

## Credit card debt and payment use

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### Abstract

Approximately half of credit card holders in the United States regularly carry unpaid credit card debt. These so-called “revolvers” exhibit payment behavior that differs from the behavior of those who repay their entire credit card balance every month. So far, there has been no empirical analysis exploring the relationship between revolving behavior and patterns of payment use, such as substitution away from credit cards to other payment methods. Using data from the 2005 Study of Consumer Payment Preferences, we find that credit card revolvers are significantly more likely to use debit and less likely to use credit than convenience users, that is, those who repay their balances each month. There is no difference between the two groups in their use of check or cash. Revolvers are also more likely to see debit as superior with respect to control over money and budgeting. The findings show that revolvers not only adopt, but also use, debit more frequently, as a means to control their spending and improve their financial planning. The results suggest that consumers learn from their past financial behavior and change their payment habits after experiencing financial consequences. © 2010 Academy of Financial Services. All rights reserved.

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### 1. Introduction

Borrowing money on a credit card is expensive. Despite the high cost, over 46% of credit card holders carry balances on their cards. The median value of credit card debt reported by households with card balances was around \$3,000 in 2007, while the mean exceeded \$7,000

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(2007 dollars) (Bucks et al., 2009). Financial distress associated with managing such credit card debt may contribute to personal bankruptcy filing (Domowitz and Sartain 1999, Stavins 2000, White 2007).

The high levels of credit card debt and the consequences resulting from the debt make the study of individuals who carry credit card balances an important topic in payments research. Previous research has primarily explored the underlying motivations for carrying credit card debt, focusing on either cost-based (Brito and Hartley 1995, Calem and Mester 1995, Calem et al., 2005, Telyukova and Wright 2005, Zinman 2007) or behavioral explanations (Ausubel 1991, Ausubel and Shui 2005, Bar-Gill 2004, Laibson et al., 2000, Meier and Sprenger 2007, Prelec and Lowenstein 1998, Thaler 1999).

Relatively little attention has been paid to the payment behavior of individuals *after* they incurred credit card debt. An important—yet previously unexplored—question is whether credit card revolvers switch from using credit cards to alternative payment instruments to regain financial control. In other words, do consumers utilize their payment methods as part of the overall financial planning? Consumers who carry credit card debt—commonly called revolvers—face finance charges on the marginal purchase. Absent liquidity constraints, such individuals should prefer alternative, lower-cost payment mechanisms at the point of sale. Zinman (2009) and Klee (2006) document that revolvers do appear more likely than nonrevolvers to acquire debit cards. However, payment adoption—that is, obtaining a payment instrument—differs from payment use.<sup>1</sup> Whether revolvers actually make payment substitution and therefore alter their payment behavior to curtail their debt, however, remains an open question. Given the high levels of debt and its potentially dire consequences, it is important to ask whether consumers change their behavior once they incur credit card debt. Do credit card borrowers learn about debt management and alter their payment habits? Or do they repeat their old patterns, even if they recognize the financial consequences?

Using data from the Study of Consumer Payment Preferences for over 1,800 individuals who hold both credit and debit cards, we explored differences in payment use between revolvers (those who carry debt) and convenience users (those who do not) for payments made with four different methods: credit cards, debit cards, checks, and cash. We found significant evidence of substitution of debit for credit by individuals with unpaid credit card balances: Individuals who regularly carry revolving balances make a significantly lower proportion of their total payments with credit and a higher proportion of their total payments with debit. In contrast, there was no significant difference in the use of check or cash between revolvers and convenience users. Furthermore, revolvers were much more likely than convenience users to report debit as the payment method chosen most frequently at the point of sale.

We complemented our analysis of payment behavior with qualitative data on payment attribute perceptions. Perceptions—or perceived differences in payment attributes—have been found to be important determinants of consumer payment behavior (see Ching and Hayashi 2010, Hirschman 1982, Mantel 2000, Miyazaki and Fernandez 2001, Schuh and Stavins 2010). Revolvers' perceptions of debit cards are different from those of convenience users, and those differences may be linked to their substitution behavior. We found that individuals with revolving balances were much more likely than convenience users to feel that debit offers superior budgeting and control over money relative to credit. Because earlier

research found perceptions to be important determinants of payment substitution, we conclude that revolvers view debit cards as a budgeting tool to regain financial control and improve their future financial planning after incurring debt.

Our results are the first to show substitution from credit to debit for actual payments made by individuals with revolving credit card balances. This substitution is likely motivated by concerns about debt and financial control. During the recent policy changes associated with the Credit Card Accountability Responsibility and Disclosure Act of 2009 (Credit CARD Act of 2009, H.R. 627), credit card issuers have received increased levels of scrutiny and criticism, from both policymakers and the media. This paper shows that consumers learn from the consequences of their past financial behavior and change their payment habits in response. Therefore, although increased transparency and disclosure resulting from the CARD Act of 2009 will undoubtedly help borrowers manage their debt, further policy intervention that would curtail credit card lending may not be warranted.

The paper focuses on demand-side reasons for changes in payment behavior. It is possible that credit card revolvers were forced to switch to debit cards because of supply side constraints. For example, revolvers may have reached their borrowing limits and been forced to switch to debit. Our data do not allow us to distinguish among the possible reasons for the observed behavior, as we have no information about respondents' liquidity, debt, or access to credit. However, there is some evidence that reaching credit card limits was unlikely: according to a recent article in *The Wall Street Journal*, "a relatively small portion of U.S. consumers have actually maxed out their credit cards, and most currently have ample room to spare on their unused credit lines. For example, the industry credit line utilization rate ... was just 17% at the end of 2008" (Whitney 2009).<sup>2</sup>

The remainder of the paper is organized as follows: the next section summarizes relevant literature. The following section describes the Study of Consumer Payment Preferences, followed by descriptions of the methodology and the relevant payment measures. The subsequent section presents results related both to substitution behavior and to payment attribute perceptions. The last section concludes the paper.

