



# The 2017 Diary of Consumer Payment Choice

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## Abstract:

This paper describes key results from the 2017 Diary of Consumer Payment Choice (DCPC), the fourth in a series of diary surveys that measure payment behavior through the daily recording of U.S. consumers' spending. The DCPC is the only diary survey of U.S. consumer payments available free to the public. In October 2017, consumers paid mostly with cash (30.3 percent of payments), debit cards (26.2 percent), and credit cards (21.0 percent). These instruments accounted for three-quarters of the number of payments, but only about 40 percent of the total value of payments, because they tend to be used more for smaller-value payments. In contrast, electronic payments accounted for 30.3 percent of the value of total payments but only 8.9 percent of the number of payments. Checks, at 17.7 percent, continued to account for a relatively high percentage of the value of payments. The average value of a cash transaction was \$23.4, compared with \$109.3 for the average noncash transaction (and \$83.3 for all transactions). The average value of consumers' holdings of cash on their persons (in pocket, purse, or wallet) was about \$60.

**JEL Classifications:** D12, D14, E42

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Acknowledgments appear on the first page of this report. The primary authors are responsible for any errors.

This paper presents preliminary analysis and results intended to stimulate discussion and critical comment. The views expressed herein are those of the authors and do not indicate concurrence by the Federal Reserve Bank of Boston, the Federal Reserve Bank of Atlanta, the principals of the Board of Governors, or the Federal Reserve System.

This report, which may be revised, is available on the website of the [Federal Reserve Bank of Atlanta](https://www.frbatlanta.org).

## Acknowledgments

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## 1. Introduction

The 2017 Diary of Consumer Payment Choice (DCPC) is the fourth official study conducted by the Federal Reserve Banks of Atlanta, Boston, Richmond, and San Francisco to gain a comprehensive understanding of the cash- and noncash-payment behavior of U.S. adult consumers (ages 18 and older).<sup>1</sup> This report contains results for 2017 and includes estimates of the number, value, and average value of payments that all U.S. adult consumers made using U.S. payment instruments. It also includes estimates of cash held on person (pocket, purse, or wallet) by denomination of currency.

The DCPC collects data on individual payments from daily records kept by consumers, including the dollar values of payments. This daily recording method differs from the recall method used by the Survey of Consumer Payment Choice (SCPC); therefore, estimates from the two surveys should not be compared directly.<sup>2</sup> For more details about the DCPC, see Greene, Schuh, and Stavins (2018); Greene and Schuh (2017); Greene, O'Brien, and Schuh (2017); Sampranathak, Schuh, and Townsend (2017); and Schuh (2017).

This report focuses on estimates of the *level* of consumer payment use in 2017—that is, the number and value of consumer payments. It also discusses changes from 2016 to 2017, which are generally more comparable than 2015-to-2016 changes. The numbers of respondents in 2016 and 2017 are similar (2,848 and 2,793, respectively) and larger than the number of respondents in 2015 (1,076). The calendar periods are aligned in 2016 and 2017 (October) and are different from the 2015 calendar period (mid-October to mid-November). Each year's questionnaire includes modest changes; therefore, the reader should exercise caution when interpreting estimates of changes in payment use.

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<sup>1</sup> The first official study was the 2012 Diary of Consumer Payment Choice (DCPC), which is described in detail in Greene, Schuh, and Stavins (2018).

<sup>2</sup> The Survey of Consumer Payment Choice (SCPC) began in 2008 and is described most recently in Greene and Stavins (2018). See also Angrisani, Marco, Foster, and Hitczenko (2017a) and Angrisani, Marco, Foster, and Hitczenko (2016).

All DCPC data, along with technical documentation, are available to the public free of charge. Throughout the paper, small discrepancies in the estimates may exist due to rounding. The data may be revised in the future, should important new information or analysis warrant doing so.

The remainder of this report is organized as follows. Section 2 provides an overview of the number and value of payments for 2017 and describes changes relative to 2016. Section 3 reports estimates of the level of consumer payment use by payment instrument and describes the implied changes in payment instrument use from 2016 to 2017. Section 4 shows how payment instrument choice in 2017 differs for purchases and bills. Section 5 focuses on cash use and Section 6 on cash holdings. Section 7 concludes. An appendix summarizes the underlying survey methodology.

## **2. Number and Value of Payments**

In October 2017, U.S. consumers each made on average 41.0 payments for the month (Table 1). Thus, on average, an adult consumer made 1.3 payments per day. Notably, an average of 40.2 percent of consumers per day reported making zero payments.

Also in October 2017, U.S. consumers each made on average \$3,418 worth of payments for the month. Consumer *payments* are not the same as consumer (or household) *expenditures*, *consumption*, or *income*, so the estimated value of consumer payments (and its growth rate) should not be compared with data on expenditures or income. For example, this estimate does not include payments made on consumers' behalf by other parties (such as other household members, other family or friends, employers, insurers, or the government). Dividing the October 2017 DCPC value of payments by that period's number of payments yields an average value for each consumer payment of \$83.3 (Table 2).

The average number of consumer payments declined about 10 percent (that is, by 4.9 payments) compared with October 2016 (45.9 payments per consumer per month), a statistically significant change. The average total value of payments decreased by \$498 from \$3,916 in 2016,

but the change is not statistically significant. The average dollar value of a payment also decreased from \$85.3 in 2016, a decline that also is not statistically significant (Table 2).

