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Consumers' Use of Debit Cards: Patterns, Preferences, and Price Response

Debit card use at the point of sale has grown dramatically in recent years in the United States and now exceeds the number of credit card transactions. However, many questions remain regarding patterns of debit card use, consumer preferences when using debit, and how consumers might respond to explicit pricing of card transactions. Using a new nationally representative consumer survey, this paper describes the current use of debit cards by U.S. consumers, including how demographics affect use. In addition, consumers' stated reasons for using debit cards are used to analyze how consumers substitute between debit and other payment instruments. We also examine the relationship between household financial conditions and payment choice. Finally, we use a key variable on bank-imposed transaction fees to analyze price sensitivity of card use, and find a 12% decline in overall use in reaction to a mean 1.8% fee charged on certain debit card transactions; we believe this represents the first microeconomic evidence in the United States on price sensitivity for a card payment at the point of sale.

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ANNUAL DEBIT CARD transactions at the point of sale have been growing at over 20% per year since 1996 and now exceed credit card transactions.[1] In sharp contrast, the volume of checks has decreased dramatically since the mid-1990's

1. Source: Authors' calculations from the *EFT Data Book and ATM and Debit News* (various years).

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and is currently falling at 3–5% per year.[2] ATM cash withdrawals are now declining, while the number of credit card transactions is growing only slightly. As a result, debit is becoming the dominant form of payment for many consumers.

This shift raises important questions for both public policy and corporate strategy; however, little information is available on patterns of debit card use or the preferences and motivations of consumers adopting this technology. From an aggregate perspective, the extent to which debit card transactions substitute for cash and checks has a direct impact on the efficiency and overall social cost of the payment system. The rapid growth and innovation in this area has also raised microeconomic concerns regarding industry structure and organization, as well as the appropriate role of regulatory and antitrust policy. Recent years have witnessed substantial government and private litigation over payment card associations' network governance and the rules surrounding fee setting and card acceptance.[3]

Questions about consumers' use of debit cards and other payments are made more intriguing by the fact that retail payment instruments are seldom priced explicitly. Although merchant cost and card issuer revenue may vary dramatically with the method of payment, this fact is generally unknown to the consumer. Charging consumers more for using a given payment method ("surcharging") is generally not currently practiced in the United States, however, it is a key component of several proposals to reform the payment system in the United States and abroad. Our results on consumer price response may inform this debate.

This paper examines these questions using a nationally representative sample of consumers from midyear 2004. We begin by describing the current state of debit card holding and use in the United States and how each varies with household demographic characteristics. We then examine the motivations for using debit, how consumers substitute between debit and other payment methods, and what underlying needs debit satisfies in consumer utility, including the extent to which debit cards serve as a method of behavioral restraint. These issues are addressed using responses to open-ended questions from the survey.

Finally, we estimate a series of probits to investigate how demographics and financial conditions relate to debit card use and, most importantly, how consumers respond to fees assessed by banks on debit card transactions. It is here that we investigate how consumers' choice of payment instrument responds to price. As mentioned, the vast majority of consumers face no price variation at the point of sale. A notable exception, however, are customers of the minority of banks who charge debit cardholders for certain types of transactions at the point of sale. Using our survey's information on

2. See Gerdes, Walton, Liu, and Parke (2005).

3. These actions include the U.S. Department of Justice's challenge of governance practices at Visa and MasterCard, and the civil suit led by Wal-Mart against the card associations' rules on credit and debit card acceptance. More recently, the pricing of interchange—interbank payments made when credit or debit cards are used—has stirred debate in the U.S. and abroad. In 2003, the Reserve Bank of Australia (RBA) mandated substantial reductions in some interchanges fees, along with other changes; the EU's Competition Commission continues to scrutinize interchange fees; in the UK, the Office of Fair Trading (OFT) has established in separate decisions in 2005 that Visa and MasterCard engaged in anticompetitive practices and is pursuing further action against them.

these fees, we are able to provide evidence on the price sensitivity of consumers to fees on a specific payment method at the point of sale.

Our results indicate that the likelihood of using a debit card decreases monotonically with age, and is higher for women than for men, but does not vary substantially with income. The frequency of use varies with age, family structure, and income, but not gender. We also find that household financial conditions and expectations affect debit card use. Households that have recently experienced bad financial outcomes are more likely to substitute credit for debit, while consumers with negative expectations about the future are more likely to use debit rather than credit. These findings suggest that consumers may have an underlying preference for spending from a payment method that draws on a liquid account, and that for some consumers, credit cards may serve to smooth consumption following adverse financial events.