## 2. Literature review

Most of the literature on revolving credit card debt has focused on the question: "Why do credit card holders revolve?" Because credit card debt is more expensive than other sources of credit, and because some revolvers hold assets earning a much lower rate of interest than they pay on their credit card debt, some economists have concluded that neoclassical economic models cannot explain consumers' decisions to revolve, and have instead sought behavioral explanations (e.g., Laibson et al., 2000). Others have attributed the decision to revolve to more standard neoclassical explanations, namely, that consumers hold low-yielding assets and credit card debt simultaneously for precautionary and liquidity reasons.

Behavioral research on credit card use (Prelec and Loewenstein 1998, Thaler 1999) highlights decoupling, or separating payment from consumption. With a credit card, payment is both later than and separated from the act of purchasing. Credit card decoupling may encourage credit card spending and potentially lead to overspending. Ausubel (1991) sug-

gests that some consumers have self-control or commitment problems. They believe that they will not revolve their credit card debt, but cannot follow through on not revolving. In later work, Ausubel and Shui (2005) show that the credit market features critical time inconsistencies. Consumers are attracted by teaser rates for short periods, but they would have been better off financially had they chosen higher rates for longer durations, given their borrowing patterns. For behavioral economists, revolving credit card debt is a result of time inconsistency.

Using a neoclassical approach to credit card debt, Telyukova and Wright (2005) and Zinman (2009) show that consumers maintain balances in their low-interest bank accounts for liquidity reasons, even while they pay back their high-interest credit card debts. A “rational” consumer may pay interest on credit card debt to avoid some of the costs associated with not holding precautionary or transactions balances. Ausubel and Shui and others have noted that switching costs may play a role in consumers’ decisions to maintain their credit card accounts despite high interest rates. Callem and Mester (1995) indicate that individual borrowing is negatively correlated with the propensity to search for better credit card deals.

In one of the few papers analyzing credit card revolvers’ other payment behavior, Zinman (2007) found, based on data from the Survey of Consumer Finances (SCF), that revolvers are more likely than convenience users to use debit cards. These consumers use debit cards to avoid sinking further into debt on their credit cards. Similarly, in Fusaro (2008), revolving consumers use debit as a restraining tool to avoid raising their credit card debt. Consumers choose to adopt credit cards as a self-control mechanism, and those who already revolve may use them to avoid (additional) finance charges.

Based on the SCF data, Klee (2006) found that the use of debit cards differs between revolvers and convenience users: while only 44% of convenience credit card users also use a debit card, 59% of revolvers do. Moreover, debit card use and convenience credit card use seem to be strong substitutes. In addition, based on the SCF data, Kim et al. (2006) found that the use of checks, ACH, and Internet bill payments is different for revolvers and nonrevolvers.

The importance of perceptions is frequently cited in the marketing literature, although little empirical work has been done on the subject with respect to payments. The payments literature to date has focused largely on the strong relationship between demographics and payment choice (see, e.g., Anguelov et al., 2004, Mester 2003, and Stavins 2001). Hirschman (1982) claims that attribute perceptions should be strongly linked to product use and finds support for her hypotheses in a survey. Miyazaki and Fernandez (2001) obtain a similar result for the effect of risk perceptions on the adoption of online shopping. Mantel (2000) finds a strong correlation between a variety of control-related preferences and adoption of electronic bill payment. Jonker (2005) shows that Dutch consumers’ perceptions of payments are important in their choice of payment method at checkout.

Schuh and Stavins (2010) estimate the effects of payment characteristics on consumer payment behavior and find that the characteristics have a strong effect on both payment adoption and intensity of use. Moreover, they show that when the characteristics are included in the regressions, socio-demographic attributes become much less important in explaining consumer payment behavior. However, their data do not include any information about

revolving on credit cards. Similarly, Ching and Hayashi (2010) find that when perceptions of payments are included in payment choice regressions, the fit improves and the effects of demographic characteristics diminish.

None of the above studies looks specifically at differences in perceptions between credit card revolvers and convenience users. Because perceptions seem to be an important factor affecting payment behavior in general, we look at this specific comparison and test whether perceptions and credit card revolving are related to choice of payment method.

### **3. The study of consumer payment preferences**

We used survey data specifically tailored to answering the question of how revolving credit card balances are related to payment method use. In the spring of 2005, Dove Consulting, jointly with the American Bankers Association, conducted its fourth biannual payments survey, the Study of Consumer Payment Preferences (SCPP). Some of the surveys were distributed by mail, while others were administered on the Internet. A total of 3,008 individuals over 18 years of age across the United States were surveyed. Of the 3,008 respondents, 2,350 completed online surveys, and the remaining 658 submitted surveys by mail.

The SCPP contains a depth of information on payment behavior and consumer perceptions of payments not available from any other survey to date. Individuals were asked over 100 questions related to payment activity. The survey instrument was over 40 pages long, and there were over 650 payment-related variables in the SCPP data set. Questions focused on adoption of payment instruments, their use in specific locations, general payment activity, and individual perceptions of payment attributes. There were additional questions about socio-demographic characteristics.

