

## Debit card usage: an examination of its impact on household debt

Jinkook Lee, Ph.D.<sup>a,\*</sup>, Fahzy Abdul-Rahman, M.S.<sup>a</sup>, Hyungsoo Kim, Ph.D.<sup>b</sup>

<sup>a</sup>*Ohio State University, Columbus, OH 43210, USA*

<sup>b</sup>*University of Kentucky, Lexington, KY 40506-0054, USA*

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### Abstract

This paper investigates debit card usage and its impact on household debts, using the *2004 Survey of Consumer Finances*. By conducting simultaneous equation modeling, we examine how debit card users are different from non-users, and whether debit card usage influences household debt. We find that, after controlling for selection bias, the use of debit cards is negatively associated with household debt. We also find that those with revolving debt tendencies (i.e., carrying outstanding balances on credit cards) are more likely to use debit cards than those without a revolving debt tendency. We conclude that debit card usage discourages the accumulation of household debt rather than that debit card users tend to be financially conscientious. © 2007 Academy of Financial Services. All rights reserved.

*JEL classifications:* D12; D14

*Keywords:* Credit card; Debit card; Household debts; Payment instrument; Survey of Consumer Finances

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### 1. Introduction

In recent years, debit cards have become a popular payment instrument in the United States (Evans & Schmalensee, 1999, p. 306; Weiner, 2000). Since their introduction in 1975, growth of these cards has been slow, particularly throughout the 1980s and mid-1990s. However, in the last decade, the percentage of households that use debit cards has increased dramatically: from 20% in 1995 to 37% in 1998 and to 50% in 2001 (Anguelov, Hilgert &

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\* Corresponding author. Tel.: +1-614-247-7892; fax: +1-614-688-8133.

*E-mail address:* lee.42@osu.edu (J. Lee).

Hogarth, 2004). Debit cards achieved the highest growth rate among forms of retail payment between 1995 and 2000 with an increase of 41.8% (Anguelov et al., 2004). In 2000, debit cards accounted for 11.6% of all retail transactions (Gerdes & Walton, 2002).

For retail transactions, consumers have several choices of payment instruments, including cash, check, credit cards, and debit cards. Each choice provides a host of desired properties that differentiate one instrument from the other. Debit cards, which became feasible and more widely available through the Visa and MasterCard network, provide the point-of-sale convenience of credit cards and yet the direct transaction properties of automatic teller machine (ATM) cards (Weiner, 2000). In addition, consumer protection for this form of payment has been enhanced by the limits now placed on the liability for lost or stolen debit cards. Unlike credit cards, debit cards use funds from the consumer's funded bank account and do not allow consumers to borrow money, a characteristic that can discourage overspending and, thus, discourage debt accumulation. One could argue then that consumers intentionally choose debit cards instead of credit cards in an effort to avoid debt accumulation.

We empirically investigated two research questions in this study: whether debit card users are different from non-users and whether debit card usage discourages the accumulation of household debt. Using the 2004 Survey of Consumer Finances, commissioned by the Federal Reserve Board, we examined (1) what influences the use of debit cards, particularly whether consumer tendency to use revolving credit (i.e., carrying outstanding balances on credit cards) is associated with debit card usage, and (2) whether the use of debit cards is negatively associated with household debt. The research utilized simultaneous equation models.

Despite the growing popularity of debit cards, only limited research has been devoted to debit cards. Particularly, the relationship between the use of debit cards and household debt has never been studied although theories do posit that debit card usage discourages the accumulation of household debt. Empirical investigation of the relationship between debit card usage and household debt can provide important and useful implications for financial counseling agencies and consumer educators in their attempt to help consumers lower their debt levels and practice better household finance management.

## **2. Existing literature**

Debit cards bundle the many desirable properties of different payment tools. Like checks, consumers can use debit cards to make direct transactions and use existing funds in their bank accounts. Compared to checks, debit cards have additional desired benefits, including the convenience of carrying a plastic card rather than a checkbook, faster transactions at the point of sale, and the enhanced consumer protection features of limited consumer liability for lost or stolen debit cards.

As a payment instrument for retail transactions, debit cards do compete with credit cards. Particularly, a comparison of debit cards and credit cards is interesting because of their close similarities and distinctive differences. In physical form, both forms of payment are plastic cards of the same size, and both enable cardholders to carry a large amount of "virtual"

money with a high degree of security (Mann, 2002). Both types of cards also require a dial-up network for point-of-sales transactions to occur. In fact, the widespread acceptance of debit cards has been largely driven by the widespread acceptance of Visa and MasterCard. Merchants who accepted credit cards were then pushed to accept debit cards also (Evans & Schmalensee, 1999, p. 309).