Debit cards appear to serve primarily as a substitute for cash and checks. Contrary to some popular wisdom (but consistent with other empirical evidence), only a small share of debit card holders (5.8%) explicitly report using debit as a method of behavioral restraint; however, we view this number as a lower bound on the share of households using debit to constrain behavior.

Finally, we find a substantial price response for debit card use. Consumers respond strongly to fees charged for so-called PIN (personal identification number) debit transactions by using a signature rather than a PIN to secure transactions; however, the fee also reduces the likelihood that the consumer uses a debit card at all. On average, a 1.8% fee on a debit card transaction (nearly all of which are charged only on PIN transactions) is associated with a 12% decline in the likelihood of use. We believe this to be a conservative estimate of the response to payment price at the point of sale. The estimate suggests that surcharging an individual payment method, without adjusting the prices of others, would likely cause a sharp decrease in use of the surcharged instrument.

1. BACKGROUND

1.1 Literature

Several prior studies of U.S. consumers have investigated demographic patterns in the adoption of payment methods. Using various years of the Survey of Consumer Finances (SCF), Kennickell and Kwast (1997) (1995 SCF), Stavins (2001) (1998 SCF), and Zinman (2005) (2001 SCF) find similar results. Newer technologies such as electronic banking and bill payment or debit cards are used most frequently by younger, better-educated individuals.[4] Income appears to be non-linearly related to debit card use in these studies, with the probability of use rising with income at first and then declining among the wealthiest households. Klee (2006) summarizes

4. Also, Jonker (2005) and Loix, Pepermans, and Van Hove (2005) analyze payment method adoption in the Netherlands and Belgium, respectively. A survey of earlier work on payment choice can be found in Hancock and Humphrey (1998).

and extends many of these results by examining several years of the SCF. Three additional studies using proprietary datasets mirror these results: Carow and Staten (1999) specifically examine debit card use early in its diffusion, Rysman (2004) focuses on the role of demographics in consumers' choice of credit card brands, and Hayashi and Klee (2003) examine consumer adoption of debit cards as well as direct deposit and electronic bill payment.

Several other papers examine consumers' motivations when choosing among payment methods. Working from the empirical results in Kennickell and Kwast (1997), survey data, and focus groups, Mantel (2000) offers a framework to analyze payment choice. Hirschman (1982) uses a very similar approach in her earlier research identifying eleven attributes that consumers value when choosing how to pay. In contrast to these more qualitative approaches—neither of which directly addresses the substitution between differing options for payment—Zinman (2005) and Fusaro (2006) focus specifically on the consumer choice between debit cards and other payment instruments.

Evidence on consumer response to differential pricing of payment methods is extremely scarce. Using aggregate data from Norway from 1989 to 1995, Humphrey, Kim, and Vale (2001) estimate own- and cross-price elasticities for ATM cash withdrawals, checks and debit. They find own-price elasticities for each payment method ranging between -0.3 and -1.1. To our knowledge, Amromin, Jankowski, and Porter (2007) provide the only prior microeconomic evidence on consumers' price response to payment method in the United States, they find a strong consumer response to the asymmetric pricing of cash and electronic toll payments on the Illinois Tollway.

1.2 The Debit Card Industry

As with a credit card, a consumer uses a debit card by presenting the card to a retail merchant. The merchant initiates the transaction message, which travels over a debit network to the bank that issued the card or its processor, which in turn checks a record of the cardholder's deposit account.[5] The issuing bank sends an authorization message back to the merchant. The transaction proceeds and the purchase amount is debited from the cardholder's deposit account in real time or with a slight delay, depending on the specifics of the transaction.

There are two types of point-of-sale debit transactions: those authorized by a PIN and those authorized by a signature. With a PIN debit transaction, the customer must have a network-branded debit card, and the merchant must have a debit terminal compatible with the network displayed on the card.[6] The customer swipes the card in the terminal and enters a PIN. The transaction runs over the debit network, and the customer's deposit account is debited immediately.

