

## Debit or Credit?

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### Abstract

Empirical consumer payment price sensitivity has implications for theory, optimal regulation of payment card networks, and business strategy. A critical margin is the price of a credit card charge. A revolver who did not pay her most recent balance in full pays interest; other credit card users do not. I find that revolvers are substantially less likely to incur credit card charges and substantially more likely to use a debit card, conditional on several proxies for transaction demand and tastes. Debit use also increases with credit limit constraints and decreases with credit card possession. Additional results suggest that debit is becoming a stronger substitute for credit over time.

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Appendices available online at [http://www.dartmouth.edu/~jzinman/Papers/Debit\\_Appendix.pdf](http://www.dartmouth.edu/~jzinman/Papers/Debit_Appendix.pdf).

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## 1. Introduction

Several modeling, policy, and business issues hinge on how consumers respond to the price of payment instruments. The developing theory of two-sided markets suggests that the degree of substitutability between debit and credit cards affects equilibrium interchange fees and the optimal regulation of card platforms.<sup>1,2</sup> Consumer price sensitivity may also have implications for how payment card issuers compete and price their services. And retail payment price sensitivity informs models of high-frequency intertemporal consumer choice, by speaking directly to the question of whether consumers are indifferent on the margin when the cost difference between choices tends to be small.<sup>3</sup> But there is little empirical evidence on price sensitivity to inform consideration of these issues.<sup>4</sup>

I estimate price sensitivity in retail payment choice by examining the most important pecuniary cost margin faced by most consumers: the price of a marginal credit card charge. A *revolver* who did not pay her most recent credit balance in full starts paying interest on the charge starting immediately; a *convenience user* floats until her next payment due date (up to 60 days hence). The 70% of U.S. households who own a general purpose credit card face this implicit price; in contrast, only about 15% face per-transaction fees, and only about 40% earn airlines miles or other rewards for charging.

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<sup>1</sup> Theoretical models find that the social optimality of equilibrium transaction prices set by payment card platforms depends on consumer price sensitivity and in turn on willingness to substitute across payment options (Rochet and Tirole 2003; Guthrie and Wright 2007). Rochet and Tirole (2006b) finds that the social optimality of the Honor-All-Cards rule depends on the degree of substitutability between debit and credit. These models inform policy debates; see, e.g., Rochet and Tirole (2006a) for a discussion of recent antitrust actions taken by regulators and merchants against card associations in Australia, the U.K., and the U.S.

<sup>2</sup> Rysman's (2007) evidence on homing patterns and a correlation between usage and acceptance also informs two-sided market models.

<sup>3</sup> Although the stakes of any individual's choice may be small, the high frequency and ubiquity of payment choices aggregate to large stakes, as detailed below.

<sup>4</sup> Borzekowski et al. (2008) is the most similar paper; they find strong sensitivity to per-transaction fees on debit in nationally representative microdata from the U.S.

Debit cards offer similar payment attributes to credit cards on other margins—acceptance, security, portability, and time costs— and hence the pecuniary cost of a marginal credit card charge is the key economic difference between debit and credit for many households.

I estimate that credit card revolvers were at least 21% more likely to use debit than convenience users over the 1995-2004 period, conditional on a rich set of proxies for transaction demand, preferences, and other potential confounds. I also show that debit use responds sharply to other implicit prices on credit card payments. Consumers facing credit limit constraints are more likely to use debit than consumers who revolve but have ample available remaining credit. And consumers who lack a credit card altogether are more likely to use debit than those who have a credit card. In all, the results suggest that at least 38% of debit use in the cross-section was driven by pecuniary cost minimization over 1995-2004.<sup>5</sup> The comparable estimate for 2004 alone is 50%; these and other results suggest that consumer substitution between debit and credit has been increasing over time.

The results have implications for modeling. They suggest that models of payment networks must take into account a substantial degree of price sensitivity and substitutability between debit and credit. And they suggest that the right model of high-frequency, low-stakes intertemporal choice has the *average* consumer optimizing on the margin, rather than choosing indifference out of bounded rationality (e.g., to conserve on decision-making costs).

The results also inform business and policy applications. The popularity of debit is poorly understood. Debit is now used more often than credit at the point-of-sale, and increased acceptance and improved security have been important proximate drivers of recent growth.<sup>6</sup> But

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<sup>5</sup> My results do not explain the time series growth in debit use documented in Table 1; the relevant prices and margins of credit card use have changed relatively little over the period of debit's substantial growth.

<sup>6</sup> Debit surpassed credit as the most common form of POS Visa transaction in 2002. Overall, debit was used for over 15.5 billion POS transactions totaling \$700 billion in the year 2002. This represented about

which attribute(s) creates underlying consumer demand for debit? Anecdotal evidence suggests that issuers have focused on the substitution of debit for cash and check for convenience reasons (Reosti 2000), with academics sharing the view that debit's growth has come largely at the expense of paper payments (Chakravorti and Shah 2003; Borzekowski et al. 2008; Scholnick et al. 2008). My results suggest that debit is a strong substitute for credit as well as for cash and checks. Consequently platforms and issuers should account for debit-credit interactions (e.g., cross-price sensitivity) in formulating pricing, marketing, and network strategies. Policymakers should account for such interactions when evaluating the welfare and distributional impacts of proposed interventions in payment markets.

## **2. Consumer Choice at the Point-of-Sale: A Simple Model**

### *2.1. Overview*

This section details the consumer's payment choice problem at the point-of-sale ("POS"), and models it assuming that transaction cost minimization drives the decision. The model generates testable predictions on which consumers should be more likely to use debit— those who revolve credit card balances, those who face binding credit card credit limits, and those who lack a credit card.<sup>7</sup> The discussion also highlights how the interpretation of these test results on price sensitivity is affected by assumptions on the degree of substitutability between debit and credit on non-price margins.

### *2.2. Attributes of Payments Media*

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35% of electronic payment transaction volume and 12% of POS noncash payments (Gerdes and Walton 2002).

<sup>7</sup> Throughout the paper I focus on general purpose credit cards (Visa, Mastercard, Discover, and AMEX cards with revolving credit). These stand in contrast to store-specific/"proprietary" cards.

Traditionally, literature on media of exchange has focused five key margins of consumer payment choice (Jevons 1918). I begin by briefly comparing debit, credit, and other payments media (principally cash and check) along each of the four non-pecuniary dimensions: acceptance, security, portability, time costs. This discussion highlights the close substitutability of debit and credit along non-pecuniary margins (particularly during the latter part of my sample period), and motivates a simple model of consumer choice between debit and credit that focuses on pecuniary costs and generates related testable predictions.