One fundamental difference between a credit card and a debit card is that debit cards do not offer consumers “float time” to make payments. For debit card transactions, money is directly transferred to the merchant bank; depending on the transaction, money is deducted instantly from the consumer’s account (i.e., online transactions) at the point-of-sale or shortly after (i.e., offline transactions).<sup>1</sup> Purchases made using credit cards are billed to the consumer at predetermined intervals (on average, a credit card payment cycle is about 28 days). In addition, consumers can choose to pay only minimum payments instead of paying for recent purchases in full.

Further, credit cards offer a credit line that allows consumers to use these cards as a financing mechanism; whereas debit card usage is restricted by the amount of money available in the consumers’ bank account(s) and by the daily limit that most banks impose on debit card spending. Such a difference in spending limit and financing ability may positively influence user spending and consequently positively affect household debt. Rook (1987) proposes that the financing ability of credit cards (i.e., allowing consumers to borrow funds) facilitates unnecessary purchases and impulse spending. For example, Feinberg (1986) observed that when consumers use credit cards, they tend to tip more than when they use cash. As debit cards do not allow their users to borrow funds, we expect that debit cards users would not engage in unnecessary or impulse purchases, and consequently would carry less debt. Therefore, we hypothesize that because debit card usage does not allow for financing purchases or facilitate unnecessary or impulse spending as easily, the use of debit cards does discourage the accumulation of or a greater amount of household debt.

An alternative explanation for the relationship between debit card usage and household debt is that consumers who desire to avoid debt accumulation may intentionally choose debit cards over credit cards for their household purchases. Prelec and Loewenstein (1998) provided an explanation for why consumers use debit cards based on the double-entry mental accounting theory. Noting the psychological burden associated with paying later or carrying debt, Prelec and Loewenstein posited that the thought of post-payment (e.g., in credit card installment purchases) significantly lowers the net utility of the household purchases. They then suggested that consumers use debit cards because of the prepayment property, which enables consumers to enjoy consumption without worrying that they will have to pay for the goods or services at a later date.

Under the mental accounting theory (Kahneman & Tversky, 1979), Prelec and Loewenstein (1998) differentiated the pain of payment associated with two payment mediums, that is, debit and credit cards. When a debit card is used, the pain of payment occurs at the purchase stage. At this stage, a consumer may evaluate the possibility of overdraft charges and remaining balance in his or her bank account(s). On the other hand, when a credit card is used, the pain of payment is separated from the time of purchase and deferred until a consumer receives the statement and needs to make a credit card payment. If a consumer does not pay off the full amount of his or her credit card charges each month, this pain of

payment is spread out throughout the lifetime of the debt, negatively influencing the net utility of the consumption over time. Prelec and Lowenstein attributed the overspending associated with credit card usage to this separation of the pain of payment from the actual purchase.

Mantel (2000) proposed a theory of obstacles, incentives, and opportunities to explain why consumers use different electronic payment methods (e.g., debit cards, credit cards, smart cards, etc.) based on the literature review, a qualitative electronic banking survey, and 35 in-depth interviews with a sample of consumers in Chicago. In his theory, obstacles are those limits on consumers' ability to obtain certain payment tools; for example, to obtain a debit card, consumers need to have sufficient funds to open and maintain a bank account. Therefore, those without financial assets cannot obtain or use debit cards. Incentives are the promotional offers used to achieve adoption of a specific payment tool, and opportunities are certain innovative ways of using payment instruments in particular circumstances, times, or occasions. For example, credit card banks offer incentives, such as cash-back bonuses, discounts, and other promotional offers to attract consumers, whereas consumers may use gasoline cards and store cards (e.g., Sears and Wal-Mart) as an opportunity to budget and keep a record of their purchases.

Although Mantel's theory (2000) focused more on the monetary gains of using credit cards, Prelec and Lowenstein (1998) incorporated the mental account proponent (Thaler, 1980) in explaining the latent cost of credit card usage. Even if consumers use credit cards for convenience, there are other unseen costs involved, such as the mental cost of having to keep track of spending and understanding credit card related issues, such as daily interest calculations, card limits, late payments, over limit fees, and so forth. These issues become even more complicated if consumers use more than one credit card. In addition, credit card usage may offer consumers the pretense of having more money than they *actually* do, allowing them to consume based on expected increased income and wealth that may not ever be realized. With debit card usage, consumers may reduce unnecessary spending by spending only from the funds that are immediately available to them as opposed to what they expect to have at a later date. Thus, we hypothesize here that consumers who want to avoid debt accumulation intentionally choose to use debit cards.