While not statistically significant, the decline in average total value from 2016 to 2017 is unexpected, given the increase in the average total value of payments from 2015 (\$3,600) to 2016 (\$3,916). Although the average total value of payments (which includes payments made for savings, investment, and taxes) is not comparable to consumer expenditures (which include expenditures made by the government, employers, or insurers on a consumer's behalf and exclude savings, investment, and taxes), one could expect it to grow in line with inflation and economic growth. The decline in the average total number of payments is similar in magnitude to the decline in average total number from 2015 to 2016. This decline is more ambiguous, since there are not many economic models of endogenous determination of the number of consumer payments.<sup>3</sup>

Further investigation found that the declines in average total value and average total number are not attributable to changes in the sample, a failure to record payments by panel members who have responded in multiple years, or respondents' avoiding recording payments on reporting days 2 or 3. The general trend of fewer payments in 2017 and 2016 is robust to many different analyses. For example, estimates based on data from individuals' first diary day maintained the pattern observed only when using all of the data, suggesting that data quality associated with shirking or diary fatigue has little influence. The same is true for estimates based on a variety of weighting schemes. Finally, a study of trends among the 2,226 individuals who participated in both 2016 and 2017 showed clear evidence that the percentage of individuals reporting fewer payments in the latter year *and* the average number of payments reported each decreased in a statistically significant manner. Overall, the collected data consistently show a

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<sup>3</sup> Coibion, et al. (2017) uses the Consumer Expenditure Survey to show a trend of decline since the early 1980s in the number of days per month in which consumers make at least one expenditure (more than \$0).

declining number of reported payments over time, with the decline from 2016 to 2017 continuing a trend from 2015.

### **3. Number and Value of Payments by Instrument**

In October 2017, U.S. consumers made most of their payments with payment cards (debit, credit, and prepaid) and paper instruments (cash, checks, and money orders). Consumers on average each made 20.1 payments for the month with payment cards, 15.1 with paper instruments (including cash), 3.6 with electronic instruments linked to a bank account,<sup>4</sup> and 2.2 payments through other methods<sup>5</sup> (Table 1). The volume shares of payments were 49.0 percent for payment cards, 36.7 percent for paper instruments, 8.9 percent for electronic payments, and 5.4 percent for other types (Table 1). Compared with 2016, the volume share of cards increased and the volume shares of paper and electronic instruments declined, but these changes are not statistically significant.

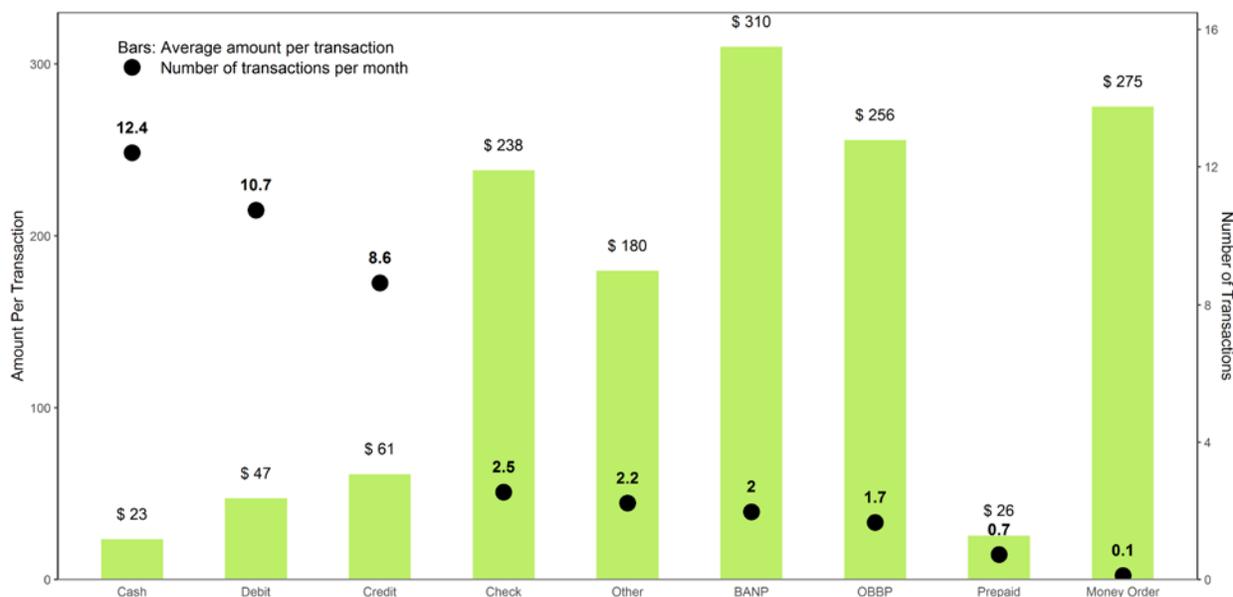
The values of U.S. consumer payments in October 2017 were approximately equal for cards and for electronic instruments. Consumers on average each made \$1,055 worth of payments for the month using payment cards, followed by \$1,036 using electronic instruments, and \$928 using paper instruments. The value shares were 30.9 percent for payment cards, 30.3 percent for electronic payments, and 27.2 percent for paper instruments (Table 1). Note the increase in the value shares for the other payment instruments (income deduction, account-to-account transfer, and other nascent options) from 2015 to 2017; this change was statistically

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<sup>4</sup> The electronic payment instruments are defined as follows. Bank account number payment (BANP): a payment made by providing one's bank account number to a third party, such as one's employer or a utility company. The number can be given on websites, paper forms, etc. Online banking bill payment (OBBP): a payment made from a bank's online banking website or online mobile app that accesses funds from a customer's checking or savings account to pay a bill or to pay other people. This payment does not require the customer or the bank to disclose his or her bank account number to a third party.