### *2.2.1. Acceptance*

Debit and credit enjoy similarly widespread acceptance as payments devices; Shy and Tarkka (2002) treat them as equivalent. Rough equivalence has come about due to the rise of “signature” (or “offline”) debit, whereby an ATM or “check” card with a Visa or MasterCard logo can be used, as a debit card, anywhere the credit card brand is accepted.<sup>8</sup> Consequently today debit and credit are essentially equivalent along the acceptance margin when compared to cash or check. This was much less true during the early part of my sample period, when both “online” POS PIN terminals and signature debit cards were far less widespread.

### *2.2.2. Security*

Debit and credit now offer comparable fraud protection, and hence offer similar theft risk compared to cash or check. Credit was generally less risky on this margin during the earlier part of sample period, however. This pushes against the model’s testable predictions, as detailed below.

### 2.2.3. *Time costs*

From the consumer's vantage point at the POS, debit and credit transactions are typically processed exactly the same way, using either a POS terminal or signature-based transaction. These methods may be more or less time-consuming than cash or check, depending on the situation (Klee 2006).<sup>9</sup> Both debit and credit may be used to economize on trips to the bank or ATM.<sup>10</sup>

### 2.2.4. *Portability*

Debit and credit are plastic card-based media, offering identical advantages over bulkier cash and checkbooks.

## 2.3. *Model*

The similarities between debit and credit as payment devices suggest that an optimizing consumer could choose her POS payment method in two steps by:

1. Deciding whether to use "paper" (cash, check) or "plastic" (debit, credit), based on the four margins discussed above.
2. Minimizing pecuniary costs, conditional on the choice in step 1.<sup>11</sup>

Then in the case where the consumer is using plastic, she faces the following problem:

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<sup>8</sup> There are a few exceptions; e.g., some merchants take only PIN ("online") debit, and post-Walmart settlement in 2003 some merchants take credit but not signature debit. Hayashi, et al. (2003) describes the debit card industry's institutions and operations.

<sup>9</sup> Debit and credit may pose different non-POS time costs (re: paying bills), and I consider this margin in Section 4.4.

<sup>10</sup> About 17% of debit transactions involve "cash back" (Breitkopf 2003), and about 29% of debit users ever got cash back during the sample period under consideration in this paper (December 1996 Survey of Consumer Attitudes and Behavior). Cash back is only available in the 25% or so of merchant locations with the POS terminals required for PIN entries (Breitkopf 2003).

<sup>11</sup> See, e.g., Santomero and Seater (1996) for a more comprehensive model of consumer payment choice.

$$(1) \text{ Min } [C_d(p), C_c(H, f, r(R, r_{\text{purch}}, B, L))]$$

$C_d$  and  $C_c$  and represent the marginal (implicit) pecuniary cost of using debit and credit, respectively. The direct cost of  $C_d$  debit depends on  $p$ , the amount of the transaction fee that is sometimes levied. During the sample period under consideration in this paper only about 15% of debit card holders faced transaction fees, and the modal nonzero fee was 25 cents.<sup>12</sup> Most fees are levied on PIN debit transactions only; fees per signature debit or credit card transaction have been very rare in the United States. For the purposes of discussion I assume for the moment that debit transactions clear with an effective interest rate of zero, ignoring settlement lags (which can provide a day or two of float) and costly checking account overdrafts.

The cost  $C_c$  of using credit depends first on  $H$ , whether the household has a credit card. Assume for simplicity that the 30% of households lacking a credit card ( $H=0$ ) do so only for supply reasons. This is a reasonable approximation both under standard theory— holding a credit card is cheap, given the prevalence of no-fee cards and strong fraud protection— and in practice.<sup>13</sup>  $C_c$  is infinite when  $H=0$  and debit is of course relatively attractive.

$C_c$  also depends on  $f$ , the “rewards” benefits (e.g., airlines miles, rebates) available per unit charged (Ching and Hayashi 2008). These incentives typically have been more prevalent and generous for credit than debit, and can be valued at approximately one cent per dollar charged for the 50-60% or so of card holders earning rewards.<sup>14</sup>

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<sup>12</sup> See Dove Consulting’s 2001 report prepared for the Federal Reserve System; Borzekowski et al. (2008) find a similar prevalence of fees in 2004, with a median fee of 75 cents.

<sup>13</sup> Many households seem to lack a credit card due to supply constraints. In the SCF raw data, 43% of debit users who lack a general purpose credit card report not being able to borrow as much as they would like. Estimating extensively conditioned models of credit card holding produces economically large, statistically significant results on each of the standard variables that are verifiable to credit card issuers and generally held to be determinants of credit card supply: homeownership, time at current residence, and loan delinquency (results not shown).

<sup>14</sup> There may be heterogeneity in consumer rewards valuation due to nonlinearities in rewards pricing. The December 1996 Survey of Consumers found that 56% of credit card holders had a card with rewards.

$C_c$  depends finally on  $r$ , the effective interest rate at which the consumer may borrow to charge a purchase at the point of sale.  $r$  in turn is determined by  $R$ , a discrete variable capturing whether the consumer revolved a balance at her last credit card payment due date (assume for the moment that the consumer holds only one credit card; I consider the complication of multiple cards in Section 3). In cases where  $R=1$ , i.e., where the consumer did not pay her balance in full, then she must borrow-to-charge— each dollar charged on the margin begins accruing interest immediately at the consumer’s “purchases” rate,  $r_{\text{purch}}$ .<sup>15</sup> Thus when  $R = 1$  debit use is relatively attractive.<sup>16</sup> In contrast, when  $R = 0$  the consumer gets to float for about 25 days on average, and retains the option to borrow, so  $r < 0$ .<sup>17</sup>

Rather than tapping available liquidity by using debit, an alternative strategy for revolvers is to pay down credit card balances at higher frequencies than the monthly billing cycle; i.e., to “charge up” using a credit card, and then “pay down” the credit card balance multiple times per month using liquid assets from the checking account. But the pecuniary cost savings from this strategy is typically small relative to the time and hassle costs of paying down the credit balance more frequently (Zinman 2007).