Several researchers have also identified several influencing factors associated with the use of debit cards. Using the 1995 Survey of Consumer Finances SCF, Kennickell and Kwast (1997) found that the use of debit cards is positively associated with financial assets and education and negatively associated with age. They also found that income has no significant relationship to the use of debit cards. Using data from a mail survey to 6,451 gasoline credit card holders (response rate 25.9%), Carow and Staten (1999) found that debit card users also tend to be younger and more educated. In addition, they found that debit card users are less likely to be married, own a home, or both, than non-users and that the probability of using debit cards increases with the number of general-purpose credit cards and travel and entertainment cards held by the consumer. Using the 1998 SCF, King and King (2005) found that debit card usage is positively associated with a negative opinion of credit card use, higher educational achievement, credit card ownership (defined as whether or not the household owns at least one credit card, i.e., no card as the referent), and a higher amount

of revolving credit card balances. Debit card usage was negatively related to age and assets (dollar value of a household’s financial and non-financial assets).

### 3. The estimation model

To test the hypothesized relationship between the use of debit cards (*Debit*) and household debt (*Debts*), we estimated the following model.

$$Debts = \alpha Debit + X\beta + \epsilon \tag{1}$$

where  $X$  is a vector of other observable variables that influence household debt, and  $\epsilon$  is an error term. In estimating the unbiased effect ( $\alpha$ ) of debit card use on household debt, we needed to consider endogeneity of debit card use. This means that we could not use the direct ordinary least square (OLS) approach. Biased estimates can stem from two sources of endogeneity. The first source of endogeneity can come from unobserved heterogeneity (self-selection) in the error term that is correlated to both the amount of debt and the use of debit cards. For example, people without impulsive shopping habits might have lower level of debt and also tend to use debit cards. An additional source of endogeneity can result from the potential reverse causality of the amount of debt to debit card use. Higher level of existing debt may lead to a lack of cash in checking or savings accounts, resulting in avoiding debit card usage.

To minimize the endogeneity effect, we used the treatment effect model among variations of estimation models (Greene, 1997, p. 714; Maddala, 1993, pp. 117–147) because it allowed us to estimate the effect of an endogenous binary treatment variable (*Debit*) on a continuous, fully observed (dependent) variable (*Debts*) (Stata, 2003, p. 275).

We expect that the error terms in the Eq. (1) and in the following Eq. (2) are correlated because of the endogeneity mentioned above.

$$Debit = W\gamma + \mu \tag{2}$$

where  $W$  is a vector of observable variables that influences use of debit card, and  $\mu$  is an error term.

Suppose that  $\epsilon$  and  $\mu$  have a bivariate normal distribution with a mean of 0 and a covariate matrix expressed as  $\begin{bmatrix} \sigma_\epsilon & \rho_{\epsilon\mu} \\ \rho_{\epsilon\mu} & 1 \end{bmatrix}$  where  $\sigma_\epsilon$  is the variance of  $\epsilon$ ,  $\rho_{\epsilon\mu}$  is the covariance of  $\epsilon$  and  $\mu$ , and the variance of  $\mu$  is standardized as 1. Following Greene (1997, pp. 713–714) and Maddala (1983, pp. 120–122), if  $Debit = 1$ , the expected debt can be expressed as

$$\begin{aligned} E [Debts] | Debit = 1 &= \alpha + X\beta + E [\epsilon | Debit = 1] \\ &= \alpha + X\beta + \rho_{\epsilon\mu}\sigma_\epsilon \left[ \frac{\phi(W\gamma)}{\Phi(W\gamma)} \right] \end{aligned} \tag{3}$$

where  $\phi$  and  $\Phi$  are the density function, and the cumulative distribution function of the standard normal function is evaluated at  $W$ .

Conversely, if  $debit = 0$ , the expected debt can be expressed as

$$E[Debts | Debit = 0] = X\beta + E[\epsilon | Debit = 0] = X\beta + \rho_{\epsilon\mu}\sigma_{\epsilon} \left[ \frac{-\phi(W\gamma)}{1 - \Phi(W\gamma)} \right] \quad (4)$$

The difference in expected household debt between debit card users and non-users can then be expressed as

$$\begin{aligned} E[Debts | Debit = 1] - E[Debts | Debit = 0] \\ = \alpha + \rho_{\epsilon\mu}\sigma_{\epsilon} \left[ \frac{\phi(W\gamma)}{\Phi(W\gamma)(1 - \Phi(W\gamma))} \right] \end{aligned} \quad (5)$$

If there is no correlation between  $\epsilon$  and  $\mu$ , which is  $\rho_{\epsilon\mu}=0$  in Eqs. (3), (4), and (5), then  $\alpha$  measures the effect of debit card use on debt and represents the difference in the expected debt between debit card users and non-users. We can test the hypothesis  $H_0: \rho_{\epsilon\mu}=0$  using a likelihood ratio (LR) test. Thus, the likelihood function to be maximized is:

$$L(\alpha, \beta, \gamma) = \Pi [g(Debts, Debit = 1)]^D [g(Debts, Debit = 0)]^{1-D} \quad (6)$$

$$\int_{-\infty}^{w_{\gamma}} f(Debts - \alpha Debit - X\beta, \mu) d\mu$$

$$\int_{w_{\gamma}}^{\infty} f(Debts - \alpha Debit - X\beta, \mu) d\mu$$

We estimate the log likelihood to be Eq. (6), using the maximum likelihood estimation method.