<sup>5</sup> Other methods include income deduction, PayPal, account-to-account transfers (e.g., Zelle, Venmo), and mobile payments.

significant. Compared with 2016, however, none of the changes in the value shares of cards, paper and electronic instruments was statistically significant.



Source: 2017 Diary of Consumer Payment Choice, Table 1. *Note:* \*Check includes money order. OBBP: online banking bill pay. BANP: bank account number payment. Other includes PayPal, account-to-account transfers, mobile payments, and deductions from income.

**Figure 1: Number and Average Value of Payments by Instrument, October 2017**

Cash, debit, and credit remain the most popular ways to pay,<sup>6</sup> with cash used most by number of payments (Table 1). Thirty percent of payments were with cash, 26 percent with debit cards, and 21 percent with credit cards. Altogether, consumers made about three-quarters of their payments using cash, debit cards, and credit cards.

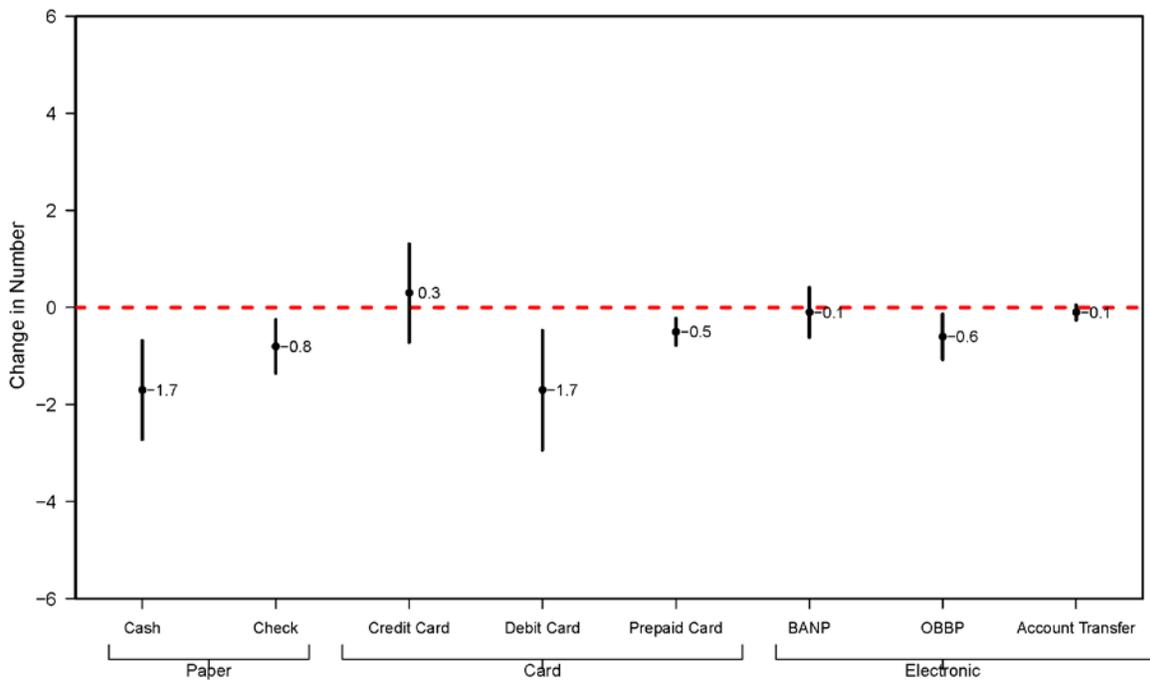
The distribution by value is different. Cash, debit, and credit payments accounted for 39 percent of the value of consumers’ payments: 8.5 percent in cash, 14.8 percent in debit cards, and 15.5 percent in credit cards. The combined value share of cash, debit, and credit increased from 34 percent in 2016, as the value share of each of the three payment instruments increased (Table 1). The increase from 2016 is statistically significant. The difference between the distribution by

<sup>6</sup> Cash, debit, and credit are also the three most frequently used payment instruments by consumers in the SCPC. See Greene and Stavins (2018).

volume and by value reflects that consumers tend to use cash and payment cards more often, but for relatively low-value payments, while they tend to use checks and electronic payments less often, but for relatively high-value payments (Figure 1). For example, U.S. consumers on average made fewer electronic-instrument payments than cash payments (3.6 compared with 12.4), but they used electronic payments for transactions that were higher in average value than cash-payment transactions (\$285.2 compared with \$23.4). The average value when using payment cards fell between the two at \$52.5 (Table 1 and 2).

### Changes in the Number and Value of Payments by Instrument

The drop in the overall number of payments from 2016 to 2017 is reflected in fewer payments made by U.S. consumers with the individual payment instruments (Table 1). Cash, debit cards, checks, OBBP, and prepaid cards each show a statistically significant decline in the number of payments per month for which they were used. No payment instrument shows a statistically significant increase in use by number of payments (Figure 2).