With a signature debit transaction, the customer has a Visa- or MasterCard-branded debit card, likewise linked to a deposit account, and the merchant need only have

5. An exception is a stored-value card, for which the cardholder has no deposit account.

6. One exception is a "PIN-less" Internet transaction, for which the merchant needs no terminal.

access to the Visa or MasterCard credit card networks; the merchant may, but need not, have a debit card terminal. Instead of keying in a PIN, the customer secures the transaction with a signature.[7] The transaction runs over the credit card network and then to the customer's bank; the customer's account is debited after a short delay (usually within 2 days).

An *interchange fee* is the fee that a merchant's bank pays to the consumer's bank for a debit card transaction. The interchange fee is passed on to the merchant via the *merchant discount*, which is the fee the merchant pays its bank for carrying the transaction to the network. At the time of this study, interchange fees are higher for signature debit transactions than for PIN debit transactions. As a result, merchants prefer less costly PIN-based debit transactions, while card-issuing banks prefer the higher-revenue signature transactions.

As a result of these opposing incentives, some banks charge fees to their customers for conducting PIN-based debit transactions. Using a separate bank-level survey, we estimate that as of mid-2004, approximately 15% of banks nationwide charged fees for using PIN-based debit.[8] The median PIN debit per-transaction fee among banks charging the fee is 75 cents.[9] We analyze the consumer response to PIN debit fees using consumer survey data in Section 5. Because merchants are currently constrained from most surcharging, we use the findings on bank-imposed fees to try to infer what might occur if merchant surcharging were allowed and implemented.

2. CONSUMER USE OF DEBIT CARDS

2.1 Survey Data

The data used in the analysis below were collected during March, April, and May 2004 as a special module of the Michigan Surveys of Consumers; the data set is a nationally representative sample of 1,501 distinct households.[10] The special module was included in order to gather information about consumers' experience with debit cards.[11] Respondents were asked whether they use debit cards to make purchases, how often they do so, and whether they tend to secure the transaction with a PIN or a signature.[12] The survey also asked the reasons underlying the decision whether to

7. Increasingly, no signature is required for small-value transactions at certain merchants (for example, at major fast-food chains).

8. The depository institution survey was conducted by Moebs Services, Inc., during June 2004 on a stratified random sample of 800 banks and thrifts.

9. The survey also indicated that fewer than 1% of banks reported charging fees for *signature* debit.

10. The Michigan Survey sampling frame includes all U.S. households regardless of account holdings and has a high response rate (about 70%). This contrasts with some industry surveys. For example, the 2004 ABA/Dove sample consists of checking account holders who voluntarily responded to a written survey; the response rate is about 7% (see Dove Consulting and the American Bankers Association 2005).

11. The full questionnaire is available from the authors upon request.

12. The question on PIN vs. signature reads: "When making a purchase with your debit card, you may be asked to choose to either enter a personal identification number – often called a PIN code – or sign a receipt. Thinking back over the past 12 months, did you make purchases with your debit card by entering a PIN or signing a receipt or did you do both?"

use debit cards, along with several questions about any fees respondents' banks may charge for using a debit card. The questions on reasons for using or not using debit cards were asked as open-ended questions. Using the transcripts from the responses to these questions, we are able to categorize them in multiple ways for use in our analysis.[13]

2.2 Descriptive Statistics of Debit Card Use

Table 1 shows the composition of our sample. Eighty-eight percent of households reported having a checking account or a similar transaction account at a depository institution; this is consistent with the 2004 SCF, another comparable nationally representative data source.[14] About 52% of households (59% of households with a checking account) have a debit card; thus, a large margin still remains for growth in cardholding. Approximately 45% of households (86% of households with a debit card) reported having used the card to purchase items at stores in the 12 months preceding the survey.

The numbers on debit card use in our survey are also consistent with results obtained in the 2004 SCF. In the 2004 SCF, 64% of households with a checking or savings account reported using a debit card. In our survey, 52% of such households reported doing so; differences in the wording of the survey questions most likely account for this difference. Our debit card ownership rate is below that reported in the 2004/2005 ABA/Dove Study, which reports 83% of consumers possessing a card; this difference is likely due to ABA/Dove's more affluent sample. Notably, our card usage rate *conditional* on holding a card aligns with the 87% reported by ABA/Dove.