## 4. Methods

### 4.1. Data

We employed data from the 2004 Survey of Consumer Finances (SCF) conducted by the National Opinion Research Center at the University of Chicago. Sponsored by the Federal Reserve Board with the cooperation of the Statistics of Income Division of the Internal Revenue Service, this survey covers financial situations, demographic factors, financial attitudes, assets owned, labor participation, and liability conditions. Households are encouraged to refer to their financial documents and records for their answers.

The SCF includes an over sampling of wealthy households to capture the diverse financial situations of the rich. Weights are assigned to the data to obtain a better and unbiased representation in describing the population. Another important aspect of the data are that in public use, data missing responses are estimated with five imputates.

Table 1 Description of variables

Variable	Description
Debts	A continuous variable: Log of the total household debt, excluding housing debts and student loans.
Debit card use	A binary variable: Use debit card = 1; Do not use debit card = 0
Credit card use	A binary variable: Use credit card = 1; Do not use credit card = 0
Age	A continuous variable: the respondent's age, in years
Household composition (marital status)	A categorical variable: Married (base), single male, and single female.
Saving time horizon	A categorical variable: Within one year (base), next year up to next five year, and more than 5 years.
Attitude toward credit	A categorical variable: Neutral (base), bad, and good.
Bad credit history	A categorical variable: Never applied for loans, credit application recently rejected or given at lower amount than applied for, and credit application never turned down for full amount (base).
Education (in debt equation)	A categorical variable: Highest education attainment in categories of less than high school (base), high school diploma, some college studies, and bachelor's degree or more.
Education (in debit card equation)	A continuous variable: 0 for less than first grade, 1 for first grade, 2 for second grade, and so forth with a maximum of 17 for those with graduate school education.
Income	A continuous variable: Total annual household income.
Marital status	A binary variable: Married = 1; not married = 0
Home ownership	A binary variable: Own a home = 1; renter = 0
Financial assets	Total household financial assets: Total of assets in checking accounts, savings accounts, money market deposit accounts, money market mutual funds, call accounts at brokerages, certificates of deposit, stock mutual funds, bond mutual funds, and annuities.
Revolving tendency	A categorical variable: Those who do not have credit card, always revolve, sometimes revolve, and (almost) never revolve (base).
Ever filed for bankruptcy	A binary variable: yes = 1; never filed for bankruptcy = 0

#### 4.2. Measurement

The two dependent variables in this study are the use of debit cards and household debt. The use of debit cards is a binary variable that indicates whether the household uses debit cards (1 = use; 0 = do not use). We defined household debt as the sum of all household debt, including: installment loans, credit card debts, personal loans, margin loans, and other lines of credit, excluding housing debt and student loans. The log of household debt (plus one) is used to avoid the heteroskedasticity problem in using OLS for one of the equations of the simultaneous equation modeling.

The descriptions of these independent variables used for the debt and debit card use equations can be found in Table 1. The control variables for predicting household debt are: the use of credit cards, age, household composition, gender, saving time horizon, attitude toward credit, credit history, education, and income. The previous literature suggests the following variables as the determinants of debit card usage: Age, marital status, home ownership, total financial assets, education, consumer tendency to use revolving credit, and

the number of general-purpose credit cards and travel and entertainment cards held. These are the independent variables for estimating debit card usage.

However, there is a significant multicollinearity between one's tendency to use revolving credit and the number of general-purpose credit cards and travel and entertainment cards held, so that including both of these variables can result in incorrect estimation. Because this study questions whether consumers who tend not to use revolving credit tend to use debit cards, instead we kept only the variable that measures one's revolving tendency and eliminated the number of credit cards held. Specifically, we defined consumer tendency to use revolving credit as the practice of carrying outstanding balance on credit cards after purchases and included a categorical variable: always revolve, sometimes revolve, almost never revolve (base), and do not have a credit card. Finally, we included whether or not a respondent had filed bankruptcy since that may have forced that consumer to resort to debit card usage because of the inability to obtain credit cards.

#### *4.3. Analysis*

To obtain an unbiased estimate of the population, we used the weights in our descriptive analysis. Having five imputates, the data required the use of Repeated-Imputation Inferences (RII) to arrive at efficient estimates and to account for imputation sampling errors (Rubin, 1987). Thus, we used RII for descriptive analysis, as proposed by Montalto and Sung (1996).