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<sup>15</sup> The Federal Reserve Board of Governors’ biannual publication “Shop: The Card You Pick Can Save You Money” states: “Under nearly all credit card plans, the grace period applies only if you pay your balance in full each month. It does not apply if you carry a balance forward.” See, e.g., the January 1998 or August 2001 versions. Nationally representative surveys suggest that most credit card holders are cognizant of the interest rates on their plans; e.g., Durkin (2000) reports that at least 85% are aware of their APRs, and Durkin (2002) reports that 54% of holders consider rate information the “most important” disclosure, with 78% of holders responding that the APR is a “very important” credit term (compared to only 25% for rewards).

<sup>16</sup> In principle the *intensive* margin of the cost of revolving,  $r_{\text{purch}}$ , should provide an independent source of variation in incentives for debit use along with the extensive margin  $R$ . But in practice this is unlikely to be the case, due to data limitations (the SCF only reports an interest rate for one card, which introduces noise into my empirical model), and the relatively limited steady-state dispersion in  $r_{\text{purch}}$ .

<sup>17</sup> For analytical simplicity, I incorporate the opportunity cost of transaction balances, incurred by using debit, into the effective interest rates. This simply increases the reward to floating, and reduces the effective  $r_{\text{purch}}$  by the amount of the opportunity cost.



Overall the stakes of making the “correct” payment choice at the POS, conditional on  $R$ , will be small in most cases. A typical revolver who borrows-to-charge pays about \$12 per month to do so.<sup>18</sup> A typical debit user who forgoes credit card float (and miles) loses perhaps \$3 (\$23) per month.<sup>19</sup> In the presence of uncertain cash flows, the cost of using debit incorrectly could be significantly higher due to nonlinear overdraft penalties. If overdraft risk is present but unmeasured (as in this model, and its empirical implementation below) this may induce some revolvers with nonincreasing demand for credit to borrow-to-charge instead of using debit.

$r$  also depends on whether the consumer overdraws her credit limit. When a charge pushes the outstanding balance ( $B$ ) over the credit limit ( $L$ ), the consumer often incurs three added costs: i) an overlimit fee of \$20-\$30; ii) a negative effect on her credit score; iii) “penalty pricing” on all outstanding balances; i.e.,  $r_{\text{over}} \gg r_{\text{purch}}$ .<sup>20</sup> Debit use thus becomes more attractive as  $B$  approaches  $L$ .

In summary, consumers face a complex optimization problem over relatively small stakes when choosing a payment method at the POS. They are confronted with several payment options, several cost margins (only some of them explicit), intertemporal tradeoffs, and uncertain cash flows. The stakes are nontrivial but probably less than \$20 per month for most consumers. A simple model predicts that debit should be relatively attractive to households lacking a credit card, revolving a credit card balance, and/or facing a binding credit card limit constraint.

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<sup>18</sup> E.g., a revolver who makes credit card payments once per month and charges \$2,000 per month will incur \$12 per month in finance charges on that \$2,000 at the median interest rate revolvers faced during my sample period (14% APR). The \$2,000 per month is one-half of median household income; assuming that electronic POS payments do (or could) equal one-half of income is probably too high, given the preponderance of expenditure that can not be paid by credit or POS debit.

<sup>19</sup> A nonrevolving consumer who held a credit card but used debit for \$2,000 worth of purchases would forgo about \$3.33 per month in float given a riskless real return on assets of 2%, and \$20 per month worth of rewards where applicable (assuming the industry-standard reward valuation of one cent per dollar charged).

<sup>20</sup> See Furletti (2003) on credit card contracting practices.

#### 2.4. Not Modeled, Not Needed: Transaction Demand and Portfolio Choice

The model thus far has presumed that transaction demand and portfolio choice are exogenous to the decision about whether to use debit. These assumptions are innocuous, since the model's predictions hold for any *marginal* transaction, given the values of the cost variables.<sup>21</sup> The model fits with recent work showing that simultaneously lending “low” in bank transaction accounts and borrowing “high” on credit cards can be explained by neoclassical models containing payment and credit market frictions that give liquid assets implicit value (Zinman 2007; Telyukova 2008).

### 3. Data and Identification

The model's predictions suggest estimating the following types of equations:

$$(2) Y_{it} = f(H_i, R_i, F_i, x_i, t_i)$$

$$(3) Y_{it} = f(R_i, x_i, t_i | H_i = 1)$$

where  $i$  indexes consumers,  $t$  indexes time (with a vector  $t_i$  of time effects),  $Y$  is a measure of debit use,  $H$  is credit card holding,  $R$  is revolving,  $F$  is a binding credit card limit constraint, and  $x$  includes several variables that can be used to help identify the model by capturing other payments costs, payments and credit demand, and tastes. The model predicts that  $\partial Y/\partial R$  (“ $\beta_R$ ”) and  $\partial Y/\partial F$  (“ $\beta_F$ ”) will be positive, and that  $\partial Y/\partial H$  (“ $\beta_H$ ”) will be negative. In each case the null

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<sup>21</sup> Debit and credit may be chosen jointly as well. Forward-looking consumers may take into account the availability of debit in deciding whether to borrow on credit cards, since the availability of debit makes steady-state revolving slightly cheaper by providing the benefits of electronic POS payments without borrowing-to-charge. This interaction reinforces the model's prediction that revolvers should be more likely to use debit.

hypotheses is that  $\beta = 0$ . Equation (3) simplifies (2) in order to focus on the model's key prediction, that  $\beta_R > 0$ , by ignoring F and limiting the sample to credit card holders ( $H=1$ ).

I use data from the 1995-2004 Surveys of Consumer Finances (SCFs), a triennial, nationally representative cross-section of over 4,000 U.S. households.<sup>22</sup> The SCF has asked about debit *use* since 1995 (Web Appendix 1 shows the survey question). Each SCF also contains detailed data on the use of credit cards and other electronic payments, financial status, demographics, and preferences.<sup>23</sup> I set  $Y = 1$  if the household reports using a debit card and zero otherwise,<sup>24</sup>  $H = 1$  if the household was one of the estimated 70% in the U.S. population holding one or more general purpose credit cards, and  $R = 1$  for the estimated 54% of credit card holding households that did not pay their most recent balance in full on a general purpose credit card.<sup>25</sup> Web Appendix 2 provides details on the construction of the credit card and control variables.

The SCF is the best publicly available, nationally representative source with data on both debit and credit usage in the U.S. Nevertheless data limitations create three identification issues.