For our purposes, we focused on a subsample of SCPP respondents: those individuals who currently held both credit and debit cards and provided complete socio-demographic information. (It was assumed that all respondents already had the option to use check or cash at the point of sale.) This choice of sample allowed us to examine substitution between credit cards and other payment instruments—debit, cash, and check—after the adoption decisions had taken place. In the sample, 1,880 individuals held both debit and credit cards and provided complete socio-demographic information. Out of that sample, 43% reported regularly carrying balances on their credit cards, as based on their responses to the following statement: “I regularly carry a balance on my credit card (do not pay off the balance in full).” The proportion of revolvers was almost identical to that in the 2004 Survey of Consumer Finances, where approximately 45% of credit card holders carried balances (authors’ calculation).

Table 1 shows the socio-demographic characteristics of individuals included in our analysis along with separate summary statistics for revolvers and convenience users. The values in the table are the fractions of the sample in each category. For example, 51% of the sample were men. Individuals in the sample were predominantly white, with at least some college education. On average, individuals in the sample had reasonably high levels of financial experience: the average length of time for which a person had held his or her

Table 1 Demographic variable means by credit card revolving behavior

Variable	Total <i>N</i> = 1,880 (1)	Convenience users <i>N</i> = 1,073 (2)	Revolvers <i>N</i> = 807 (3)	<i>p</i> -value from <i>t</i> -test $H_0: (2) = (3)$
Revolving balances (= 1)	0.43	0	1	
Male	0.51	0.51	0.50	0.68
Age				
Over 65 years	0.10	0.12	0.08	0.01
55–64 years	0.21	0.23	0.18	0.01
45–54 years	0.18	0.18	0.18	0.90
35–44 years	0.25	0.22	0.28	0.00
25–34 years	0.20	0.19	0.23	0.03
18–24 years	0.06	0.07	0.05	0.08
Race				
Other	0.04	0.05	0.04	0.29
Hispanic	0.07	0.06	0.08	0.30
White	0.70	0.71	0.70	0.60
Asian	0.06	0.07	0.06	0.77
Black	0.12	0.12	0.13	0.42
Income				
Over \$150K	0.03	0.04	0.02	0.19
\$100–\$149K	0.10	0.10	0.09	0.84
\$60–\$99K	0.28	0.26	0.30	0.03
\$40–\$59K	0.25	0.25	0.25	0.83
\$20–\$39K	0.25	0.25	0.24	0.85
Less than \$20K	0.10	0.11	0.09	0.08
Education				
Graduate school	0.14	0.15	0.13	0.22
College	0.31	0.31	0.31	0.74
Some college	0.38	0.38	0.39	0.63
High school	0.16	0.15	0.17	0.23
Some high school	0.01	0.01	0.01	0.37
Additional controls				
Check account years	11.51	11.61	11.38	0.60

primary checking account exceeded 11 years. The last column shows the *p*-values from testing the null hypothesis that the proportion of convenience users and the proportion of revolvers is equal within each subgroup. There were very few significant differences in socio-demographic characteristics between individuals who did and did not carry credit card balances, although revolvers were generally younger than those who repaid their balances.

#### 4. Methodology

Our primary measures of payment use at the point of sale were: (1) the proportion of total payments made with a given payment instrument and (2) the payment instrument cited as the one most frequently used at the point of sale.

#### 4.1. Payment proportions

The survey asked respondents to indicate how many purchases they make with a given payment instrument in stores in a given week. The question was worded as, “How often do you use the following payment methods to make purchases in stores?” The options were “Don’t use, once a week or less, 2–4 times per week, 5–7 times per week, or 8 or more times per week.”

For payments made with each method  $j$  we used the midpoint of the interval response as the number of payments made. In the SCPP data, the highest response, “>8 payments,” was top-coded as 10. The results were robust to variations in this top-coding. The lowest response was coded as 0. We divided the number of payments made with payment  $j$  by the total number of payments made by consumer  $i$ , to obtain the proportion of purchases made by consumer  $i$  with payment  $j$ .

$$\text{Proportion}_{ij} = \frac{N_{ij}}{\sum_{p \in (\text{Credit, Debit, Cash, Check})} N_{ip}} \quad (1)$$

where  $N_{ij}$  is the number of payments made by consumer  $i$  with payment  $j$ .

The resulting variables *Proportion Credit*, *Proportion Debit*, *Proportion Check*, and *Proportion Cash* were used as dependent variables in our analysis. Table 2 defines the variables used in the paper.

#### 4.2. Most frequent payment

In addition to asking about the total number of payments, the survey also asked respondents to state which payment instrument they use most frequently at the point of sale. The question was worded as, “When you make purchases *overall*, which method of payment do you use most often?”

Responses to this question generated four binary variables used in our analysis: *Most Frequent Credit*, *Most Frequent Debit*, *Most Frequent Check*, and *Most Frequent Cash*. These variables were equal to 1 if the given payment instrument was chosen most frequently, and 0 otherwise.

