take account of a previous, unintended inclusion of prepaid debit card payments in some non-prepaid debit network data.¹¹

Non-prepaid debit card growth per year increased at annual growth rates of 7.7 percent by number and 6.6 percent by value from 2012 to 2015. From 2015 to 2016, the speed of this growth tapered to a growth rate of 6.8 percent by number and 6.1 percent by value. These growth rates correspond to a one-year increase of 4.0 billion non-prepaid debit card transactions from 2015 to 2016, reaching 63.0 billion transactions in 2016, by far the largest total among all payment types studied. Over the same period, non-prepaid debit card transactions had a one-year increase of \$139.48 billion, reaching \$2.41 trillion in 2016 (table 2). The average value of non-prepaid debit card transactions remained stable from 2015 to 2016 at \$38.

As noted above, the 2012 and 2015 figures for general-purpose prepaid debit cards are restated.¹² General-purpose prepaid debit card payments represent a small but growing segment of general-purpose debit card payments. The number and value of these payments grew at 11.3 and 11.1 percent a year, respectively, from 2012 to 2015, and then at a much slower pace of 2.7 and 0.7 percent, respectively, from 2015 to 2016. The lower growth rates from the

¹⁰ The 2015 private-label credit card payments are restated because of revisions to previously reported data.

¹¹ These restatements lowered the total estimates of both the number and value of the 2015 non-prepaid debit card payments by 1.0 percent compared with the previously reported estimates.

¹² The restatements led to relatively large increases in total estimated 2015 general-purpose prepaid debit card payments by number (17.7 percent) and value (20.9 percent) compared with the previously reported estimates.

later period reflect an increase of 116.9 million transactions worth \$1.00 billion.¹³ In 2016, there were 4.4 billion general-purpose prepaid debit card transactions valued at \$151.75 billion. The average value of these transactions decreased slightly from \$35 to \$34 between 2015 and 2016.

During the 2012 to 2015 period, private-label prepaid card transactions declined annually in number by 0.3 percent while increasing in value by 15.0 percent. The decline in payments reversed from 2015 to 2016, increasing 5.0 percent, by number, while growing much more slowly, at 1.0 percent by value. Total private-label prepaid card transactions grew 0.2 billion to 3.8 billion from 2015 to 2016, while the average value of these transactions decreased from \$20 to \$19.

Payments made by prepaid EBT cards increased 1.7 percent by number and 0.2 percent by value per year, from 2012 to 2015. This modest increase over the previous three-year period reversed for 2015 to 2016, during which the number and value of EBT transactions fell by 4.4 and 7.3 percent, respectively. In 2016, 115.5 million fewer EBT transactions were made, and they were worth \$5.49 billion less than in 2015, yielding 2.5 billion payments valued at \$69.56 billion. The average value of these transactions fell from \$29 to \$28 in the one-year period.

In-Person and Remote Card Payments

Card payments can be made in person, typically using the card itself at a terminal and, increasingly, with a mobile device via near-field communications technology to transmit the payment information to the card-accepting terminal. They can also be made remotely, typically using the card number either entered into an e-commerce or bill pay website or given over the telephone for one-time purchases or regular bill payments. Innovations in retail and financial offerings are evolving to be more digital, as shopping and other payment-related habits change to take advantage of new technology.

These developments are reflected in the growing share of remote payments in total card payments the general-purpose card networks have been reporting (figure 2).¹⁴ Remote payments represented 22.2 percent of all general-purpose card payments in 2016, up 1.5 percentage points from an estimated 20.7 percent in 2015.¹⁵ By value, remote payments represented 44.0 percent of all general-purpose card payments, up 1.1 percentage points from an estimated 42.9 percent in 2015.