For simultaneous equation estimation, we were not able to employ the RII technique, as the algorithm for RII is currently unavailable. Therefore, we reported the results of all five imputates. Specifically, for households with greater than zero debt, we conducted a simultaneous equation estimation that consisted of a binary logistic regression of debit card usage and an OLS regression of household debt.

## **5. Results**

### *5.1. Descriptive statistics*

The demographic, financial, and attitudinal profiles of debit card users and non-users are presented in Table 2. Using the sample of 4,519 respondents, we estimate that 59.35% of U.S. residents use debit cards, and estimate that 81% of debit card users have at least one type of credit card. According to our findings, debit card users are more likely to be younger, male, more educated, have higher incomes, have a medium amount of financial assets, be convenience users of credit cards (almost never revolve), and use credit cards.

Table 3 shows descriptive statistics of total unsecured household debts across debit and credit card usage. The median for users of debit cards only was \$1,000, while the median for users of credit cards only was \$800, and the median for users of both cards was \$9,500. The comparable mean values for the three groups were \$7,044.31, \$13,657.18, and \$12,846.87, respectively. In other words, household debt was the highest for households that use both debit and credit cards, followed by those that use credit cards only. Debt was the least for those who use debit cards only. For all three groups, total household debt was zero for at least

Table 2 Descriptive statistics: use of debit cards

Variable	Statistics/group	Debit card users	Debit card non-users	Total
Age (years old)	Mean	44.60	56.80	49.56
	Standard error	0.292	0.409	0.257
	Median	43	57	48
	Less than 35	74.81%	25.19%	100%
	35–50	70.71%	29.29%	100%
	50–65	58.70%	41.30%	100%
	65 or more	27.12%	72.88%	100%
Household composition	Married	63.39%	36.61%	100%
	Single male	52.02%	47.98%	
	Single female	54.71%	45.29%	100%
Saving time horizon	Within 1 year	54.40%	45.60%	100%
	1 to 5 years	59.61%	40.39%	100%
	Longer than 5 years	63.36%	36.64%	100%
Attitude toward credit	Indifferent	57.92%	42.08%	100%
	Bad	57.07%	42.93%	100%
	Good	63.35%	36.65%	100%
Credit history	Never applied	37.13%	62.87%	100%
	Rejected or obtained lesser amount	79.90%	20.10%	100%
	Obtained full amount	64.93%	35.07%	100%
Education	Mean	13.80	12.52	13.280
	Standard error	0.054	0.078	0.04
	Median	14	12	13
	Less than high school (HS)	33.69%	66.31%	100%
	HS graduate	55.56%	44.44%	100%
	Some college	70.49%	29.51%	100%
	Bachelor's or more	67.04%	32.96%	100%
Income (\$)	Mean	71,474	63,059	68,053
	Standard error	3,379	5,844	3,184
	Median	49,000	30,000	42,000
	Less than \$25,000	43.40%	56.60%	100%
	\$25,000–\$49,999	61.31%	38.69%	100%
	\$50,000–\$74,999	68.14%	31.86%	100%
	\$75,000–\$99,999	73.84%	26.16%	100%
	\$100,000 or more	67.24%	32.76%	100%
Use credit card	Yes	63.95%	36.05%	100%
	No	45.57%	54.43%	100%
Home ownership	Own a home	58.39%	41.61%	100%
	Do not own a home	61.59%	38.41%	100%
Financial assets (\$)	Mean	145,712	246,317	186,612
	Standard error	17,180	36,881	18,719
	Median	17,000	18,300	18,000
	Less than \$5,000	55.12%	44.88%	100%
	\$5,000–\$49,999	67.99%	32.01%	100%
	\$50,000–\$499,999	60.14%	39.86%	100%
	\$500,000 or more	44.32%	55.68%	100%
Revolving tendency	Almost always	54.67%	45.33%	100%
	No credit cards	45.79%	54.21%	100%
	Sometimes	74.29%	25.71%	100%
	Almost never	76.78%	23.22%	100%
Ever filed for bankruptcy	Yes	75.12%	24.88%	100%
	No	57.40%	42.60%	100%
<i>n</i>	Unweighted frequency	2,489	2,030	100%
Percentage	Weighted percentage	59.35%	40.65%	100%

Table 3 Descriptive statistics of unsecured household debts across payment card users

Variable	Statistics	Using debit card only	Using credit card only	Using both cards	All*
Total unsecured Household Debts	Mean	7,044.31	13,657.18	16,721.31	12,846.87
	Standard error	688.38	2,891.66	1,177.00	1,046.36
	99th percentile	66,400	112,000	101,710	94,440
	75th percentile	8,860	10,980	22,700	15,000
	Median	1,000	800	9,500	3,000
	25th percentile	0	0	1,000	0
	1st percentile	0	0	0	0
<i>n</i>	Unweighted frequency	424	1,555	2,065	4,319
Percentage	Weighted frequency	11.42%	27.01%	47.93%	100%

\*Total includes those individuals who do not use either card.

the first quarter of respondents in the distribution. After their median values were reached, debt increased relatively quickly. Up to the 75th percentile, households that used both cards had the highest debt, but at the 99th percentile, households that used credit cards only had higher debt than any other group.