In addition to these payment behavior variables, the survey also asked respondents to report their participation in credit and debit card rewards programs. Such program participation changes the relative price of using a certain payment instrument and so represents an important determinant of payment behavior (for evidence, see Ching and Hayashi 2010). Of our sample of 1,880 individuals, 1,722 answered the question asking whether or not they had either debit card or credit card rewards, or both. Table 3 presents the average proportion of payments made with each payment method at point of sale and the fraction of respondents citing each payment method as most frequently used. All the numbers were broken down by revolving behavior. In contrast to the demographic variables, these variables show that individuals with revolving balances exhibited payment patterns that differ significantly from those of convenience users. Even though cash and check payment behavior was similar for revolvers and convenience users (based on the  $p$ -values in the last column), revolvers show

Table 2 Variable definitions

Variable	Definition
Revolving balances (=1)	Equals 1 if cardholder regularly carries a balance on his credit card (does not pay off the balance in full); 0 if cardholder does not carry balance
Proportion of payments made at point of sale	Share of payments made at point of sale using a particular payment instrument: cash, check, credit card, or debit card. These variables are bounded between 0 and 1
Payment type cited as most frequently used at point of sale	Set of dummy variables that equal 1 if the respondent said that he used that payment instrument (check, cash, credit card, or debit card) most often overall; 0 otherwise
Debit better than credit for . . .	Set of dummy variables that equal 1 if the respondent gave a positive response for debit cards and a negative response for credit cards with respect to one of these characteristics: ease, acceptability, safety, budgeting, control, and refunds. Each variable is 0 otherwise
Male	Equals 1 if male
Age categories	Dummy variables for each age range: 18–24; 25–34; 35–44; 45–54; 55–64; 65+
Race categories	Separate dummy variables for Black, Asian, White, Hispanic, and Other
Income categories	Dummy variables for each income range: under \$20,000; \$20,000–39,999; \$40,000–59,999; \$60,000–99,999; \$100,000–149,999; \$150,000 and over
Education categories	Separate dummy variables for highest level of education completed: some high school; high school; some college; college; graduate school
Check account years	Number of years the respondent has banked with financial institution where he kept his primary checking account
Credit card rewards	Equals 1 if respondent said he received rewards (for example, miles, points, cash-rebate) for using his credit card for purchases; 0 otherwise
Debit card rewards	Equals 1 if respondent said he received rewards (for example, redeemable points for airline travel, sweepstakes, or discounts) for using debit card for purchases (entering PIN or signing receipt); 0 otherwise

significant substitution from credit to debit: they cited a significantly lower proportion of total payments made with credit and a higher proportion of total payments made with debit. Revolvers were also significantly more likely to cite debit, and significantly less likely to cite credit, as their primary payment choice. Revolvers are also somewhat more likely to use checks than are convenience users (although the difference is less statistically significant), providing further support that revolvers try to improve their financial management relative to their past behavior, by drawing on funds that are available in their checking accounts instead of borrowing.

Table 3 Average payment method use by credit card revolving behavior

Variable	Total <i>N</i> = 1,880 (1)	Convenience users <i>N</i> = 1,073 (2)	Revolvers <i>N</i> = 807 (3)	<i>p</i> -value from <i>t</i> -test $H_0: (2) = (3)$
Proportion of payments made at point of sale				
Credit card	0.21	0.23	0.19	0.00
Debit card	0.36	0.34	0.40	0.00
Cash	0.31	0.32	0.30	0.09
Check	0.12	0.11	0.12	0.42
Proportion citing payment type as most frequently used at point of sale				
Credit card	0.24	0.28	0.18	0.00
Debit card	0.39	0.34	0.45	0.00
Cash	0.32	0.34	0.30	0.10
Check	0.05	0.04	0.06	0.05

### 4.3. Perceptions of payments

Perceptions of payments are important in affecting consumer payment decisions (see Ching and Hayashi (2010) for further discussion of perceptions in the SCPP data and Schuh and Stavins (2010) for analysis of the importance of payment perceptions in consumer payment use). In addition to asking about payment use, the SCPP asks a series of questions on individual perceptions of payment instruments. The responses to these questions allowed us to explore underlying reasons for the payment behavior that consumers reported. For each payment instrument, respondents were asked whether they viewed it as: *easy* to use, widely *acceptable*, *safe*, allowing *control* over money, helping in *budgeting*, and easy to get *refunds* or resolve disputes (for the design of these survey questions, please see Appendix Table). Individuals responded either “Yes” or “No” to each question, for each payment instrument.

The perceptions of payments elicited in the SCPP provide an opportunity to see what consumers view as salient features of each payment instrument and to explore how these perceptions correlate with payment use. For the purposes of this paper, we are primarily interested in consumers’ perceptions of debit cards and credit cards.

We used responses to the above perception questions to generate six binary variables that were equal to 1 if the respondent answered “Yes,” and 0 if the respondent answered “No”; these variables were: *Easy*, *Acceptable*, *Safe*, *Control*, *Budgeting*, and *Refund*. Further, we generated binary variables that are equal to 1 if the survey respondent answered positively in the case of debit *and* negatively in the case of credit—that is, they show whether or not the respondent clearly perceived debit as superior to credit. The following six variables were used in our analysis of perceptions: *DebitBetterEasy*, *DebitBetterAcceptable*, *DebitBetterSafe*, *DebitBetterControl*, *DebitBetterBudgeting*, and *DebitBetterRefund*.

Table 4 shows summary statistics of these variables, broken down by revolvers and convenience users, for individuals with nonmissing socio-demographic characteristics. Individuals with revolving balances were significantly less likely to see debit as superior to credit with respect to ease of use and acceptability, but significantly more likely to see debit as better with respect to control over money and budgeting. No significant difference is observed between convenience users and revolvers for safety or ease of refunds.