The first identification issue stems from the fact that the SCF does not report balances for individual credit cards, but rather total balances outstanding over *all* of the household's general purpose credit cards. This creates a downward bias on  $\beta_R$  if some households use separate credit

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<sup>22</sup> The SCF has not had a panel component since 1983-1989, which predates widespread debit use and questions about debit use. The SCF produces 5 imputed observations per household in order to maximize precision in the presence of substantial imputation of certain financial variables. I use the full dataset of 5 observations per household, adjust standard errors accordingly, and report the number of households in the tables.

<sup>23</sup> For more information on the SCF see <http://www.federalreserve.gov/PUBS/oss/oss2/scfindex.html>.

<sup>24</sup> The SCF does not have any data on usage intensity. Table 1 shows the rapid growth of debit use (on the extensive margin) among SCF households from 1995 to 2004. The SCF yields proportions of debit users comparable to other surveys; e.g., the Standard Register's *National Consumer Survey of Plastic Card Usage*, a random phone survey of 1,202 households, found that 37% were debit users in March 1999. The 1998 SCF (collected January-August) found that 34% of households used debit.

<sup>25</sup> SCF households underreport credit card revolving balances by a factor of about 2 relative to issuer reports after adjusting for definitional differences (Zinman 2008). But there is no evidence that SCF households underreport the *extensive* margin of revolving.

cards for borrowing and transacting, and motivates some consideration of the 33% of credit card holding households with only a single general purpose credit card.

The second identification issue stems from omitted variables on debit and credit payment attributes: rewards incentives, overdraft risk, cash back usage, and merchant acceptance.<sup>26</sup> Each of these unobservables biases  $\beta_R$  towards zero by producing revolvers who do not use debit due to some unobserved price (e.g., to rewards incentives or overdraft risk), or nonrevolvers who do use debit due to some unobserved cost (e.g., time cost savings from cash back transactions or avoiding the need for a credit card bill payment). Control variables for demographics, financial attitudes (toward borrowing, risk, and planning horizon), credit card interest rate and recent charges, household financial condition, and spending patterns will mitigate the downward bias on  $\beta_R$  if they are correlated with debit use, revolving, and the unobserved attributes/costs.

A third identification issue is the possibility that  $\beta_R > 0$  simply picks up indifference. This would occur if revolvers are relatively “big spenders” who choose their payment device haphazardly, perhaps because the computational costs of finding the right solution outweigh the benefits. In this case revolvers might be mechanically more likely to use debit because they transact more. The binary nature of my measure of debit use mitigates this concern. I also control for underlying transaction demand with data on wealth, income, income shocks, spending relative to income over the past year, borrowing attitudes, the interest rate on revolving balances, the number of credit cards, credit card charges, and the use of other electronic payments. The latter variables also help (over-) control for any “taste for plastic” that may be correlated with revolving behavior but not necessarily indicative of cost minimization as defined by the model.

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<sup>26</sup> Note that missing information on the prevalence of debit transaction fees is *not* likely to bias estimates on  $\beta_R$ , since fees are: 1. not very prevalent (see Section 2.3); and 2. typically levied only on PIN debit

Overall then, estimating (3) using probit should, under the usual distributional assumptions about the error term, identify whether debit use responds to the price of a marginal credit card charge. The most likely biases push toward null effects.

## 4. Main Results

This section presents results obtained from estimating versions of equations (2) and (3). The findings are consistent with each of the model's three predictions: revolving and facing binding credit constraints are positively correlated with debit use, while holding a credit card is negatively correlated with debit use.

### 4.1. Debit Use and Credit Card Revolving

I estimate  $\beta_R$ , the correlation between revolving credit balances and debit use, by implementing equation (3) on several samples from the SCF.<sup>27</sup> Table 2 presents the key results. Each cell presents an estimate of  $\beta_R$  from a different combination of (control variable specification)  $\times$  (sample). Web Appendix Table 1 shows the pseudo-R-squareds (which are high by cross-sectional standards) and some results on control variables for several specifications. All specifications include controls for debit card supply (census region,<sup>28</sup> housing type, and ATM cardholding status); and for demographic, life-cycle, and transient proxies for transaction demand and secular tastes that might affect payment choice: income last year, last year's income relative to average, number of household members, homeownership, marital status, attitudes

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transactions. As such fees are unlikely to influence the *extensive* margin of debit use, all else constant, since in most cases consumers will have the option of a fee-free signature debit transaction.

<sup>27</sup> Throughout the paper I report probit marginal effects with SCF sample weights; using linear probability or logit produces virtually identical results. The results are also robust to using unweighted estimation on samples that exclude wealthy households as defined by Hayashi and Klee (2003).

toward borrowing, financial risk attitude, planning horizon for saving and spending decisions, age, gender, educational attainment, military experience, race, (self-)employment status, and industry.<sup>29</sup>

Table 2 suggests two key results. First, revolvers are significantly more likely to use debit. The marginal effect for the pooled 1995-2004 sample in Column 1 (my preferred control variable specification) implies that debit use is 9.8 percentage points higher among revolvers (21% higher than the sample mean). Second, the correlation between revolving and debit use has been growing over time. The marginal effect for 2004 in Column 1, 17.3 percentage points, is 27% of the sample mean and significantly higher than the marginal effects for any of the other years (p-values not shown in table but all three are  $< 0.01$ ). This time pattern fits with increases in fraud protection and debit acceptance that have made debit a closer substitute for credit over time. The growing correlation between debit use and ATM card possession (Web Appendix Table 1) is also consistent with increased debit acceptance via the diffusion of ATM cards with Visa and MasterCard logos.

Columns 2-5 add various proxies for “big spenders” and a “taste for plastic”, and suggest that the results are robust to different control variable specifications. Column 2 adds a quadratic in net worth and categories for spending relative to income in the past year. Column 3 then adds dummy variables for whether the household uses other electronic payment media or computer banking. Column 4 adds the number of general purpose credit cards, last month’s credit card charges, and the interest rate paid on revolving balances. Column 5 add the interaction between the number of cards and revolving status (since SCF revolvers may in fact hold multiple cards

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<sup>28</sup> Census region is not available in the 2001 and 2004 SCF public releases; results estimated on the 1995 and 1998 do not change if region is omitted.

<sup>29</sup> Results do not change if 1-digit occupation code is used instead of, or in addition to, industry.

for the express purpose of maintaining one for convenience use). The point estimate on the revolving variable falls but the qualitative results are largely unchanged.