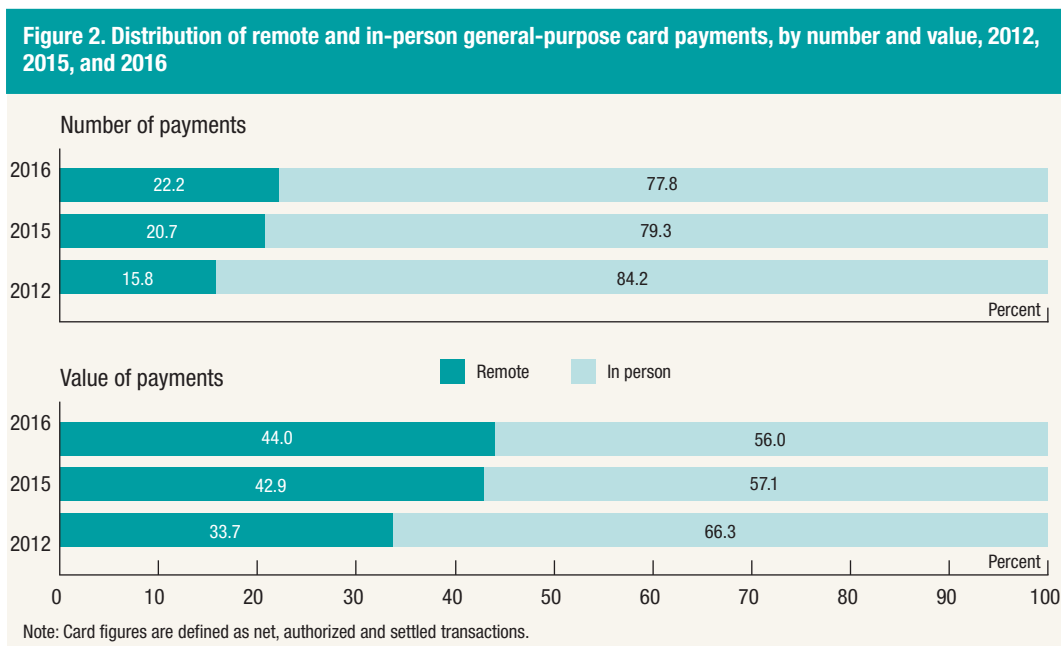
The increasing percentage share of remote payments also reflects relatively high growth rates compared with in-person growth rates among the general-purpose card types (figure 3). The number of general-purpose credit card payments displayed the highest growth rate of both remote payments from 2015 to 2016 (16.6 percent) and in-person payments (7.9 percent). Both growth rates rose compared to growth rates from 2012 to 2015, which were 16.4 and 5.5 percent a year, respectively.¹⁶ The average value of remote general-purpose credit card payments declined from \$170 to \$161 from 2012 to 2015, and declined further to \$151 in 2016 (figure 4). This may be explained, in part, by increases in the share of smaller purchases over time, such

¹³ Some numeric figures in the text are presented in different units in the tables.

¹⁴ Share calculations are based on sums of remote general-purpose card payments for general-purpose credit cards, non-prepaid debit cards, and general-purpose prepaid cards reported in table 2.

¹⁵ The percent of remote payments in 2015 is restated because of revisions to previously reported data. Rapid developments in this area may lead to improvements in categorization and measurement over time. As noted in previous reports, the 2012 surveys allocated card payments into card-present and card-not-present categories, which should have roughly corresponded to the in-person and remote allocations used in 2015 and 2016.

¹⁶ These growth rates are restated and were previously reported to be 14.1 and 6.4 percent a year, respectively.