Table 4 Proportion of consumers reporting debit better than credit

Variable	Total	Convenience users	Revolvers	$p$ -value from $t$ -test $H_0: (2)T=T(3)$
	$N = 1,722$ (1)	$N = 964$ (2)	$N = 758$ (3)	
Debit better than credit for . . .				
Ease	0.17	0.20	0.13	0.00
Acceptability	0.17	0.19	0.15	0.06
Safety	0.28	0.28	0.28	0.78
Control	0.63	0.60	0.67	0.00
Budgeting	0.44	0.40	0.49	0.00
Refund	0.15	0.16	0.13	0.11

The  $t$ -tests presented in Table 4 indicate that there were significant differences in perceptions that were directly related to debt and budgeting. That suggests that revolvers substitute debit for credit to better manage their debt.

In the next section, we used econometric estimation to further explore differences in payment behavior associated with revolving balances, controlling for socio-demographic characteristics and participation in rewards programs. We also studied how perceptions were related to revolving behavior, controlling for socio-demographic characteristics and rewards program participation.

## 5. Results

### 5.1. Revolving balances and proportion of payments

If revolvers try to curtail their debt and recognize the advantages of debit in their financial planning, we expect them to substitute away from credit cards and into alternative payment methods for purchases. Consequently, we expected revolving balances to be associated with a lower proportion of credit card payments and a higher proportion of other payments. In Table 5 we present the results of ordinary least squares regressions of the following form, with robust standard errors:

$$Proportion_{ij} = \beta_0 + \beta_1 RevolvingBalances_i + \gamma x_i + \varepsilon_i \quad (2)$$

$Proportion_{ij}$  is the proportion of payments made by consumer  $i$ , using payment  $j$ .  $RevolvingBalances_i$  is a binary variable that takes the value 1 if an individual regularly carried a credit card balance and 0 otherwise.  $x_i$  is a vector of socio-demographic and other characteristics of consumer  $i$  that varies with specification but always includes categorical variables for gender, age group, income group, race, education, and a continuous variable for the length of time in years that an individual had held his or her current checking account. The socio-demographic variables are defined as shown in Table 1.

In Columns 1 and 2 of Table 5 we present regressions with  $ProportionCredit$  as the dependent variable. In the initial specification of Column 1, we found that, controlling for socio-demographic characteristics, carrying revolving credit card balances was associated

Table 5 Payment use and revolving balances: ordinary least squares regressions

	Proportion credit		Proportion debit		Proportion cash		Proportion check	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Revolving balances (=1)	-0.04***	-0.02***	0.05***	0.04***	-0.02	-0.02	0.01	0.00
Male	0.01	0.01	-0.05***	-0.04***	0.07***	0.07***	-0.03***	-0.03***
Age								
Over 65 years	0.06***	0.04*	-0.07***	-0.05**	-0.02	-0.02	0.03*	0.04**
55–64 years								
45–54 years	-0.03	-0.02	0.01	0.01	0.03*	0.02	-0.01	-0.01
35–44 years	-0.01	-0.02	0.02	0.02	-0.01	-0.01	0.00	0.01
25–34 years	0.00	-0.01	0.04**	0.05**	-0.01	-0.01	-0.04***	-0.03**
18–24 years	0.00	0.00	0.02	0.01	0.03	0.03	-0.05***	-0.04***
Race								
Other	-0.05**	-0.03	0.06**	0.05	0.01	0.00	-0.02	-0.02
Hispanic	0.00	0.02	0.02	-0.01	0.00	0.01	-0.02	-0.02
White								
Asian	0.12***	0.13***	-0.12***	-0.12***	-0.01	0.00	0.00	0.00
Black	-0.06***	-0.03**	0.01	-0.02	0.07***	0.07***	-0.03***	-0.02***
Income								
Over \$150K	0.12***	0.05	-0.07*	-0.03	-0.01	0.01	-0.04**	-0.03*
\$100–\$149K	0.09***	0.07***	-0.05**	-0.04	-0.03	-0.02	-0.01	-0.01
\$60–\$99K	0.03**	0.02	-0.02	-0.01	-0.02	-0.02	0.00	0.00
\$40–\$59K	0.00	0.00	0.00	0.01	-0.01	-0.01	0.01	0.01
\$20–\$39K								
Less than \$20K	0.00	0.02	-0.06**	-0.07***	0.05**	0.04**	0.01	0.00
Education								
Graduate school	0.11***	0.08***	-0.08***	-0.06***	-0.02	-0.02	-0.01	0.00
College	0.04***	0.02*	-0.02	-0.01	-0.02**	-0.02	0.00	0.00
Some college								
High school	-0.02	-0.02	-0.05**	-0.05***	0.04**	0.04**	0.03**	0.03**
Some high school	-0.05	-0.02	0.05	0.00	0.04	0.06	-0.04*	-0.04*
Additional controls								
Check account years	0.00	0.00	-0.00***	-0.00**	0.00	0.00	0.00***	0.00***
Credit card rewards		0.17***		-0.13***		-0.02*		-0.02**
Debit card rewards		-0.09***		0.12***		-0.02		-0.01*
Constant	0.18***	0.15***	0.43***	0.46***	0.27***	0.27***	0.13***	0.12***
N	1880	1722	1880	1722	1880	1722	1880	1722
R <sup>2</sup>	0.12	0.21	0.09	0.13	0.06	0.07	0.07	0.07

*Note.* Coefficients from ordinary least squares regression with robust standard errors. Dependent variable: proportion of payments made with credit card (Columns 1 and 2), debit card (Columns 3 and 4), cash (Columns 5 and 6), and check (Columns 7 and 8).  
Level of significance: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

with a significantly lower proportion of credit card payments. In Column 2, we additionally controlled for participation in credit and debit card rewards programs. Although rewards program participation may be endogenous, including it in the regression did not qualitatively change our results. Across all specifications, we found that carrying revolving balances was associated with a reduction of between 2% and 4% in the proportion of payments for which credit cards were used. Age and education had the expected effects on the proportion of payments for which credit cards were used, and having rewards on either credit or debit raised the use of that payment card, and lowered the use of the other card, consistently with expectations.