2.3 Demographic Variation in Debit Card Use

Table 2 shows a breakdown of debit card use by demographic group. The left column shows the proportion of debit card *holders* in each demographic category who use their debit cards at least occasionally; the right column shows debit card usage rates among all *households with a checking account*. The difference between these two groups is the set of checking account holders who report not having a debit card, and therefore are unable to use one.

Overall differences in debit card use are driven by reported debit card holdings. To see this, note the difference in usage rates between debit card holders and checking account holders. High debit card use is reported among all demographic groups of debit card holders. In contrast, debit use varies to a much greater extent within the

13. For example, debit card users were asked, "We are interested in understanding the reasons why people use debit cards to make purchases. Why do you use your debit card to make purchases?"

14. Eighty-nine percent of households in the 2004 SCF reported holding a checking account at some type of depository institution; the SCF definition of a checking account is slightly broader than the Michigan Survey's. Source: Authors' calculations, computed using household weights.

TABLE 1

SAMPLE COMPOSITION

	Number	Percent of sample
Total interviewed	1,501	100.00
Checking account holders	1,316	87.67
Debit card holders	783	52.17
Debit card users	674	44.90

TABLE 2

DEMOGRAPHICS OF DEBIT CARD USE

	Percent of sample	
Demographic characteristic	Debit card holders ($N = 783$)	Checking account holders ($N = 1316$)
Education		
High school diploma or less	85.0	37.9
Some college	90.6*	60.6***
College/bachelors degree	85.0	60.0***
Graduate degree	80.4	52.2***
Household income		
Less than $35,000	87.6	45.5
$35,000-$59,999	88.9	55.3**
$60,000-$99,999	82.5	56.9***
$100,000 or more	86.9	54.7**
Home ownership		
Does not own home	89.9	60.2
Owns home	85.0	49.2***
Business phone		
No business phone	86.9	51.1
Business phone in household	79.3*	52.4
Age		
18–24	93.9	77.5
25–34	92.8	78.3
35–44	87.8	63.5**
45–54	87.5	52.7***
55–64	79.3***	41.4***
65 or older	69.6***	20.5***
Sex		
Male	80.9	47.1
Female	90.4***	54.8***
Race		
White except Hispanic	85.7	48.9
Black except Hispanic	91.8	64.4***
Hispanic	91.7	65.7***
Other	71.9**	54.8
Marital status		
Married	84.2	48.9
Single	88.6*	54.5**
Children		
No children	84.5	45.8
One or more children	88.6	61.9***
All respondents	86.1	51.2

NOTE: Asterisks represent statistical difference from omitted category at 1% (***), 5% (**), and 10% (*) levels.

broader population of households with a checking account. We return to analyzing debit card holding shortly.

For the descriptive statistics, we focus on the rates among checking account holders (rather than debit cardholders) because they more closely represent the customer base of U.S. retail outlets. Debit card use varies substantially with several demographic variables. As expected, age is a strong predictor of debit card use: among checking account holders, the probability of using a debit card is decreasing monotonically with age. This finding is consistent with other studies on debit card use (ABA/Dove) as well as the other studies of electronic payment methods cited earlier. We are unable to determine from cross-sectional data whether this relationship represents an age effect or a cohort effect; that is, we cannot say whether younger U.S. consumers will "age out" of debit card use or whether debit card use will increase over time as younger, debit-preferring cohorts age. On the one hand, once a consumer has "adopted" debit card technology, he or she may use it indefinitely. On the other hand, if age is positively correlated with credit access, those with a preference for credit cards are less likely to use debit, so some younger consumers may indeed eventually age out of debit cards as they establish credit histories.

Education is, as expected, predictive of debit card use among checking account holders. About 38% of respondents with a high school diploma or less report using debit cards. The highest usage rates, around 60%, are among individuals with some college or a college degree; those with a graduate degree are slightly less likely to use debit cards. The low usage rate among less educated households likely reflects lower account holdings and potentially a lesser familiarity with electronic payment technology, consistent with the prior literature. The slightly lower rate among the highly educated is likely correlated with age (and the associated technological cohort effect) and/or access to credit cards, consistent with Zinman (2005).

With the exception of lower card use for the lowest income category (with a corresponding lower rate of checking account holdings), income is not a strong predictor of debit card use. This finding is unsurprising given the potential substitutes for debit cards: Although higher income households are generally more likely to use electronic technologies, higher income households have better access to credit cards, an important substitute for debit cards. Also, because income is positively correlated with age, the higher income categories also reflect older households. Homeowners are less likely than renters to use debit cards, again probably due to the high correlation between homeownership and access to credit. These compositional effects are controlled for in the probit analysis.