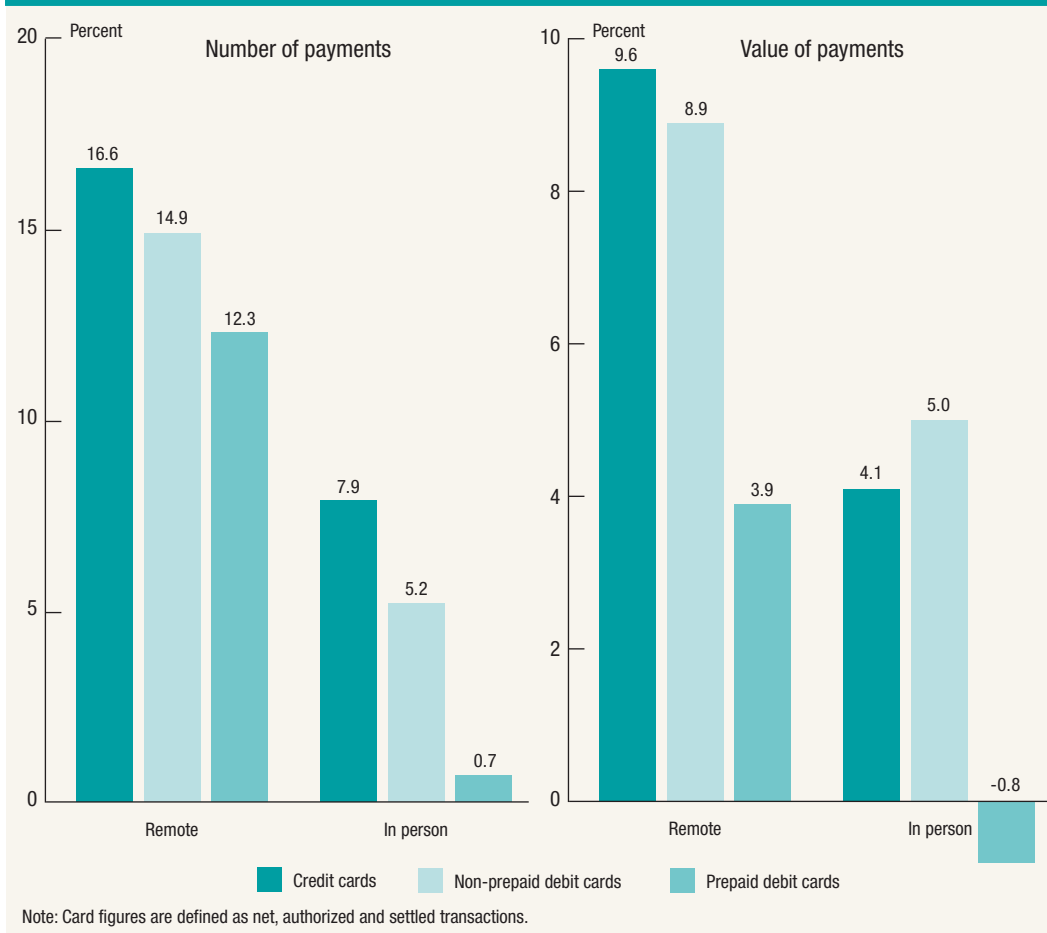


as online purchases of everyday merchandise, perhaps while larger, less frequent purchases, such as airline tickets or bill payments, might have increased more slowly or held relatively steady. The average value of in-person general-purpose credit card payments was less than half that of remote payments, at \$68 in 2012, falling to \$60 in 2015 and falling again to \$58 in 2016.

Growth in the number of non-prepaid debit card payments was somewhat slower than growth in general-purpose credit cards for both remote and in-person payments, with a 14.9 percent growth rate of remote payments and a 5.2 percent growth rate of in-person payments from 2015 to 2016. The growth rates for remote and in-person payments for non-prepaid debit cards were down from 19.5 percent a year and 5.9 percent a year, respectively, from 2012 to 2015. The average value of remote non-prepaid debit card payments was almost flat at \$73 in 2012 and 2015 but dropped to \$69 in 2016. The average value of in-person payments using non-prepaid debit cards was less than half that of remote payments in all years, falling from \$35 in 2012 to \$32 in 2015 and staying flat for 2016.