Columns 6 and 7 suggest that the results are robust to different definitions of revolving motivated by the measurement issues discussed in Section 3. Column 6 limits the sample to households with only one general purpose credit card (the idea is to make the revolving classification more precise—albeit for a selected sample-- since the SCF reports household-aggregate rather than card-level general purpose credit balances). Column 7 drops revolvers who made any recent charges on a general purpose credit card (the idea here is to make the revolving classification more precise by eliminating revolvers who are ramping up borrowing). The results are largely unchanged.<sup>30</sup>

Table 3 suggests that the negative correlation between revolving and debit use operates through reductions in general purpose credit card charges, as one would expect. Mechanically, that is, one expects to find revolvers charging less on their credit card if they are in fact minimizing the marginal cost of POS payments by not borrowing-to-charge. Column 1 (OLS) estimates that revolvers charged \$376 less on their most recent billing cycles over the 1995-2004 period, a 52% reduction relative to the sample mean, conditional on the preferred set of controls. The distribution of charges has a mass at zero and is right-skewed, so Column 4 presents estimates from poisson regression, which delivers a consistent estimate of the conditional mean under general assumptions. The result implies revolvers charged 48% less than non-revolvers.

Columns 2 vs. 3 (OLS) and 5 vs. 6 (poisson regression) show that debit users do not exhibit significantly greater reductions in credit card charges than non-users in the pooled sample. This

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<sup>30</sup> Other alternative measures of revolving behavior also produce similar results. These include: using total credit card balances or self-reported habitual revolving behavior to define R (instead of the most recent credit card revolving balances), and dropping the 14% of revolvers who hold an American Express or comparable charge card and can float thereon.

suggests that some revolvers switch to cash or check rather than debit to manage their payments costs. The 2004 point estimates do show larger reductions for debit-using revolvers, although neither difference is statistically significant.

#### *4.2. Debit Use and Credit Card Holding*

Table 4 presents estimates of  $\beta_H$ , the correlation between general purpose credit card holding and debit use. I estimate equation (2) on the sample of households with a checking account and positive income (an estimated 87% of U.S. households in 1995-2004), using my preferred specification of control variables. There is a power issue, particularly in 1995, since few households use debit but lack a credit card (Table 5, column 5). The cardholding coefficient may be attenuated as well, since cardholding mechanically effects revolving.<sup>31</sup>

Nevertheless  $\beta_H$  has the negative sign predicted by the model, and is significant with 99% confidence. The estimated marginal effect in Column 1 indicates that holding a credit card is associated with a 6.3 percentage point reduction in the probability of debit use (a 14% decrease relative to the sample mean of 0.45). Column 2 excludes revolvers in order to maximize sample homogeneity. The point estimate now implies that general purpose credit card holders are 11% less likely to use debit. Columns 3 and 4 limit the sample to 2004 and find larger correlations; households with a credit card use debit 20% and 22% less than the mean. These correlations are economically large, but an order of magnitude smaller than the effects of credit card holding on money balances found in Duca and Whitesell (1995) using the 1983 SCF.

#### *4.3. Debit Use and Credit Card Credit Limit Utilization*

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<sup>31</sup> This type of over-controlling problem is discussed in Angrist and Krueger (1999).



Table 6 presents estimates of the correlation between credit card credit limit constraints and debit use, using equation (3) and my preferred control variable specification.<sup>32</sup>

Columns 1 and 3 proxy for credit limit constraints using categories of utilization = (total general purpose revolving balances)/(total credit limit). The results on the pooled 1995-2004 sample (Column 1) show the expected discrete jump at positive utilization (this is the revolving effect, evident here in the results on category two, where  $0 < \text{utilization} \leq 0.25$ ). There is an additional discrete jump higher in the utilization distribution, as predicted by the theory: a Wald test on the difference in coefficients between the highest utilization ( $> 0.75$ ) and second-lowest ( $0 < \text{utilization} \leq 0.25$ ) categories has a p-value 0.05.<sup>33</sup> When the sample is limited to 2004 (Column 3) the difference is smaller and insignificant (p-value = 0.27).

One drawback of measuring utilization as a *proportion* of available credit is that consumer decisions may be driven more by the *level* of credit available on credit card lines. Columns 2 and 4 explore this possibility after scaling available credit by household income. Both columns show that households in the lowest quartile of available credit (quartile 1) use debit discretely more. Since this correlation is estimated conditional on revolving status, it indicates that debit use increases discretely again as credit constraints begin to bind, as predicted by the theory.<sup>34</sup> The size of this jump is substantial: households in the lowest quartile of available credit used debit 12% more than the mean in 1995-2004, and 14% more in 2004.

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<sup>32</sup> See Web Appendix 2 for details on construction of credit limit and utilization variables.

<sup>33</sup> Gross and Souleles (2002) use utilization categories of 0-50%, 50-90%, and >90% in their analysis of the impact of credit constraints on interest rate elasticities and propensities to consume out of available credit. This demarcation is impractical in my sample since only 3% of households have utilization >90%. Presumably this low proportion is due to: a) the fact that the SCF credit line variable may include lines from multiple cards, and b) underreporting of credit card borrowing (Zinman 2008).

#### 4.4. Debit Use, Pecuniary Costs, and Time Costs

The results thus far suggest that debit use by the *average* consumer responds strongly to the marginal (implicit) price of a credit card charge. But 28% of debit users in the 1995-2004 SCFs lack any observable pecuniary reason for using a debit card (Table 7); i.e., they are not revolving and do possess a credit card. What drives these “non-pecuniary” debit users to choose debit rather than credit? One possibility is time costs: using debit for cash back or to eliminate the hassle of paying a credit card bill.<sup>35</sup>

Web Appendix Table 1 suggests that time costs do play an important role.<sup>36</sup> Various multivariate specifications find that debit use is positively correlated with characteristics that might indicate a high shadow value of time: household size, income, education, and female. But these results reveal little about what proportion of the non-pecuniary group is motivated by time costs. Additional data sheds some light on the magnitude.

First, note that 17% of the non-pecuniary group exhibits behavior that is consistent with the hassle cost explanation: they have no recent general purpose credit card charges. Second, note that many debit users get cash back; 29% in the December 1996 Survey of Consumers, a proportion that probably has been rising over time with the diffusion of PIN POS terminals. Together these two statistics suggest that time and hassle costs could explain debit use for nearly half of the non-pecuniary group.<sup>37</sup>

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<sup>34</sup> The results suggest that credit constraints may bind more for all other quartiles relative to the quartile with the most available credit; this is consistent with consumers holding buffer stocks of available credit, as found in Gross and Souleles (2002).