## 5.2. Simultaneous equation estimation

The result of the simultaneous-equation estimation on the users of debit cards and a log of household debt is presented in Table 4. Because the model applies to households with household unsecured debt, 1,856 observations with no such debt were excluded from the multivariate analysis. We also eliminated the observations with imputed value for debit card use from simultaneous-equation estimation, because debit card use is the key variable of this study and that imputation of a key variable could produce unreliable estimates. Therefore, 53 observations that had imputed value for debit card usages were dropped, and only 2,610 observations with reported value for debit card usages were included for the final estimation. Results using each of all the five implicates are presented in Table 4.

The resulting simultaneous-equation estimations are highly significant at a p-value less than .0001. The *rho* values are significantly different from zero, indicating that the error terms of the two sets of simultaneous equations do correlate. In other words, separate estimations of debit card use and debt equations produce biased estimates. The simultaneous nature of this model controls for the correlated error terms.

In estimating household debt, we found that the use of debit cards is negatively associated with household debt (i.e., lower debt). Compared to non-users, debit card users tend to have 394% less unsecured debt, and this estimation is after controlling for any selection bias of debit card usage.

The following independent variables were also found to be significantly related to household debt: household composition, saving time horizon, attitude toward credit, credit history, education, and income, whereas age and credit card use were the insignificant variables. Results of the categorical variables are discussed first, followed by the results of continuous variables.

Table 4 Simultaneous-equation modeling result

Implicates	Imp 1	Imp 2	Imp 3	Imp 4	Imp 5
Equation: log (household debts)					
Constant	8.803***	8.785***	8.789***	8.741***	8.762***
Age	0.002	0.002	0.002	0.003	0.003
Marital status (married as base)					
Single male	−0.337**	−0.335**	−0.348**	−0.335**	−0.348**
Single female	−0.723***	−0.733***	−0.732***	−0.751***	−0.754***
Saving time horizon (within 1 year as base)					
1 to 5 years	0.013	0.023	0.023	0.026	0.034
Longer than 5 years	0.189*	0.180*	0.189*	0.212**	0.203*
Attitude toward credit (neutral as base)					
Good	0.221**	0.211**	0.228**	0.231**	0.210**
Bad	0.022	0.010	0.016	0.025	0.023
Bad credit history (never rejected for full amount as base)					
Rejected or obtained lesser amount	0.313***	0.326***	0.323***	0.327***	0.310***
Never applied	−0.884***	−0.840***	−0.857***	−0.846***	−0.874***
Education (high school as base)					
Less than high school	−0.195	−0.250*	−0.206*	−0.208	−0.190
Some college	0.220*	0.233*	0.216*	0.244*	0.249**
College degree or more	0.609***	0.625***	0.627***	0.638***	0.637***
Income (\$1,000)	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
Use credit card	0.099	0.110	0.097	0.119	0.099
Use debit card	−3.937***	−3.934***	−3.924***	−3.870***	−3.985***
Equation: debit card use					
Constant	−0.990*	−0.941*	−1.141*	−1.486**	−1.650***
Age	−0.002	−0.002	−0.001	−0.001	−0.001
Marital status (married as base)					
Single male	−0.648*	−0.588*	−0.562*	−0.612*	−0.596*
Single female	−0.494**	−0.472**	−0.419*	−0.457**	−0.473**
Own a home (renter as base)	−0.524**	−0.487**	−0.522**	−0.508**	−0.548**
Financial assets (\$1,000)	−0.128***	−0.122***	−0.118**	−0.127**	−0.112**
Education (years)	−0.005	−0.017	−0.005	0.021	0.040
Revolving tendency (almost never as base)					
Almost always	0.394	0.469*	0.448*	0.437*	0.417*
Sometimes	0.501*	0.562*	0.517*	0.534*	0.408
No credit card	0.291	0.366	0.361	0.371	0.287
Attitude toward credit (neutral as base)					
Good	0.173	0.139	0.157	0.196	0.125
Bad	0.050	0.046	0.015	0.060	0.007
Ever filed for bankruptcy					
Yes (no as base)	−0.815	−0.785	−0.737	−0.736	−0.721
Statistics					
<i>Rho</i>	0.882***	0.878***	0.868***	0.870***	0.890***
LR test of independent ( $\rho = 0$ ); $\chi^2(1)$	35.97***	34.67***	32.90***	34.78***	32.27***