General-purpose prepaid debit card payments showed the greatest disparity in growth rates among the general-purpose card categories, by number registering a 12.3 percent growth rate of remote payments and only a 0.7 percent growth rate of in-person payments from 2015 to 2016. By value during the same period, remote payments by general-purpose prepaid debit cards grew 3.9 percent, while in-person payments *declined* by 0.8 percent. By number and value, these growth rates are substantially lower than the growth rates that general-purpose prepaid debit cards posted for 2012 to 2015 when the growth rates for remote payments by number and value were 34.2 and 26.9, respectively, while the growth rates for in-person payments by number and value were 8.2 and 4.1, respectively. The average value of remote general-purpose prepaid debit card payments was almost twice the average value of in-person payments in 2012 and more than twice in 2015 and 2016, increasing from \$60 in 2012 to \$63 in 2015, and then falling, to \$59 in 2016. The average value of in-person payments using general-purpose prepaid cards declined from \$32 in 2012 to \$29 in 2015, and fell again in 2016 to \$28.

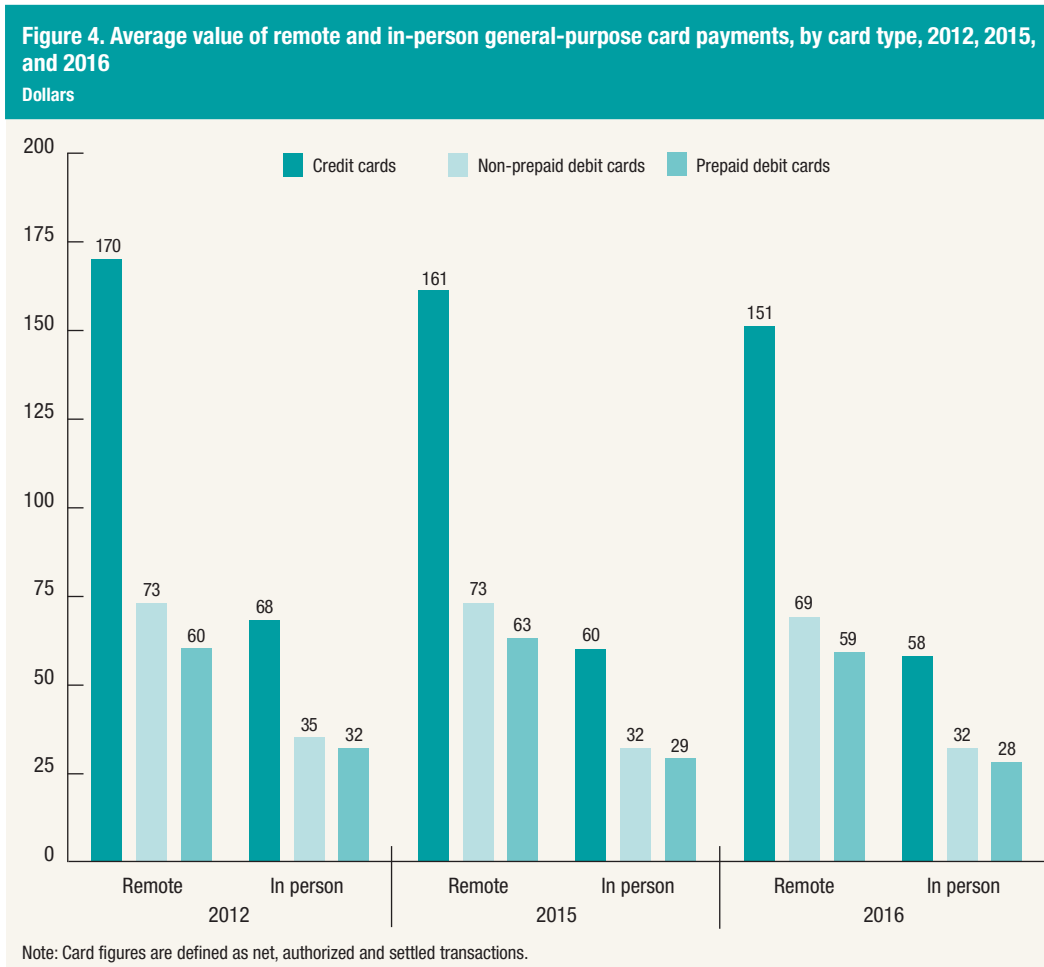
Figure 3. Growth rates of remote and in-person general-purpose card payments, by number and value, 2015–16