<sup>35</sup> Differential acceptance may be another, albeit small, motive here, since there were a few establishments that accepted debit but not credit during the sample period. This phenomenon is becoming more prevalent in the wake of the Wal-Mart settlement; 4.9% of debit users in the May 2004 Survey of Consumers mentioned it (Borzekowski et al. 2008).

<sup>36</sup> Fusaro (2008) reaches a similar conclusion.

<sup>37</sup> E.g., if we assume that cash back use averaged 35% over 1995-2004 and was distributed equally among different types of debit users:  $0.17 + (1.0-0.17)*0.35 = 0.46$  .

## 5. Conclusion

I find that debit card use responds strongly to the price of making payments by a close substitute— a credit card. Using data from the most complete nationally representative survey with data on both debit and credit use, I find that debit use is significantly higher among consumers facing a relatively high cost on marginal credit card charges: those who revolve debt, those who face a binding credit limit constraint, and those who lack a credit card. The results are robust to a rich set of controls for underlying transaction demand, demographics, financial attitudes, and financial condition. The point estimates for 1995-2004 suggest that pecuniary cost minimization motives account for at least 38% of cross-sectional debit use. This is calculated by simply summing the absolute values of  $\beta_R$  and  $\beta_H$  in Table 4, Column 1, and scaling by the sample proportion of debit-using households. The same calculation for 2004 (from Table 4, Column 3) produces an estimate of 50%, suggesting that debit is becoming a stronger substitute for credit over time. Additional evidence suggests that time cost minimization explains substantial additional cross-sectional variation in debit use.

Data limitations imply that these estimates are probably lower bounds on both the importance of pecuniary motives and the degree of substitutability between debit and credit. Some revolvers presumably do not substitute to debit because rewards incentives or strategic default make “borrowing-to-charge” worthwhile in a pecuniary sense. Some households classified as revolvers in the SCF may not substitute to debit because they actually have a general purpose credit card on which they can float. An earlier version of this paper contains additional

discussion and simulations of how much these omitted variables bias the estimated correlation between debit use and revolving toward zero.<sup>38</sup>

As noted at the outset, the results have implications for policy, modeling, and practice. Antitrust regulators should take the nature and degree of the substitutability between debit and credit into account. Theorists working on two-sided markets should do so as well, by making assumptions about demand functions that are consistent with the available evidence. Issuers should consider debit and credit cross-price elasticities when optimizing pricing, marketing, and network strategies.<sup>39</sup> Researchers working on high-frequency intertemporal choice should note that the average consumer behaves as predicted by a simple model where pecuniary costs drive the debit or credit decision.

But have we learned anything about whether the sort of neoclassical model sketched in Section 2.3 fits the data *better* than plausible, more “behavioral” alternatives? Importantly, the strong response to pecuniary costs presented in this paper casts serious doubt on a plausible form of bounded rationality. Consumers do *not* seem to choose payment methods randomly— at least on average-- despite the complexity of the optimization problem and the often small stakes. But my tests can not reject models based on mental accounting (Prelec and Loewenstein 1998) and other explanations related to spending control or transaction utility (Soman 2003).

Richer data may be needed to make further progress toward identifying the deep and proximate drivers of consumer payment choice. For example, linked transaction and account data would permit sharp tests of neoclassical vs. mental accounting models and finer estimates of consumer payment price sensitivity.

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<sup>38</sup> [http://www.dartmouth.edu/~jzinman/Papers/Zinman\\_Debit%20or%20Credit\\_aug06.pdf](http://www.dartmouth.edu/~jzinman/Papers/Zinman_Debit%20or%20Credit_aug06.pdf) .

<sup>39</sup> For more on bank pricing of deposits and payment services see, e.g., Guibourg and Segendorff (2007), Humphrey et al (2006), and Stanhouse and Ingram (2007).

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Table 1. Debit Use in the Raw, Over Time

|              | Full Sample | Households with a General Purpose Credit Card |                   |           |                     |                  |
|--------------|-------------|---|-------------------|-----------|---------------------|------------------|
|              |             | All   | Convenience Users | Revolvers | Revolvers, one card | High utilization |
|              | (1)         | (2)   | (3)               | (4)       | (5)                 | (6)              |
| 1995         | 0.20        | 0.23  | 0.19              | 0.25      | 0.23                | 0.20             |
| # households | 3795        | 3152  | 1876              | 1275      | 325                 | 156              |
| 1998         | 0.39        | 0.40  | 0.32              | 0.48      | 0.47                | 0.54             |
| # households | 3821        | 3147  | 1880              | 1267      | 351                 | 176              |
| 2001         | 0.51        | 0.53  | 0.44              | 0.61      | 0.53                | 0.72             |
| # households | 3989        | 3380  | 2027              | 1353      | 348                 | 183              |
| 2004         | 0.64        | 0.65  | 0.52              | 0.76      | 0.72                | 0.79             |
| # households | 4111        | 3405  | 1997              | 1408      | 388                 | 237              |
| 1995-2004    | 0.45        | 0.47  | 0.38              | 0.54      | 0.50                | 0.60             |
| # households | 15716       | 13084   | 7781              | 5303      | 1412                | 753              |

Each cell is a weighted proportion of households that report using debit in the Survey of Consumer Finances (SCF).

"Full sample" = households with a checking account and positive income in previous year; using the SCF weight this is 87% of the U.S. population in the pooled 1995-2004 data , and 89% in 2004.

Using the SCF weight 70% of households held one or more general purpose credit cards in the 1995-2004 data, and 71% held one or more in 2004.

High utilization = 1 if revolving general purpose credit card balances > 75% of the available credit limit.