In Columns 3 and 4 of Table 5 we present regressions with *ProportionDebit* as the dependent variable. Socio-demographic characteristics, along with rewards program participation, had strong effects on the proportion of payments for which debit was used. We found evidence for substitution into debit cards by individuals with revolving balances. Controlling for socio-demographic characteristics and rewards program participation, we found that revolving balances were associated with an increase of 4% to 5% in the proportion of payments made by debit card.

The results strongly show that for individuals who revolved their balances, the reduction in the proportion of credit card payments was entirely offset by the increase in debit card payments. Columns 5 and 6 of Table 5 present regressions with *ProportionCash* as the dependent variable. We found no significant increases associated with revolving balances in the proportion of payments for which cash was used. In fact, the coefficient on the revolving dummy variable is negative, although the effect is not statistically significant. Columns 7 and 8 of Table 5 present regressions with *ProportionCheck* as the dependent variable. We also found no impact of revolving balances on the proportion of payments for which checks were used.

The results show very strong and significant patterns of payment behavior across the demographic and socio-economic groups. Men are significantly less likely to use debit cards or checks, but are significantly more likely to use cash. Consistent with previous studies, younger people are more likely to use debit cards, and less likely to use checks. Black consumers use more cash, but fewer checks or credit cards. Income has the strongest effect on credit card use: higher-income consumers are significantly more likely to use credit cards, and somewhat less likely to use checks. Lowest-income respondents use more cash. Those with the highest level of education are more likely to use credit cards, and less likely to use debit cards. The results confirm findings in some earlier studies that socio-demographic factors influence consumer payment behavior. As is often the case in cross-sectional regressions, the overall regression fit is low, as indicated by low  $R^2$  values.

### 5.2. *Revolving balances and most frequently used payment*

Evidence of substitution from credit cards to debit cards for payments was further supported when we examined the payment instrument cited by individuals as the one most frequently used at the point of sale. In Table 6 we present results from logit regressions with robust standard errors of the following form:

$$\text{MostFrequent}_{ij} = \lambda_0 + \lambda_1 \text{RevolvingBalances}_i + \lambda x_i + \eta_i \quad (3)$$

Table 6 Most frequent use and revolving balances: logit regressions

	Credit card		Debit card		Cash		Check	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Revolving balances (=1)	-0.54***	-0.41***	0.42***	0.36***	-0.16	-0.16	0.45**	0.28
Male	0.31**	0.34**	-0.33***	-0.32***	0.30***	0.31***	-0.73***	-0.93***
Age								
Over 65 years	0.47**	0.37	-0.40*	-0.27	-0.07	-0.09	0.08	0.16
55–64 years								
45–54 years	-0.27	-0.33	0.13	0.14	0.17	0.09	-0.42	-0.22
35–44 years	-0.05	-0.17	0.26*	0.27*	-0.20	-0.19	-0.12	-0.02
25–34 years	-0.02	-0.16	0.52***	0.56***	-0.37**	-0.42**	-1.17***	-0.88**
18–24 years	0.20	0.19	0.17	0.17	-0.06	-0.09	-1.89*	-1.62
Race								
Other	-0.45	-0.37	0.29	0.22	0.11	0.08	-0.71	-0.55
Hispanic	-0.01	0.33	0.19	0.09	-0.07	-0.21	-1.04	-0.85
White								
Asian	1.32***	1.46***	-1.34***	-1.38***	-0.17	-0.08	-0.59	-0.41
Black	-0.69***	-0.43*	-0.17	-0.29*	0.68***	0.63***	-0.57	-0.42
Income								
Over \$150K	1.11***	0.55	-0.11	0.10	-0.88**	-0.54	-0.64	-0.78
\$100–\$149K	0.86***	0.65***	-0.10	-0.04	-0.48**	-0.39*	-0.63	-0.30
\$60–\$99K	0.52***	0.40**	0.09	0.16	-0.39***	-0.42***	-0.35	-0.12
\$40–\$59K	0.20	0.18	0.11	0.18	-0.19	-0.26*	-0.11	-0.03
\$20–\$39K								
Less than \$20K	0.12	0.43*	-0.39**	-0.43**	0.30*	0.13	-0.13	0.07
Education								
Graduate school	0.96***	0.78***	-0.44***	-0.39**	-0.55***	-0.48**	0.51	0.85**
College	0.53***	0.42***	-0.13	-0.09	-0.30**	-0.27*	0.15	0.34
Some college								
High school	-0.30	-0.31	-0.45***	-0.48***	0.42***	0.45***	0.58**	0.63*
Some high school	-0.80	-0.67	0.03	-0.18	0.26	0.34	0.54	0.61
Additional controls								
Check account years	0.01	0.01	-0.01**	-0.01	0.01	0.01	0.00	0.00
Credit card rewards		1.66***		-0.60***		-0.78***		-0.61*
Debit card rewards		-0.78***		0.66***		0.01		-0.12
Constant	-1.90***	-2.37***	-0.26	-0.14	-0.63***	-0.46**	-2.40***	-2.61***
N	1880	1722	1880	1722	1880	1722	1880	1722
R <sup>2</sup>	0.12	0.19	0.06	0.06	0.05	0.07	0.08	0.08

Notes. For each column, the dependent variable = 1 if the given payment instrument is cited as most frequently used at point of sale.