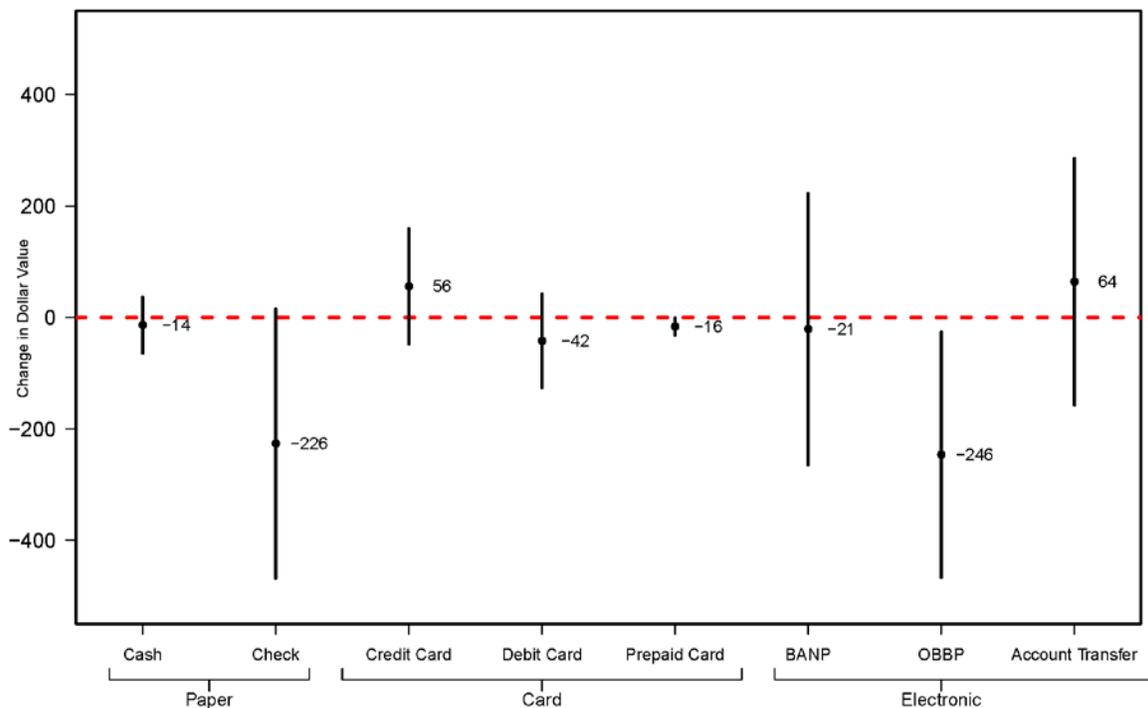


Source: 2016 and 2017 Diary of Consumer Payment Choice. Notes: The vertical lines depict the 95 percent confidence intervals of the changes in the number of payments between 2016 and 2017, and the numbered dots depict the point estimates. Confidence intervals

that lie entirely above or below the horizontal zero line indicate changes that are statistically significantly different from zero. Money orders are omitted from this figure.

**Figure 2: Changes in the Number of Payments per Month by Payment Instrument, 2016 to 2017**

Just as there was no statistically significant change in the total value of payments overall, there were no statistically significant changes in the dollar value of payments by payment instrument from 2016 to 2017. Total dollar value of credit card payments and account-to-account transfers increased from 2016, but the change is not statistically significantly different from zero.



Source: 2016 and 2017 Diary of Consumer Payment Choice. Notes: The vertical lines depict the 95 percent confidence intervals of the changes in the total dollar value of payments between 2016 and 2017, and the numbered dots depict the point estimates. Confidence intervals that lie entirely above or below the horizontal zero line indicate changes that are statistically significantly different from zero. Money orders are omitted from this figure.

**Figure 3: Changes in the Total Dollar Value of Payments per Month by Payment Instrument, 2016 to 2017**

An examination of payment instruments commonly used to pay bills reveals that the average number of check and electronic payments (the sum of online banking bill pay [OBBP]

and bank account number payment [BANP]) over the course of the month decreased from 7.7 to 6.2. The average total dollar value of these payments declined about 25 percent, from \$2,135 to \$1,642 (Table 1). While the average value per transaction of check and electronic payments was relatively high (\$243, Table A), it declined about 7 percent from 2016 to 2017.

	Number per consumer per month	Value per transaction	
Check + electronic	8.5	2073	243
Percentage share	20.8%	60.7%	NA

*Source:* 2017 DCPC, authors' calculations. Note: Includes paper checks, OBBP, and BANP.

**Table A: Check and Electronic Payments, October 2017**

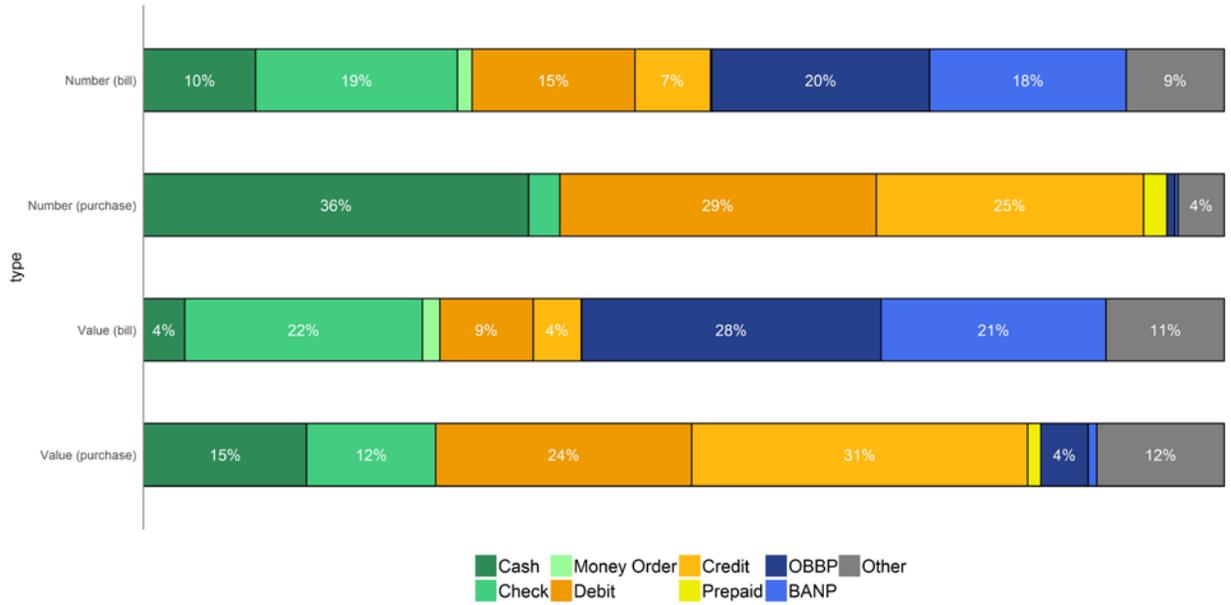
Changes in economic conditions and changes in underlying preferences may have influenced consumer payment choices in 2017. A full explanation of these changes requires additional data and more research.