Table 2. The Correlation Between Debit Use and Revolving Credit Card Balances

|  | (1)              | (2)              | (3)              | (4)              | (5)              | (6)             | (7)             |
|--|------------------|------------------|------------------|------------------|------------------|-----------------|-----------------|
| 1995   | 0.018            | 0.015            | 0.015            | 0.016            | 0.045            | 0.028           | 0.020           |
| weighted sample proportion of<br>debit users = 0.23  | (0.019)<br>3152  | (0.019)<br>3152  | (0.019)<br>3152  | (0.020)<br>3152  | (0.032)<br>3152  | (0.030)<br>914  | (0.029)<br>2139 |
| 1998   | 0.098***         | 0.086***         | 0.087***         | 0.083***         | 0.070*           | 0.128***        | 0.107***        |
| weighted sample proportion of<br>debit users = 0.40  | (0.024)<br>3147  | (0.025)<br>3147  | (0.025)<br>3147  | (0.026)<br>3147  | (0.042)<br>3147  | (0.041)<br>952  | (0.038)<br>2170 |
| 2001   | 0.086***         | 0.077***         | 0.082***         | 0.064**          | 0.074*           | 0.060           | 0.087**         |
| weighted sample proportion of<br>debit users = 0.53  | (0.026)<br>3380  | (0.027)<br>3380  | (0.027)<br>3380  | (0.028)<br>3380  | (0.045)<br>3380  | (0.044)<br>996  | (0.041)<br>2319 |
| 2004   | 0.173***         | 0.146***         | 0.145***         | 0.146***         | 0.104**          | 0.111**         | 0.194***        |
| weighted sample proportion of<br>debit users = 0.65  | (0.026)<br>3405  | (0.027)<br>3405  | (0.027)<br>3405  | (0.027)<br>3405  | (0.044)<br>3405  | (0.052)<br>917  | (0.042)<br>2295 |
| pooled: 1995-2004                                    | 0.098***         | 0.084***         | 0.086***         | 0.081***         | 0.078***         | 0.085***        | 0.103***        |
| weighted sample proportion of<br>debit users = 0.47  | (0.013)<br>13084 | (0.014)<br>13084 | (0.014)<br>13084 | (0.014)<br>13084 | (0.023)<br>13084 | (0.022)<br>3779 | (0.020)<br>8923 |
| <u>Sample includes</u>                               |                  |                  |                  |                  |                  |                 |                 |
| General purpose credit card holders only?            | yes              | yes              | yes              | yes              | yes              | no              | no              |
| One general purpose credit card only?                | no               | no               | no               | no               | no               | yes             | no              |
| R=1 only if no general purpose charges last month?   | no               | no               | no               | no               | no               | no              | yes             |
| <u>Controls include</u>                              |                  |                  |                  |                  |                  |                 |                 |
| Demographics, income, financial attitudes, ATM card? | yes              | yes              | yes              | yes              | yes              | yes             | yes             |
| Wealth, and spending vs. income?                     | no               | yes              | yes              | yes              | yes              | no              | no              |
| Other electronic payments?                           | no               | no               | yes              | yes              | yes              | no              | no              |
| Other credit card variables?                         | no               | no               | no               | yes              | yes              | no              | no              |
| Revolving*(# of accounts)?                           | no               | no               | no               | no               | yes              | no              | no              |

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

The dependent variable =1 if the household reports using debit.

Each cell shows the probit marginal effects coefficient and imputation-corrected standard error on R (the revolving variable), as well as the sample size (i.e., the number of households), from estimating a version of equation (3) on SCF data. Results for other covariates are reported in Appendix Table 1 for some specifications used in columns 1 and 5 above.

Point estimates can be multiplied by 100 to translate the magnitudes into percentage point terms.

Sample definitions:

"R=1 only if no g.p. charges last month" drops revolvers with nonzero general purpose credit card charges on their most recent bill(s).

Control variable specifications:

All specifications using data from multiple years include survey year effects.

(1) "Demographics, income, financial attitudes, ATM card" includes age, race, gender, marital status, education, household composition, income, income high/normal/low last year, homeownership, employment status and industry, military service, attitudes towards borrowing and financial risk, planning horizon for spending and saving decisions, and ATM card possession.

(2) "Wealth, and spending vs. income" adds net worth quadratic, and spending  $\geq$  income last year to (1).

(3) "Other electronic payments" adds use of computer banking; and of direct deposit, auto payment (ACH), and/or smart card, to (2).

(4) "Other credit card variables" adds last month's general purpose credit card charges, # of general purpose accounts, and credit card interest rate to (3).

(5) adds an interaction between revolving status and the number of general purpose credit card accounts to (4).

Table 3. The Correlation Between Recent General Purpose Credit Card Charges and Revolving

|  | OLS         |             |             | Poisson regression |           |           |
|--|-------------|-------------|-------------|--------------------|-----------|-----------|
|  | (1)         | (2)         | (3)         | (4)                | (5)       | (6)       |
| 1995   | -247.600*** | -208.409    | -271.770*** | -0.421***          | -0.315    | -0.506*** |
| weighted sample mean charges = 551                   | (60.175)    | (156.326)   | (57.765)    | (0.108)            | (0.209)   | (0.103)   |
|  | 3150        | 643         | 2507        | 3150               | 643       | 2507      |
| 1998   | -354.153*** | -262.541*** | -404.635*** | -0.547***          | -0.448*** | -0.624*** |
| weighted sample mean charges = 606                   | (52.371)    | (68.063)    | (71.563)    | (0.084)            | (0.121)   | (0.109)   |
|  | 3149        | 1095        | 2054        | 3149               | 1095      | 2054      |
| 2001   | -414.750*** | -396.226*** | -394.987*** | -0.559***          | -0.591*** | -0.505*** |
| weighted sample mean charges = 732                   | (62.539)    | (84.332)    | (94.081)    | (0.086)            | (0.126)   | (0.118)   |
|  | 3381        | 1573        | 1808        | 3381               | 1573      | 1808      |
| 2004   | -461.934*** | -455.399*** | -283.904    | -0.436***          | -0.439*** | -0.230    |
| weighted sample mean charges = 974                   | (101.720)   | (124.364)   | (214.409)   | (0.106)            | (0.134)   | (0.164)   |
|  | 3405        | 1966        | 1439        | 3405               | 1966      | 1439      |
| 1995-2004  | -375.754*** | -356.163*** | -358.265*** | -0.479***          | -0.455*** | -0.449*** |
| weighted sample mean charges = 728                   | (37.363)    | (58.253)    | (48.391)    | (0.053)            | (0.080)   | (0.073)   |
|  | 13085       | 5277        | 7808        | 13085              | 5277      | 7808      |
| <u>Sample includes:</u>                              |             |             |             |                    |           |           |
| General purpose credit card holders only?            | yes         | yes         | yes         | yes                | yes       | yes       |
| Debit users only?                                    | no          | yes         | no          | no                 | yes       | no        |
| Debit non-users only?                                | no          | no          | yes         | no                 | no        | yes       |
| <u>Controls include</u>                              |             |             |             |                    |           |           |
| Demographics, income, financial attitudes, ATM card? | yes         | yes         | yes         | yes                | yes       | yes       |

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

The dependent variable is total charges on the last bills of the household's general purpose credit cards, in 2001 dollars.

Each cell shows the coefficient and imputation-corrected standard error on R (the revolving variable), as well as the sample size, from estimating a version of equation (3) on SCF data. Results on control variables are not shown.