Women in the sample have a higher probability of using debit cards: conditional on holding a card, 90% of women use the card, compared with 81% of men. Among all checking account holders, 55% of women use debit cards, compared with 47% of men. Black and Hispanic households have higher rates of debit use than respondents of other ethnicities. Single respondents are more likely than married respondents to use debit cards, and households with children present are considerably more likely than those without children to use debit cards.

2.4 Consumer Substitution Patterns and Payment Choice Drivers

The structure of our survey gives us a unique opportunity to investigate the payment methods for which debit serves as a substitute, as well as the needs in consumer utility that debit satisfies. To explore these areas we use the set of open-ended questions on the reasons underlying the choice between debit and other payment options. Two questions were asked in this open-ended fashion: respondents who reported using debit were asked why they use debit cards, and households who reported that they have a card but do not use debit were asked why not.[15]

For each respondent, we used keywords to construct two sets of additional variables. First, we constructed three dummy variables for alternatives to debit: cash, check and credit. Each dummy takes on a value of 1 if the respondent mentioned that alternative payment method in their response. These variables are not mutually exclusive; more than one payment substitute could be coded. All reported reasons were used to code these indicators.

The other set of dummy variables references what we call "payment choice drivers," or the underlying needs that are satisfied by consumers' chosen payment methods. Using keywords, we construct eight dummies that refer to consumer desires for specific features: Time (a preference for speed at, e.g., the checkout counter), Convenience, Money (a pecuniary motive such as avoiding interest payments or fees, using the float, or seeking airline miles or cash rewards points), Restraint (a desire to limit overspending), Tracking (ability to track and record purchases), Acceptance (acceptance of the payment method by retailers), Security (a concern about the risk of cash being stolen, an account being compromised, etc.), and Other (not otherwise classifiable). This partition of the data allows us to investigate the drivers of payment choice, as each payment method may satisfy multiple consumer desires to a greater or lesser degree.

Descriptive statistics on the "substitute" dummy variables are shown in Table 3 for debit users and non-users, conditional on having a debit card. The left column shows the share of debit users who use debit instead of the respective alternative payment type. Nearly half (48.5%) of debit users mention that debit serves as a substitute for cash. About 32% of debit users report using debit instead of checks, and 19% say debit serves as a substitute for credit cards. About 21% report no specific alternative payment method. These numbers show that debit card users view debit cards primarily as a substitute for "paper" payment methods.

The right column of Table 3 shows the share of debit *non-users* who report using the respective payment type instead of debit. Fifty-five percent refer to credit cards as preferable to debit; 31% refer to checks and 23% refer to cash. Twenty-three percent of debit non-users mention no alternative payment method. Thus, the majority of debit non-users prefer credit cards to debit cards.

15. The exact text of the questions is as follows. Households who use debit were asked, "We are interested in understanding the reasons why people use debit cards to make purchases. Why do you use your debit card to make purchases? Any other reasons?" Those who reported not using debit were asked, "We are interested in understanding why people don't use debit cards to make purchases. Why don't you use your debit card to make purchases? Any other reason?"

TABLE 3

DEBIT CARDS VS. OTHER PAYMENT METHODS: SUBSTITUTION

Substitute[a]	Percent who use debit instead of: (users = 674)	Percent who, instead of debit, use: (non-users = 109)
Cash	48.5	22.9
Check	31.9	31.2
Credit	19.4	55.1
Indeterminate	21.4	22.9

[a]Categories not mutually exclusive.

TABLE 4

PAYMENT CHOICE DRIVERS

Utility characteristic[a]	Reasons for debit use (users = 674)	Reasons for no debit use (non-users = 109)
Time	14.1	5.5
Convenience	88.1	8.3
Money	11.7	21.1
Restraint	5.8	5.5
Tracking	10.2	40.4
Acceptance	4.9	0.0
Security	3.9	7.3
Other	3.0	35.8

[a]Categories not mutually exclusive.