#### **4. Purchases and Bills**

In October 2017, U.S. consumers on average made 32.2 purchases and 8.6 bill payments (Table 3 and 4).<sup>7</sup> Purchases include purchases of goods and services in person and online as well as payments to another person, for example, as a gift or allowance. Bill payments include only payments made by the individual survey respondent and exclude any bill payments made by other members of his or her household.

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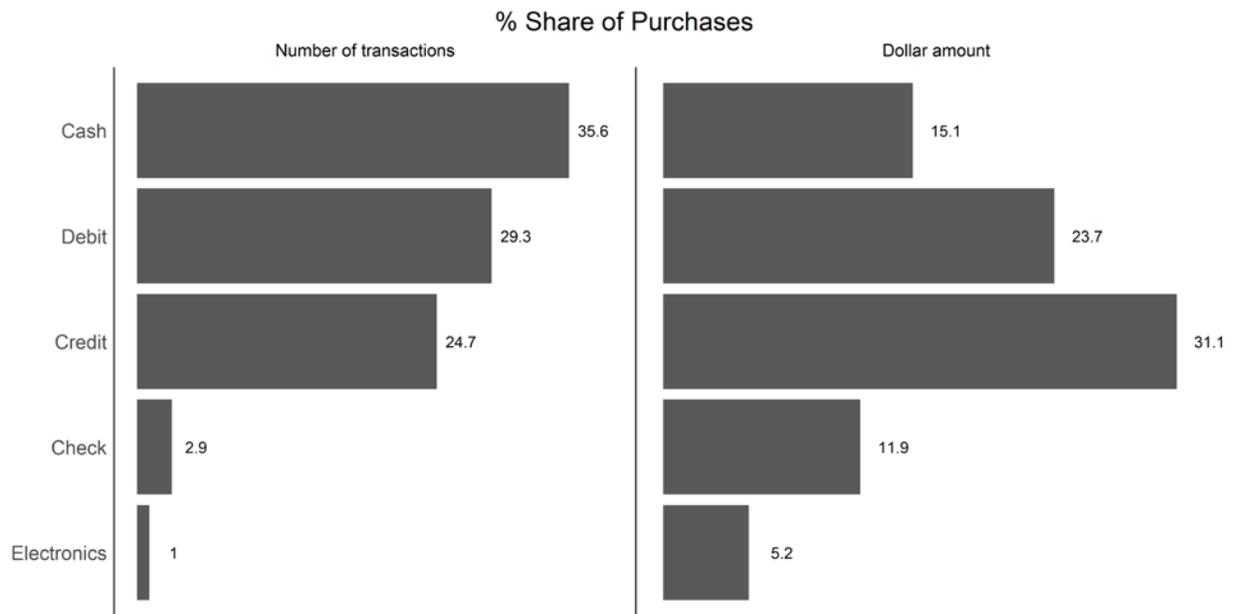
<sup>7</sup> Changes in the questionnaire design in 2017 make the purchases/bills splits from previous years not comparable. Therefore, only cross-sectional data is included in this section.



Source: 2017 DCPC.

**Figure 4: Payment Instrument Use for Bills and Purchases, Shares by Number and Value**

Purchases (both online and in person) accounted for 78.6 percent of all payments by number and 41.3 percent by value in October 2017. Cash was the most popular payment method for purchases, accounting for 35.6 percent of purchases by number, followed by debit cards (29.3 percent) and credit cards (24.7 percent) (Table 3 and Figure 5). In terms of dollar value, however, credit cards captured the highest share of purchases, followed by debit cards. The dollar-value relationship to payment instrument choice described above pertains here: Average dollar values for cash, debit, and credit purchases were, respectively and in ascending order, \$18.6, \$35.5, and \$55.1 (Table 3).