General-Purpose Card Fraud Types and Chips

As noted in the 2016 FRPS brief published in December 2016, the transition to chip cards is one of the most notable recent developments in U.S. payment card security. The chips are intended to thwart in-person counterfeit card fraud. Although most cards and terminals also allow use of the less-secure magnetic stripe, the opportunities to counterfeit cards are declining as more terminals and cards default to the chip-based technology.

The use of chips increased sharply from 2015 to 2016, reflecting the coordinated effort to place the technology in cards and card-accepting terminals and the financial incentives to do so. In 2016, the number of general-purpose card payments using chips reached 15.1 billion by number and \$837.04 billion by value in the United States, a significant increase over the 1.5 billion by number and \$100.62 billion by value in 2015 (table 2). Starting from a tiny base, growth rates by number or value in the use of the chip technology for this period are consistent with the rapid pace of deployment and use of the technology. The share of chip transactions in the total in-person general-purpose card payments reached 19.1 percent by number and 26.9 percent by value in 2016, compared with only 2.0 percent by number and 3.4 percent by value in 2015.



Aggregates of survey data from the general-purpose payment card and ATM networks for 2015 and 2016 allowed the allocation of fraudulent card transactions for six commonly recognized card-industry fraud types, as well as allocations to the in-person or remote fraud channels. Definitions were provided in the December 2016 FRPS brief.¹⁷ Counterfeit card fraud and lost or stolen card fraud generally reflect the in-person fraud channel, while fraudulent use of account numbers reflects the remote fraud channel. Other types are less easily mapped to the two channels.

The card fraud types are presented for 2015 and 2016 in terms of the percentage shares of total value of card fraud they represent. Among the payment card fraud types, counterfeit card fraud was the only type to decline from 2015 to 2016, dropping from a 43.7 percentage share of card fraud value in 2015 to 36.0 percent in 2016 (table 3). In contrast, the percentage share of card fraud value for lost or stolen cards rose slightly, from 10.8 percent in 2015 to 11.2 percent in 2016. Fraudulent use of account numbers rose the most, increasing from 39.2 percent in 2015 to 44.2 percent in 2016.

¹⁷ See fraud types and fraud channels in Board of Governors of the Federal Reserve System and the Federal Reserve System, *The Federal Reserve Payments Study 2016*, brief (Washington: Board of Governors and the Federal Reserve System, December 2016), p.7, www.federalreserve.gov/newsevents/press/other/2016-payments-study-20161222.pdf.

Table 3. Distribution of general-purpose card fraud, by value, 2015 and 2016

| Percent | | | |
|----------------------------------|--------------|--------------|------------|
| Fraud type | 2015 | 2016 | Change |
| Total fraud | 100.0 | 100.0 | 0.0 |
| Counterfeit card | 43.7 | 36.0 | -7.7 |
| Lost or stolen card | 10.8 | 11.2 | 0.4 |
| Card issued but not received | 0.7 | 0.8 | 0.1 |
| Fraudulent application | 3.2 | 5.2 | 2.0 |
| Fraudulent use of account number | 39.2 | 44.2 | 5.1 |
| Other | 2.4 | 2.6 | 0.2 |
| Total fraud | 100.0 | 100.0 | 0.0 |
| Channels | | | |
| In person | 53.8 | 41.5 | -12.3 |
| Remote | 46.2 | 58.5 | 12.3 |

Note: Figures may not sum because of rounding. The 2015 percentages are restated.