All specifications using data from multiple years include survey year effects.

Table 4. The Correlation Between Debit Use and Credit Card Holding

|  | weighted sample proportion of debit users = |                     |                      |                      |
|--|---|---------------------|----------------------|----------------------|
|  | 0.45  | 0.38                | 0.64                 | 0.54                 |
|  | (1)   | (2)                 | (3)                  | (4)                  |
| 1 = has general purpose credit card                  | -0.063***<br>(0.018)                        | -0.041**<br>(0.017) | -0.129***<br>(0.032) | -0.122***<br>(0.040) |
| 1 = revolver   | 0.103***<br>(0.013)                         |                     | 0.186***<br>(0.025)  |                      |
| Pseudo-R-squared                                     | 0.309                                       | 0.301               | 0.387                | 0.383                |
| Observations   | 15716                                       | 10412               | 4111                 | 2703                 |
| <u>Sample includes:</u>                              |   |                     |                      |                      |
| 1995-2004 pooled?                                    | yes   | yes                 | no                   | no                   |
| 2004 only?   | no  | no                  | yes                  | yes                  |
| All households with checking account and income > 0? | yes   | no                  | yes                  | no                   |
| Non-revolvers only?                                  | no  | yes                 | no                   | yes                  |
| <u>Controls include:</u>                             |   |                     |                      |                      |
| Demographics, income, financial attitudes, ATM card? | yes   | yes                 | yes                  | yes                  |

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

Each column presents probit marginal effects from a single specification of equation (2), where the dependent variable = 1 if the household uses debit. Standard errors are corrected for SCF imputation. Results on control variables are not shown..

Observations = number of households (not the number of imputates, which is households\*5).

All specifications using data from multiple years include survey year effects.

Table 5. Debit Use x Credit Use Cells

|                  | Has general purpose credit card (H=1) |                |                    |                | No general purpose c/card (H=0) |                |
|------------------|---------------------------------------|----------------|--------------------|----------------|---------------------------------|----------------|
|                  | Revolver (R=1)                        |                | Non-revolver (R=0) |                | Debit user                      | Debit non-user |
|                  | Debit user                            | Debit non-user | Debit user         | Debit non-user |                                 |                |
|                  | (1)                                   | (2)            | (3)                | (4)            | (5)                             | (6)            |
| <b>1995</b>      | 0.11                                  | 0.31           | 0.06               | 0.27           | 0.03                            | 0.21           |
| <b>1998</b>      | 0.20                                  | 0.21           | 0.11               | 0.24           | 0.08                            | 0.16           |
| <b>2001</b>      | 0.26                                  | 0.16           | 0.17               | 0.21           | 0.09                            | 0.11           |
| <b>2004</b>      | 0.33                                  | 0.10           | 0.18               | 0.17           | 0.13                            | 0.09           |
| <b>1995-2004</b> | 0.23                                  | 0.19           | 0.13               | 0.22           | 0.08                            | 0.14           |

Each cell reports the weighted proportion of households in the sample of SCF households with a checking account and positive income. Proportions may not sum to 1 across rows due to rounding.

Table 6. Correlations Between Debit Use and Credit Card Credit Limit Utilization

|   | weighted sample proportion of debit users = 0.47 |                     | 0.65                |                     |
|---|--|---------------------|---------------------|---------------------|
|   | (1)  | (2)                 | (3)                 | (4)                 |
| utilization category 2: 0 < credit limit utilization <= 0.25    | 0.085***<br>(0.016)                              |                     | 0.152***<br>(0.028) |                     |
| utilization category 3: 0.25 < credit limit utilization <= 0.50 | 0.112***<br>(0.017)                              |                     | 0.167***<br>(0.029) |                     |
| utilization category 4: 0.75 < credit limit utilization         | 0.132***<br>(0.024)                              |                     | 0.188***<br>(0.035) |                     |
| probability(coeffcient on caegory 2 = coefficent on category 3) | 0.12   |                     | 0.57                |                     |
| probability(coeffcient on caegory 2 = coefficent on category 4) | 0.05   |                     | 0.27                |                     |
| Revolver  |  | 0.094***<br>(0.013) |                     | 0.165***<br>(0.026) |
| (available credit)/income: quartile 3                           |  | 0.034*<br>(0.018)   |                     | 0.051<br>(0.032)    |
| (available credit)/income: quartile 2                           |  | 0.037**<br>(0.018)  |                     | 0.047<br>(0.032)    |
| (available credit)/income: quartile 1                           |  | 0.056***<br>(0.018) |                     | 0.094***<br>(0.034) |
| pseudo-R-squared  | 0.287  | 0.287               | 0.373               | 0.375               |
| observations  | 13084  | 13084               | 3405                | 3405                |
| <u>Sample</u>   |  |                     |                     |                     |
| 1995-2004 pooled?   | yes  | yes                 | no                  | no                  |
| 2004 only?  | no   | no                  | yes                 | yes                 |
| General purpose credit card holders only?                       | yes  | yes                 | yes                 | yes                 |
| <u>Controls include</u>   |  |                     |                     |                     |
| Demographics, income, financial attitudes, ATM card?            | yes  | yes                 | yes                 | yes                 |

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

Each column presents results from a single probit where the dependent variable = 1 if the household uses debit.

All specifications using data from multiple years include survey year effects.

Results on control variables are not shown.

Each cell presents probit marginal effects with imputation-corrected standard errors.

For credit limit utilization categories households with zero utilization comprise the omitted category.

Available credit is (total credit limit across all cards)/(general purpose credit card balances owed after last bills paid).

See Appendix 2 for additional details on variable construction.

Table 7. Prevalence of Debit Users Lacking an Obvious Pecuniary Motive

|           | No credit card | Revolves credit<br>card balances | No obvious<br>pecuniary motive |
|-----------|----------------|----------------------------------|--------------------------------|
| 1995      | 0.12           | 0.59                             | 0.29                           |
| 1998      | 0.17           | 0.56                             | 0.26                           |
| 2001      | 0.15           | 0.54                             | 0.31                           |
| 2004      | 0.19           | 0.55                             | 0.26                           |
| 1995-2004 | 0.17           | 0.55                             | 0.28                           |

Sample: Debit users in the SCF. All tabulations are weighted.

Proportions may not sum to 1 across row due to rounding.

“Revolves credit card balances” is defined as either currently revolving on a general purpose credit card or reporting habitually revolving a balance.