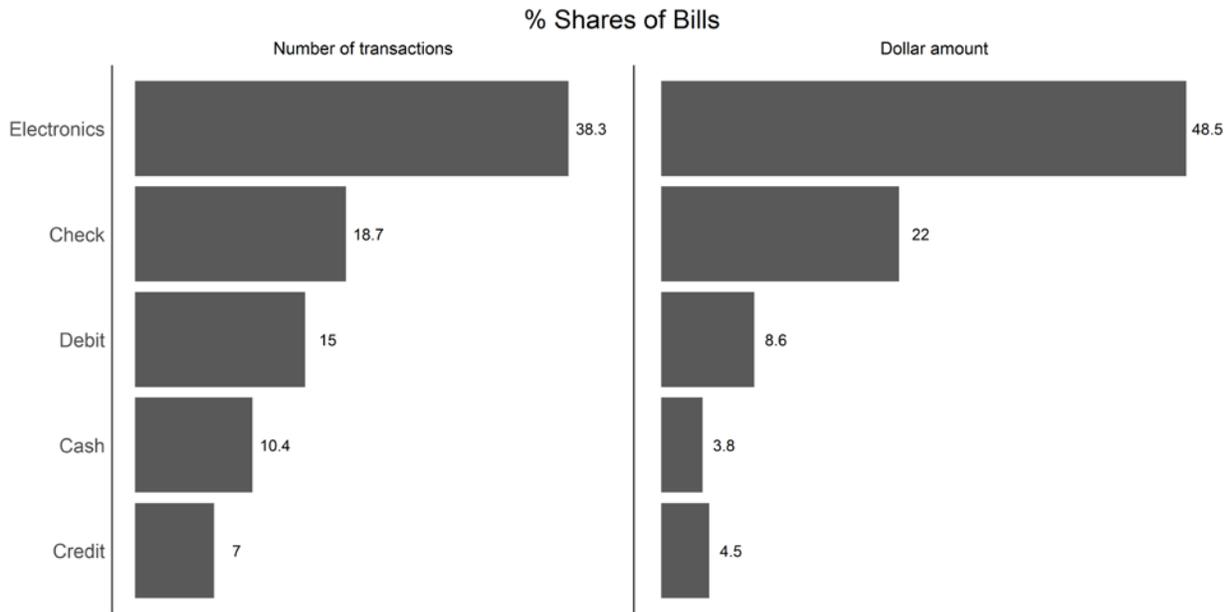


Source: 2017 DCPC. Note: simplified to include the most common payment instruments.

**Figure 5: Payment Instrument Use for Purchases, Shares by Number and Value**

Bill payments accounted for 21.0 percent of all payments by number and 58.0 percent by value in October 2017.<sup>8</sup> As noted above, paper checks and the electronic payment methods are more commonly used for bill paying. In October 2017, 18.7 percent of bills by number were paid by check, 20.2 percent by BANP, and 18.2 percent by OBBP, totaling nearly 6 in 10 of all bill payments (57.0 percent) (Table 4 and Figure 6). In addition, 1 in 5 bill payments was made with a credit card or debit card, and 1 in 10 was paid in cash. Nearly half the value of all bills was paid using electronic payments (BANP and OBBP).

<sup>8</sup> The percentage of purchases and the percentage of bills add up to 99.6, because some observations lacked the purchase vs. bill classification. Similarly, the percentages by value add up to slightly less than 100.



Source: 2017 DCPC. Note: simplified to include the most common payment instruments.

**Figure 6: Payment Instrument Use for Bills, Shares by Number and Value**

## 5. Cash Use

Consumer payment diaries make it possible to track detailed use and management of cash, transaction by transaction, during the course of a day. The DCPC reflects two important differences between cash and other payment methods. First, cash payments account for a relatively large proportion of the *number* of payments, as mentioned above. Of the total number of payments a consumer made in October 2017, on average 30 percent involved cash (Table B). About a dozen other payment instruments accounted for the remaining 70 percent. A second difference is that cash payments account for a relatively small proportion of the *value* of payments. Of a consumer's total payment value, on average only 8.5 percent was funded using cash. The average value of a cash payment was \$23.4, compared with \$109.3 for the average value of all other payments, and the average cash *purchase* was even lower in value at \$18.6 (Tables 2 and 3).

	Number	Value	
	per consumer per month	per transaction	
Cash	12.4	290	23.4
Noncash	28.6	3,128	109.3
Percentage share			
Cash	30.3	8.5	NA
Noncash	69.7	91.5	NA

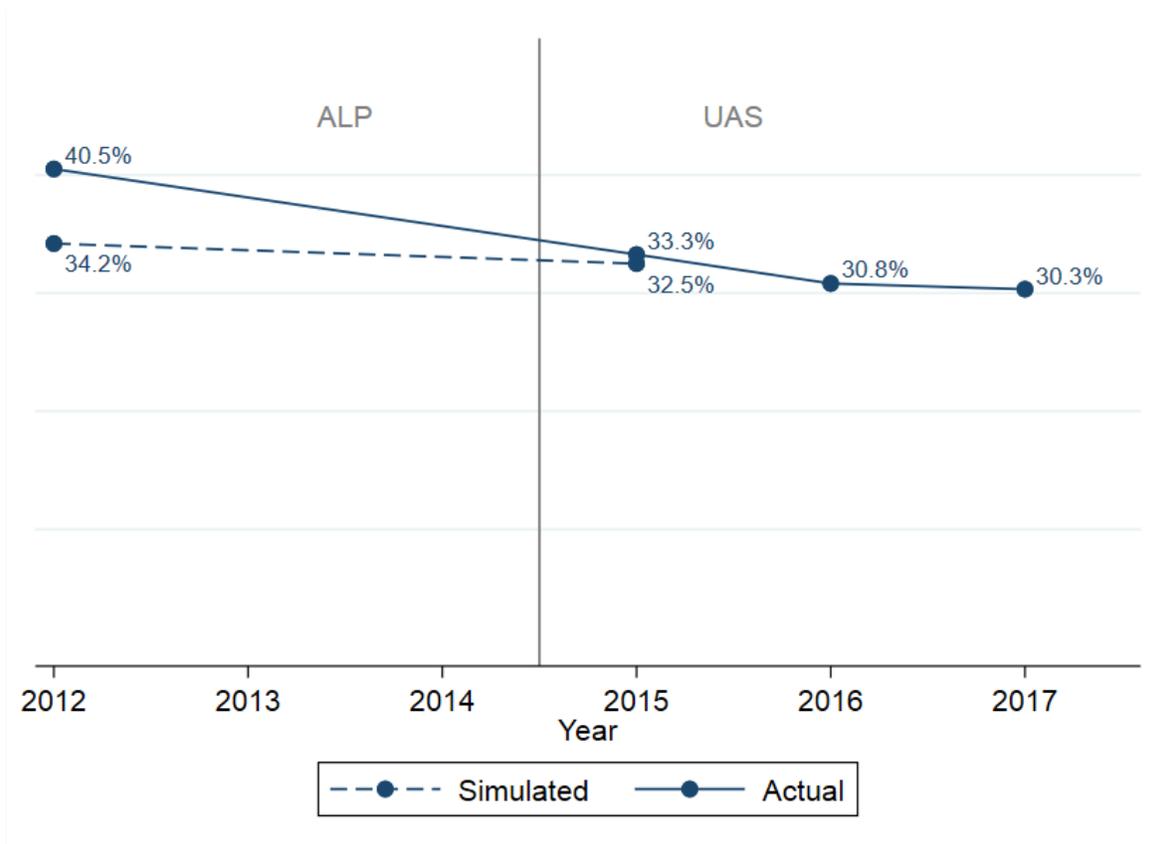
Source: Authors' calculations.