While card fraud by value in the United States was predominantly committed through the in-person channel in 2015, it was predominantly committed through the remote channel in 2016. The in-person percentage share of card fraud value dropped from 53.8 percent in 2015 to 41.5 percent in 2016, while the remote percentage share of card fraud value increased from 46.2 percent in 2015 to 58.5 percent in 2016. This shift corresponds to the rise in the share of remote payments in total general-purpose card payments. It also can be attributed, in part, to the reduction in counterfeit card fraud, the kind of fraud that chip cards are designed to prevent.

Automated Clearinghouse Payments

The ACH credit and debit transfers provided are based on reports compiled by the ACH operators, and therefore only cover payments on the ACH network. As discussed in earlier reports, these network ACH transfers are mostly those that passed between two depository institutions, i.e., interbank payments. However, because some depository institutions send all ACH transfers to ACH operators, ACH network payments also include some payments that are received by the same depository institution that sent them.

From 2012 to 2015, ACH network transfers grew at annual rates of 4.9 percent by number and 4.1 percent by value. Growth in both of these measures is up for the 2015 to 2016 period, when growth by number increased to 5.3 percent and by value to 5.1 percent. The average value of an ACH network transfer decreased slightly from \$2,159 in 2015 to \$2,156 in 2016.

Funds transfers over the ACH network can be credit transfers, in which funds are “pushed” from a payer’s depository institution to a payee’s depository institution, or debit transfers, in which funds are “pulled” by the payee’s depository institution from the payer’s depository institution.

ACH credit and debit transfers since 2012 have displayed different growth patterns, with growth in credit transfers dropping off slightly, while growth in debit transfers increased only slightly. ACH credit transfers grew 5.0 percent by number and 5.7 percent by value per year from 2012 to 2015, while ACH debit transfers increased by 4.8 percent by number and a relatively small 1.4 percent by value. From 2015 to 2016, however, the number and value of ACH credit transfers grew 5.2 and 5.1 percent, respectively, and ACH debit transfers grew by 5.3 and 5.2 percent, respectively.

Check Payments

Check payments are estimated from data gathered through the *Depository and Financial Institutions Payments Survey* (DFIPS). Restated 2015 estimates for the total number and value of commercial checks paid (17.8 billion and \$28.80 trillion), which exclude roughly 0.2 billion federal government checks and postal money orders, show that there was less of a decline in check payments from 2012 to 2015 than previously reported.¹⁸ By number, the restatement suggests a decline of about 3.0 percent per year from 2012 to 2015, replacing the previously reported 4.3 percent decline in commercial checks paid.

From 2012 to 2015, the restated estimates for commercial checks paid show an *increase* of 2.2 percent per year by value, replacing the decline of 0.4 percent reported earlier. The combined revisions to number and value led to an increase in average value of a commercial check from \$1,383 in 2012 to \$1,618 in 2015, again, higher than the earlier estimate.

When a commercial check is deposited at a different depository institution than the paying depository institution—the one that holds the account against which the check was written—it is called an interbank check. Interbank checks, also restated for 2015, are estimated to have declined at a rate of 1.5 percent a year from 2012 to 2015, dropping to 13.3 billion, while climbing at a rate of 6.7 percent a year by value, reaching \$20.92 trillion. Commercial checks that are deposited at the paying depository institution, i.e., on-us checks, declined faster, falling at a rate of 7.1 percent per year from 2012 to 2015. The value of on-us checks also fell, dropping 6.9 percent a year to \$7.88 trillion from 2012 to 2015. The average value of on-us checks increased slightly from \$1,740 in 2012 to \$1,751 in 2015. During the same period, interbank checks, which are estimated to have been \$1,239 on average in 2012, rose to \$1,573 in 2015, a relatively large change, but also coming closer to the average value of on-us checks.