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Single males and single females tend to have 34% and 72% less debt than married households, respectively. Households with saving time horizons longer than 5 years have 19% more debt than those with saving time horizons of less than a year. Households with a

good attitude toward credit tend to have more debt than those who are indifferent toward credit. Households whose credit applications were rejected or who obtained less credit than applied for have 31% more debt than those who were never denied or reduced for loans; households who never applied for credit have 88% less debt than those who were never denied or reduced for loans. Households with college education tend to have more debt compared to households with high school diplomas. Finally, in terms of income, we found that for every \$10 increase in annual income,<sup>2</sup> on average, households increase their amount of debt by .02%.

From the estimation of debit card usage, we found that there was a significant association between revolving tendency and credit card use. Those who usually or sometimes revolve are more likely to use debit cards than those who almost never revolve. This finding does not support the argument that debit card users are more financially conscientious (therefore, choose debit cards instead of credit cards). Instead, this finding supports the hypothesis that those who are credit impaired (because of outstanding balances) use debit cards for transactions.

We also found that the following variables were significantly associated with the use of debit cards: household composition, home ownership, revolving tendency, and total financial assets. Non-significant variables in debit card use were age, educational attainment, attitude toward credit, and bankruptcy filing. Single males and single females are 52% and 61%, respectively, as likely to use debit cards as married households (odds ratio not shown in the table). Households that own a house are 59% as likely to use debit card as renters. Households that own a home are 60% as likely to use debit card as households that do not own a home. For every \$1,000 increase in financial assets, the chance of using a debit card decreases by 13%.

## **6. Discussion and conclusions**

The primary goal of this study was to determine whether the use of debit cards contributes to the reduction of household debt. Theories have been suggested, but no studies have yet attempted to prove this relationship with nationally representative data. In this study, we found empirical evidence for the negative relationship between debit card use and household debt. Specifically, we found that the use of debit cards is negatively associated with household debt (i.e., debit card users tend to have smaller amounts of unsecured debt than non-users).

This finding of the relationship between debit card usage and household debt provides supporting evidence to the theories aforementioned. The use of debit cards integrates the negative feeling of payment with the positive feeling from purchasing goods and services, while credit card use segregates the positive feeling of purchase from the negative feeling of payment. We found that compared to non-users, debit card users tend to have 394% less unsecured debts, while still controlling for important factors such as income, credit history, and credit card use. This result supports the findings of Soman (2001), who proved that different payment mechanisms can lead to different types of spending behavior, based on the mental accounting theory. This tendency of debit card users having less debt is also

consistent with the findings by Zinman (2004) who found that debt-averse households tend to use debit cards. As consumers realize that debit card purchases will almost instantly reduce the amount of money in their bank account(s), they become more prudent in spending. In other words, the thought of immediate payment via a debit card discourages unnecessary or impulse spending.

We find evidence of a revolving tendency being related to debit card use, but against the common expectation that financially conscientious consumers, those who do not revolve, tend to use debit cards. Instead, we found that households that tend to carry outstanding balances on their credit cards are more likely to use debit cards than households that never use revolving credit. This result is consistent with the findings of King and King (2005), namely that the amount of revolving credit debt is positively related to the probability of using debit card. Compared to debit card non-users, debit card users also tend to be married, not own a home, and have smaller amounts of financial assets. We do not find any age impact in debit card usage in contrast to previous studies that found a negative age impact (Carow & Staten, 1999; Kennickell & Kwast 1997). As our study employed more recent data (we used the 2004 Survey of Consumer Finances, and previous studies used the 1995 SCF), we can explain such differences in age impact with the broader diffusion of debit cards and the disappearance of an age effect in the adoption of innovation. The difference in the relationship between debit card use and financial assets can be attributed to the differences in the model and time period. Whereas Kennickell and Kwast performed logistic regression of debit card use on financial assets, education, age, and income, they did not control for other important variables, such as credit revolving tendency, which are controlled for in this study. Additionally, although this study employs the 2004 Survey of Consumer Finances, Kennickell and Kwast used the 1995 Survey of Consumer Finances.

Based on the results of this study, the following implications can be drawn for financial counselors and consumer educators. To discourage household debt, financial counselors and consumer educators should recommend the use of debit cards instead of credit cards. This is an effective strategy, considering that 90% of consumers believe that overspending is the fault of consumers and not credit card companies, based on Surveys of Consumers 2000 (Durkin, 2000). Debit cards and similar payment instruments, such as prepaid smart cards, help consumers spend more conscientiously, thereby eliminating unnecessary or impulse spending. Unnecessary debt from credit card use, along with interest payments or costs, may far outweigh the utility and benefits associated with credit card use.