**Table B: Cash and Noncash Payments: Number, Value, and Percentage Shares, October 2017**

Figure 7 shows the estimated change in percentage shares of all payments that are cash. Due to changes in survey methodology, the 2012 DCPC estimate is simulated based on the technique described in Greene, O'Brien, and Schuh (2017). The midpoint of the 2012 DCPC simulated cash share implies an annual rate of decline of about 1.8 percentage points from 2012 to 2015, somewhat less than the estimated decline of 2.5 percentage points from 2015 to 2016.<sup>9</sup> Note that the rate of decline abated to 0.5 percentage points from 2016 to 2017, although that difference is not statistically significant.

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<sup>9</sup> The lower and upper simulated estimates imply annual rates of decline of 1.5 and 2.1 percentage points per year, respectively.



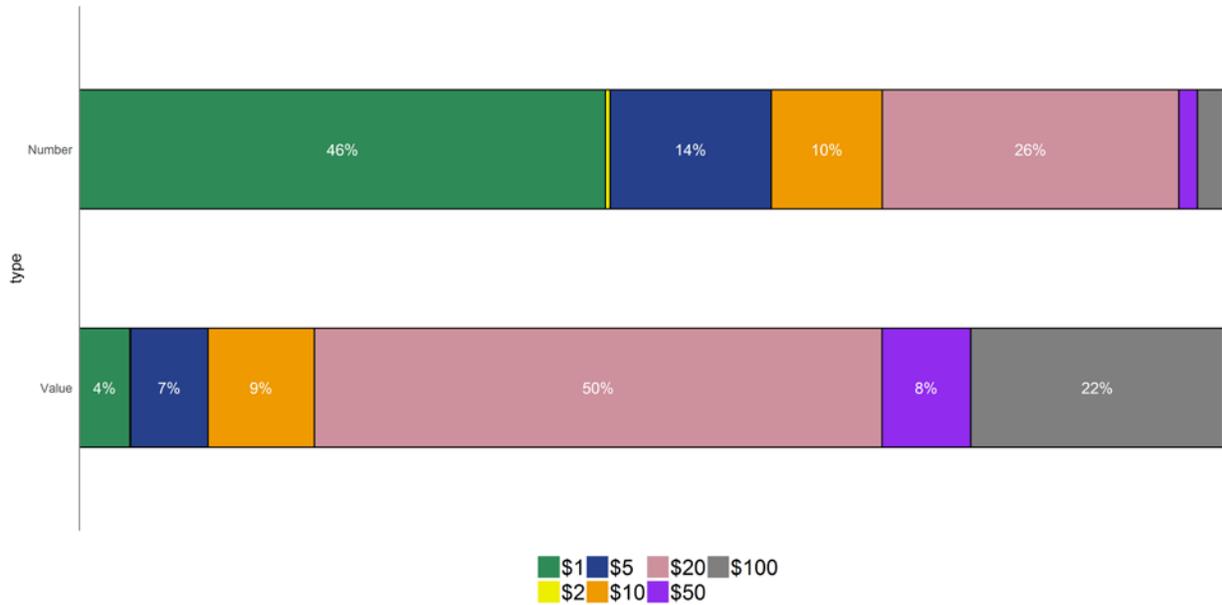
Source: 2012, 2015, 2016, 2017 Diary of Consumer Payment Choice. Notes: 2012 DCPC estimate of the share of cash payments by number (volume shares) is simulated to take into account differences in survey methodology, as described in Greene, O'Brien, and Schuh (2017). The vertical line demarcates periods in which respondents were drawn from different samples, so the estimates may not be comparable over time.

**Figure 7: Volume Shares of Cash Payments, 2012–2017**

## 6. Cash Holdings

The DCPC obtains data on consumers' holdings of cash on their person (pocket, purse, or wallet) and stored elsewhere (home, car, office, and such). The data on cash holdings on person were collected every night; the data on stored cash were collected on the first and final nights of the survey. For both measures, respondents were asked to count the exact number of bills held by denomination, and the online questionnaire automatically summed the dollar values of cash holdings by denomination and in total. Holdings of coins were not reported.

In October 2017, a U.S. consumer held on average \$58.9 of cash on his or her person each day, equivalent to the 2016 average of \$57.2 (no statistically significant difference).<sup>10</sup> These holdings represent an average of 5.6 bills of all denominations per consumer. By value, about half of cash on person was in the form of \$20 bills and one-fifth was in \$100 bills. By number, \$1 bills were the most commonly held denomination (46.0 percent of bills held) (Table 5).



Source: 2017 DCPC, Table 4. Note: \$2 shares are too small to be visible.