Coefficients from logit regression with robust standard errors.

Level of significance: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

$MostFrequent_{ij}$  is a dummy variable equal to 1 if consumer  $i$  reported using payment  $j$  most frequently. As before,  $RevolvingBalances_i$  is a binary variable indicating whether an individual regularly carried a credit card balance, and  $\mathbf{x}_i$  is a vector of socio-demographic and other characteristics of consumer  $i$ .

The results in Table 6 largely confirm the evidence presented in Table 5. Individuals with revolving balances were significantly less likely to cite credit cards as the payment instrument most frequently used at the point of sale, controlling for socio-demographic characteristics and rewards program participation. The calculated odds ratio indicates that revolvers were around half as likely as convenience users to use credit cards most frequently.

Individuals with revolving balances were, however, significantly *more* likely than con-

venience users to cite debit cards as the payment instrument used most frequently. Calculated odds ratios indicate that revolvers were nearly one-and-a-half times more likely to use debit cards most frequently. There is no significant difference between the two groups in the likelihood of citing cash as the most frequently used payment instrument. Although revolvers were more likely to cite checks as their most frequently used payment instrument, this effect became insignificant after controlling for credit card and debit card rewards.

As in the previous set of regressions, strong socio-demographic effects were found here. Gender has a strong effect on payment preferences: men were significantly more likely to select credit cards or cash as the most frequently used payment method, and significantly less likely to select checks or debit cards. Younger consumers were more likely to pick debit, and less likely to select checks or cash. Black respondents were significantly more likely to select cash as the most frequently used method, but less likely to pick credit cards. Higher income and education was associated with stronger preference for credit cards and weaker preference for cash. However, controlling for rewards weakened the income and education effects.

### 5.3. *Revolving balances and qualitative perceptions*

While we found strong evidence in support of substitution from credit cards to debit cards for individuals who regularly carry revolving balances, the finding provides little insight into the reasons for the substitution. That is, we do not know whether the substitution was carried out because individuals with revolving balances sought to curb their spending, or because they found debit cards more convenient to use, or for some other reason.

The SCPP asks a series of qualitative questions related to perceptions about individual payments. The literature has supported the view that attribute perceptions are strongly associated with payment behavior (for evidence and discussions see Ching and Hayashi 2010, Hirschman 1982, Mantel 2000, Miyazaki and Fernandez 2001, Schuh and Stavins 2010).

Given that perceptions are important factors affecting payment behavior, we were interested in analyzing differences between revolvers and convenience users in perceptions of payment methods. If significant differences exist, they can help us understand *why* the two groups behave differently.

Even though consumer perceptions have been found to be associated with payment behavior, the causality of the relationship has not been clearly established. It is not known whether a consumer uses a given payment method because he considers it superior to other methods, or whether using that payment helps him to realize its advantages. In the following analysis we did not assume causality, but rather examined conditional correlations between revolving credit card debt and the perceptions of payment characteristics.

The results shown in Table 4 indicate that budgeting and control over money may be the key differences in revolvers' perceptions associated with their substitution from credit to debit. This view is supported by regression results. In Table 7 we present results from logit regressions with robust standard errors of the following form:

$$DebitBetter_{ij} = \delta_0 + \delta_1 RevolvingBalances_i + \delta x_i + v_i \quad (4)$$

Table 7 Perceptions and revolving balances: logit regressions

	Ease (1)	Acceptability (2)	Safety (3)	Control (4)	Budgeting (5)	Refunds (6)
Revolving balances (=1)	-0.623***	-0.279**	-0.001	0.307***	0.336***	-0.263*
Male	-0.357***	-0.278**	-0.302***	-0.337***	-0.390***	-0.450***
Age						
Over 65 years	-0.080	-0.088	-0.475**	-0.378*	-0.448**	-0.908***
55–64 years						
45–54 years	-0.057	0.137	-0.060	-0.004	-0.191	-0.421*
35–44 years	0.261	0.095	-0.114	0.012	-0.192	-0.017
25–34 years	0.019	-0.078	-0.160	0.125	-0.208	0.009
18–24 years	-0.103	-0.363	-0.541*	-0.307	-0.518**	-0.177
Race						
Other	0.104	0.238	0.441*	-0.020	-0.038	0.456
Hispanic	-0.333	-0.790**	-0.183	-0.347	-0.673***	-0.332
White						
Asian	-0.586	-0.643*	-0.846***	-0.876***	-0.561**	-0.388
Black	-0.277	-0.756***	0.035	-0.043	-0.061	-0.162
Income						
Over \$150K	0.345	-0.095	-0.039	-0.275	-0.043	-0.158
\$100–\$149K	-0.753**	-0.447	-0.832***	-0.394*	-0.068	-0.747**
\$60–\$99K	-0.324*	-0.062	-0.201	-0.079	-0.049	-0.237
\$40–\$59K	-0.071	0.074	-0.061	0.039	0.203	-0.063
\$20–\$39K						
Less than \$20K	-0.555**	-0.421*	-0.365*	-0.527***	-0.293	-0.283
Education						
Graduate school	-0.232	-0.307	-0.238	-0.379**	-0.284*	-0.184
College	-0.164	-0.194	-0.186	-0.046	0.038	0.070
Some college						
High school	0.252	0.209	0.023	-0.090	-0.278*	0.372*
Some high school	1.301***	0.893*	0.917**	0.968	0.191	1.167**
Additional controls						
Check account years	0.001	-0.003	-0.015**	-0.002	-0.016**	-0.008
Credit card rewards	-1.191***	-0.485***	-0.751***	-0.744***	-0.480***	-1.154***
Debit card rewards	0.599***	0.266	0.708***	0.266*	0.594***	0.684***
Constant	-0.767***	-0.943***	-0.140	1.111***	0.398**	-0.943***
N	1722	1722	1722	1722	1722	1722
Pseudo R <sup>2</sup>	0.073	0.042	0.055	0.057	0.045	0.068