This study has some limitations that restrict its contribution. First, the measurement of debit card usage is a general one. The SCF 2004 asks one question only with regard to debit card use: does the household use a debit card or not? There is no information on when and where people prefer to use debit cards versus other payment mechanisms. Using this data, we could not thus differentiate people who use a debit card once a week from those who use a debit card 99% of the time. With a richer dataset that includes information on the frequency of debit card use, we would be able to measure the frequency or percentage of use of debit cards, and compare it to household debt. Second, because of the cross-sectional nature of the SCF 2004, we were unable to assign a cause-and-effect relationship between debt and debit card use. Third, we could not utilize a multivariate statistical analysis that took into account all the five implicates in the SCF dataset.

## Notes

1. “Online” refers to a direct transaction between card users and merchants that permits immediate money transfers. One of the easiest ways to distinguish this type of transaction, as opposed to an “offline” transaction, is the use of a Personal Identification Number (PIN) for the online transaction. “Offline” refers to a delayed transaction between card user and merchant, when either or both parties’ banks cannot be connected for an immediate money transfer. Generally, PIN-less and/or “signature required” transactions are “offline” transactions.
2. One percent of \$1,000-unit of income.

## References

- Anguelov, C. E., Hilgert, M. A., & Hogarth, J. M. (2004). U.S. consumers and electronic banking. *Federal Reserve Bulletin*, Winter, 1–18.
- Carow, K. A., & Staten, M. E. (1999). Debit, credit, or cash: survey evidence on gasoline purchases. *Journal of Economics and Business*, 51, 210–224.
- Durkin, T. A. (2000). Credit cards: use and consumer attitudes 1970–2000. *Federal Reserve Bulletin*, 86, 623–634.
- Evans, D. S., & Schmalensee, R. (1999). *Paying with plastic*. Cambridge, MA: The MIT Press.
- Feinberg, R. A. (1986). Credit card as spending facilitating stimuli: a conditioning interpretation. *Journal of Consumer Research*, 13, 348–356.
- Gerdes, G., & Walton, J. K. (2002). The use of checks and other non-cash payment instruments in the United States. *Federal Reserve Bulletin*, August, 360–374.
- Greene, W. H. (1997). *Econometric Analysis* (3rd ed.). New York, NY: Prentice Hall.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: an analysis of decisions under risk. *Econometrica*, 47, 313–327.
- Kennickell, A. B., & Kwast, M. L. (1997). Who uses electronic banking? Results from The 1995 Survey of Consumer Finance. Annual Meetings of the Western Economic Association, Seattle, WA.
- King, A. S., & King, J. T. (2005). The decision between debit and credit: finance charges, float, and fear. *Financial Services Review*, 14, 21–36.
- Maddala, G. S. (1993). *Limited-dependent and Qualitative variables in econometrics*. New York, NY: Cambridge University Press.
- Mann, R. J. (2002). Credit cards and debit cards in the United States and Japan. *Monetary and Economic Studies*, 20, 123–159.
- Mantel, B. (2000). Why don’t consumers use electronic banking products? Towards a theory of obstacles, incentives, and opportunity. *Emerging Payments Occasional Paper Series*. Federal Reserve Bank, Chicago, IL.
- Montalto, C. P., & Sung, J. (1996). Multiple imputation in the 1992 Survey of Consumer Finances. *Financial Counseling and Planning*, 7, 133–146.
- Prelec, D., & Loewenstein, G. (1998). The red and the black: mental accounting of savings and debt. *Marketing Science*, 19, 4–28.
- Rook, D. W. (1987). The buying impulse. *Journal of Consumer Research*, 14, 189–199.
- Rubin, D. B. (1987). *Multiple imputations for nonresponse in surveys*. New York, NY: Wiley.
- Soman, D. (2001). Effects of payment mechanism on spending behavior: the role of rehearsal and immediacy of payments. *Journal of Consumer Research*, 27, 460–474.
- Stata Base Reference Manual vol. 4 s–z Release 8. 2003. College Station, TX: Stata Corporation.
- Thaler, R. (1980). Mental accounting and consumer choice. *Marketing Science*, 4, 199–214.

- Weiner, S. E. (2000). Electronic payments in the U.S. economy: an overview. *Economic Review*. Fourth Quarter: Federal Reserve Bank of Kansas City.
- Zinman, J. (2004). Why use debit instead of credit? Consumer choice in a trillion-dollar market. *Federal Reserve Bank of New York Staff Reports* (191).