Data from just 80 of the largest depository institutions in the United States were used to estimate trends in checks from 2015 to 2016. Even though they represent a small fraction of all depository institutions (less than 7 percent of the participants that provided information for the 2015 estimates), the fraction of *transactions* represented by the 80 depository institutions is large; they are estimated to have paid nearly 60 percent of the number and 70 percent of the value of commercial checks in 2015. A full version of the study likely would have resulted in different trend estimates. Thus, the rates reported here may serve as indicators, but are less reliable for calculating national trends than would be the case for a full, representative sample.¹⁹

From 2015 to 2016, there was a somewhat steeper decline of 3.6 percent in the number of commercial checks paid by the largest depository institutions, compared with the restated 2012–15 decline reported above. The decline in value, though less certain because of larger variation in value between institutions, is estimated to be similar in magnitude: From 2015 to 2016, the value of checks for the largest depository institutions is estimated to have declined 3.7 percent. As the decline in value is estimated to have been slightly greater in magnitude than the decline in number from 2015 to 2016, the average value of check payments declined slightly from 2015 to 2016.

Compared with the restated 2012–15 declines reported above, changes from 2015 to 2016 were somewhat more closely aligned for the two components of commercial checks paid: interbank and on-us checks. The estimated number of interbank checks for the largest depository institutions declined 3.4 percent from 2015 to 2016, while on-us checks declined 4.2 percent. The esti-

¹⁸ The restated 2015 estimates for commercial checks paid are based on revisions received during the data validation stage of the 2017 FRPS survey process. Total commercial checks paid for 2015 are now 0.7 billion higher by number and \$2.14 trillion higher by value than the previously reported estimates.

¹⁹ See *About the Study* for more information about the estimation process.

mated value of interbank checks for the largest depository institutions declined 3.8 percent from 2015 to 2016, compared with a 3.3 percent decline for on-us checks.

About the Study

The *Federal Reserve Payments Study* is a collaborative effort by staff members at the Federal Reserve Bank of Atlanta and the Board of Governors of the Federal Reserve System to track and document developments in the U.S. payments system through the collection of quantitative survey data.

The estimates reported in this brief are based on information gathered in two survey efforts:

1. The *Networks, Processors, and Issuers Payments Surveys* (NPIPS)
2. The *Depository and Financial Institutions Payments Survey* (DFIPS)

Estimates of aggregate totals and trends are developed from individual institutions' response data provided in the surveys, which remains confidential.

Networks, Processors, and Issuers Payments Surveys

The NPIPS, administered with the help of Blueflame Consulting, collected the number and value of electronic payments in the United States for calendar year 2016. Data were collected by surveying payment networks, processors, and card issuers. A total of 81 organizations were included in the 2017 NPIPS, with 61 providing some response data, for a response rate of over 75 percent. Alternative payment methods and systems were not covered in this round of surveys.

With a small number of unique providers, routine statistical methods cannot be used to estimate missing information. When data are missing, they are imputed based on outside information and knowledge of the industry, or interpolated based on relationships with other respondents.

Depository and Financial Institutions Payments Survey

The DFIPS, administered with the help of GCI Insights, a division of McKinsey & Company, collected the number and value of various noncash payments, as well as cash withdrawals from customer accounts, and unauthorized transactions (third-party fraud) that took place during calendar year 2016. Noncash payments include transactions by check, ACH, wire transfers, debit (including prepaid and non-prepaid) card, and credit card.

The past triennial estimates, such as those from the 2016 FRPS, which collected information on 2015 number and value of check payments from 1,183 depository institutions, are based on separate estimates from representative, random samples of depository institutions of different sizes and types. Growth rate estimates for check payments from 2015 to 2016 are based on survey data collected only from the largest depository institutions.

A total of 117 depository institutions were surveyed, including commercial banks, savings institutions, and credit unions. The sample was chosen by stratifying the entire population of these institutions and selecting the largest by institution type based on the sum of transaction deposit and money market deposit balances for consolidated institutional charters and their affiliates at the level of the holding company. Responses with data for 2016 were received from 71 institutions, for a response rate of a little less than 61 percent. Among the 117 depository institutions, 80 responded to either the 2016 or the 2017 DFIPS or both. The information from the 80 institutions was used to produce estimates of the growth rates for the top 117 institutions.