Notes. Dependent variable = 1 if individual responded positively for debit cards and negatively for credit cards; zero otherwise.

Coefficients from logit regressions with robust standard errors.

Level of significance: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

$DebitBetter_{ij}$  is a dummy variable that equals 1 if consumer  $i$  believed that debit cards outperformed credit cards according to that specific perception  $j$ .  $RevolvingBalances_i$  is a binary variable taking the value 1 if an individual regularly carried a credit card balance, and 0 otherwise.  $\mathbf{x}_i$  is a vector of socio-demographic characteristics and variables for rewards program participation.

Controlling for socio-demographic characteristics, individuals who revolved balances were significantly *less* likely than convenience users to prefer debit when it comes to ease, acceptability, or refunds. We would expect such differences to be associated with increased

use of credit, not decreased use as seen in the data. Revolvers were, however, significantly *more* likely to indicate that debit was better than credit in terms of budgeting and control. Clearly, those were the features that influenced their payment choice the most.

Even though revolvers appreciated credit more in terms of ease and acceptability, they used debit more intensely than convenience users did. Perceptions of superior debit budgeting and control were the key perceptual differences between revolvers and convenience users associated with this differing payment behavior.<sup>3</sup>

## 6. Conclusions

Approximately half of credit card holders in the United States regularly carry unpaid credit card debt. Because credit card debt is expensive, we are interested in exploring whether these so-called revolvers utilize their payment behavior in their personal financial planning. Previous research has found that revolvers are more likely than convenience users to adopt debit cards, but so far there have been no empirical studies exploring the relationship between credit card revolving and payment use patterns, such as substitution away from credit cards to other, less costly payment methods to improve their budgeting and facilitate personal financial planning.

Using data collected in the 2005 Study of Consumer Payment Preferences, we explored the relationship between revolving credit card balances and payment use. We found that credit card revolvers were significantly more likely to use debit and less likely to use credit for point-of-sale purchases than convenience users, who repaid their balances each month. We found no significant differences in the use of check or cash between the two groups. The two groups also differed in their perceptions of payments—revolvers were significantly less likely to view debit as superior with respect to ease of use and acceptability, but more likely to see debit as better with respect to control over money and budgeting. The findings suggest that revolvers not only adopt, but also use, debit more frequently than convenience users do to control their spending and curb their debt.

Our results are the first to show substitution from credit to debit for actual payments made by individuals with revolving credit card balances. This substitution is likely motivated by concerns about debt and financial control. During the recent policy debate associated with the Credit CARD Act of 2009, credit card issuers received increased levels of scrutiny and criticism from both policymakers and the media. This paper shows that consumers learn from their past financial behavior and change their payment habits. Therefore, although increased transparency and disclosure resulting from the CARD Act of 2009 will undoubtedly help borrowers manage their debt, further policy intervention that would curtail credit card lending may not be warranted.

## Notes

1. By “payment use” we mean the act of using a given payment method for transactions. That differs from “payment adoption,” where a consumer may obtain a debit card, for example, but not use it for transactions.

2. Convenience users with good credit are likely to see rising credit limits, resulting in lower overall utilization rates. We thank a referee for pointing this out.
3. Although respondents indicated whether they considered debit cards to be better or worse budgeting tools, we cannot determine whether their perceptions arose from underlying preferences or from liquidity constraints.

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Appendix Table: Construction of perceptions variables

SCPP asks respondents to fill in a grid, shown below, to indicate their perceptions of each payment instrument. The respondents can check as many cells as they want to show whether they agree with a given statement. The grid is introduced as follows:

*Please select all the methods of payment for in-store purchases that you believe fit the following descriptions: (You may select more than one in each row.)*

	Cash	Paper check	Credit card	Debit card: enter PIN	Debit card: sign receipt	Gift/ prepaid card
1) Is convenient	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
2) Is easy to use	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
3) Is preferred by stores/ sales people	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
4) Keeps my money/accounts safe	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
5) Money leaves my account right away	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
6) Helps me budget/spend within my means	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
7) Gives me control over my money	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
8) Is easy to get a refund items/disputes	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No

It is not required that an individual respondent be a user of a particular instrument for him/her to register his/her perceptions. In order to develop the variables for each payment instrument we used the following mapping:

- a) “Yes” for the first and second perceptions maps into a dummy variable, *easy to use*.
- b) “Yes” for the third perception maps into a dummy variable, *widely acceptable*.
- c) “Yes” for the fourth perception maps into a dummy variable, *safe*.
- d) “Yes” for the fifth and seventh perceptions maps into a dummy variable, allowing *control* over money.
- e) “Yes” for the sixth perception maps into a dummy variable, helping in *budgeting*.
- f) “Yes” for the eighth perception maps into a dummy variable, *easy to get refunds*.

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