**Figure 8: Cash Holdings on Person by Denomination, 2017**

Fewer consumers store cash elsewhere. While 65.1 percent of consumers held at least \$1 on their persons on at least one of their diary days, just 21.7 percent had at least \$1 stored elsewhere. In 2017, for all consumers, the average value of cash stored elsewhere was \$198.7. Among the subset of consumers who had some stored cash (almost 22 percent of the sample), the average value of that cash was \$738. As one might expect, most of the value of stored cash was carried in \$100 bills: almost three-quarters of the value of stored cash. (As documented elsewhere

<sup>10</sup> Cash holdings were calculated using day-of-week weights. The results were not statistically different from those using individual weights. Please see the Technical Appendix for more details on the weighting methodology.

[Judson 2017, Greene and Schuh 2017], by value, most currency in circulation is not stored with U.S. consumers.)

## **7. Conclusion**

Data from the 2017 Diary of Consumer Payment Choice show that consumers continue to use cash, debit cards, and credit cards for most of their payments by number. The data show stability in the shares of consumer payments by number and value by payment instrument between 2016 and 2017. The data also show, however, a small but statistically significant decline in the total number of consumer payments from one year to the next. Many findings are consistent with the results from earlier surveys of consumers. In particular, consumers tend to use cash and cards for lower-value transactions, and electronic payments and checks for higher-value transactions. Payment choice also varies with purpose: Consumers tend to use cash and cards for purchases, but they are more likely to use electronic payments and checks to pay their bills. Cash is the most popular payment instrument by number for purchases, and electronic methods linked to a bank account are by far the most popular payment instrument by number for bills. For purchases by value, debit cards and credit cards have higher shares than cash. Consumer holdings of cash have been stable over the two years, 2016 and 2017.

## **Appendix A: Overview of Survey Methodology**

This section provides a brief overview of the key elements of the DCPC methodology for 2017. A complete Technical Appendix will be published later in 2018. In the interim, Angrisani, Marco, Foster, and Hitczenko (2018) contains much technical information about the DCPC.

### **Sampling Frame and Samples**

The 2017 DCPC was implemented with representative samples from the Understanding America Study (UAS), managed by the University of Southern California (USC) Dornsife Center for Economic and Social Research (CESR) (Table A.1).

	2015	2016	2017
UAS available panel	1,947	5,861	5,144
Number of unique respondents*	1,087	3,047	2,871
Respondents completing all DCPC days**	1,016	2,848	2,793
Longitudinal panelists 2015–17			688
Longitudinal panelists 2016–17			2,226

Source: Federal Reserve Bank of Boston. Notes: Longitudinal panelists participate in multiple years. \*Completed at least one day. \*\*Completed at least four days (“night before” plus three diary days).

**Table A.1: Overview of Samples, 2015, 2016, and 2017**

## Questionnaires

The DCPC is a mixed-mode survey administered to diary respondents (“diarists”) over three consecutive days. It also includes a pre-diary online survey. In the first mode, diarists record their payments, cash management, and related information for each assigned day using some form of memory aid of their choosing. Examples of memory aids include a long-form or short-form paper aid or a receipt bag provided by the survey vendor. In the second mode, diarists enter the data from their memory aid or by recall into a 20-minute online survey each night. Most of the online questionnaire collects information about payments and related data; each day, it also includes questions specific to that day. Together, the two modes are expected to take approximately 30 minutes per day to complete, and respondents receive a \$20 per day incentive. The pre-diary online survey takes about 10 minutes, and respondents receive \$10, for a total incentive of \$70 per diarist.

Prior to starting the DCPC, all diarists are required to take the 30-minute online Survey of Consumer Payment Choice (SCPC), for which they receive an incentive of \$20 upon completion. A respondent may complete the SCPC any time from one to about 45 days before beginning the DCPC. For 2017, the SCPC questionnaire was shortened due to time constraints; the most notable change is that cash holdings now are reported only in the DCPC and not in the SCPC. Also for 2017, the DCPC questionnaire was changed to assist respondents in reporting the payee and identifying bill payments. These changes mean that results for the breakdowns of bills and purchases are not comparable between 2016 and 2017. All questionnaires are posted online.

## Diary Implementation

Diarists are randomly chosen to begin participating in the DCPC each day throughout the defined sample period for the year. Thus, each new diary wave contains a small sample of respondents (an average of 84.6 per day in 2017) that is, on average, representative of all U.S. consumers. Diary waves are staggered to start two days before the official beginning of the DCPC and end two days after the official end date. This way, each day contains approximately one-third of respondents who are completing each day of the diary (one, two, or three) and every day-specific group of questions occurs on each day of the month. As a result of this implementation strategy, DCPC data provide aggregate estimates that are representative of all U.S. consumers on average for each day of the sample period (day-of-the-month weights) and, under certain assumptions about temporal trends, for the sum of all days in the sample period (monthly weights), usually the month of October. In addition, the data provide strong evidence that payment behavior is heavily influenced by a weekly cycle, with different behaviors on different days of the week. As a result, a hybrid approach for the estimates generates estimates for each day of the week by pooling across the relevant monthly data and then aggregates these to generate estimates for any particular period of time. (Also see Angrisani, Marco, Foster, and Hitczenko [2017b] and Angrisani, Marco, Foster, and Hitczenko [2018].)

## Data Preprocessing

All DCPC survey responses reported here have been analyzed for errors, inconsistencies, and influential outlier effects. Where necessary, the DCPC data have been cleaned and adjusted using statistical methods similar to methods used previously and reported in earlier SCPC and DCPC technical appendices. Because consumer payments and cash management behavior exhibit significant day-of-the-week effects and calendar months can vary notably across years in their composition of days of the week, the raw data contain seasonal fluctuations. The results for this report use revised sampling weights that attempt to adjust for differences in consumer payment behaviors across days of the week (Mondays, Tuesdays, etc.) within each year.

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