The payment choice drivers for debit users and non-users are shown in Table 4. These drivers vary substantially between debit users (left column) and non-users (right column). A remarkable 88% of debit users report that they use debit for its convenience relative to other payment methods. Debit users also referenced Time, Money, Tracking, Restraint, Acceptance, Security, and Other, in descending order. In contrast, debit card non-users referred most frequently to Tracking (40%) or to various other needs (36%), relative to debit. Pecuniary motives were also popular at 21% (many of these referenced credit card rewards programs). The other categories were mentioned by fewer than 10% of respondents.

To investigate how these payment choice drivers enter into the available payment methods, we compute means of the substitute dummies by payment choice driver for debit card users (Table 5). A few numbers are noteworthy. Respondents reporting a desire for Time and Convenience view debit as a substitute for cash and, somewhat less strongly, for checks. Consumers with pecuniary motives substitute debit for checks, followed by cash and credit (several respondents reported a desire not to buy the checks themselves). Consumers citing Security most often substitute debit for cash, driven by a fear of loss or theft of cash.

About 61% of respondents who cite payment method acceptance as a reason for preferring debit (5% of all debit card users) indicated they substitute debit for credit.

TABLE 5

SUBSTITUTION BEHAVIOR AND PAYMENT DRIVERS FOR DEBIT CARD USE

Utility characteristic (*N*)	Cash	Credit	Check	Indeterminate*	All
Time (95)	50.5	23.2	44.2	19.0	14.1
Convenience (595)	51.9	15.8	33.2	21.4	88.1
Money (76)	40.5	31.7	51.9	3.8	11.7
Restraint (39)	48.7	69.2	23.1	2.6	5.8
Tracking (69)	42.0	33.3	42.0	15.9	10.2
Acceptance (33)	21.2	60.6	36.4	12.1	4.9
Security (26)	65.3	19.2	26.9	15.4	3.9
Other (20)	35.0	15.0	10.0	45.0	3.0
All (674)	48.5	31.9	19.4	21.4	

*Categories not mutually exclusive.

This is consistent with certain large retailers' (e.g., Costco's) non-acceptance of certain credit cards.[16]

2.5 Debit Cards as a Method of Behavioral Restraint

Because debit cards draw from a liquid account and credit cards draw from an account whose balance could be either paid off at the end of the month or revolved forward as debt, payment choice is potentially intertwined with household consumption decisions. The behavioralist approach to modeling economic behavior, as in Thaler (1985) and Prelec and Loewenstein (1998), raises the possibility that consumers with limited commitment power may choose to precommit to lower consumption by paying from a liquid instrument rather than an instrument that could be used for credit. Zinman (2005) uses information on revolving credit card balances and other variables in the 2001 SCF to infer whether consumers appear to use debit cards as a means of behavioral restraint; he finds evidence that the majority of debit card users appear to have pecuniary rather than behavioral motives for their choice of payment. Fusaro (2006) finds some evidence for debit as a spending control measure by testing for differences among checking account holders in ATM withdrawal behavior, shopping patterns, and inferred debt paydowns.

16. The merchant decision not to accept credit cards is driven by the fact that interchange fees—the fees paid by merchant banks to card-issuing banks, and borne by merchants—are typically higher for credit cards than for debit cards. See, for example, Rochet and Tirole (2002), Gans and King (2003), Schwartz and Vincent (2006), Wright (2002), Chakravorti and To (2007), and Federal Reserve Board (2004) for discussions of the role of interchange fees in merchant acceptance.

Although our survey does not include information on whether the household holds or revolves a credit card balance, we can use the Restraint category included in the reasons for using debit to evaluate how consumers substitute between debit cards and credit cards. Notably, consumers citing Restraint overwhelmingly view debit as a substitute for credit. These consumers fall clearly into the "behavioralist" explanation of debit use; however, they constitute only 5.8% of debit card holders. This finding of only a small share of consumers who use debit as a commitment mechanism to control spending is consistent with Zinman's (2005) results. Nonetheless, because the survey question did not ask explicitly about behavioral restraint, not all respondents for whom this motive applies necessarily mentioned this motive. Furthermore, other responses (e.g., "Convenience,") could incorporate aspects of behavioral restraint without mentioning them explicitly. Finally, perceived social stigma about an inability to control spending could have reduced the likelihood that respondents report this motive explicitly. Therefore, we view 5.8% as a likely underestimate of the share of debit card holders for whom behavioral restraint is a motive.

3. MULTIVARIATE ANALYSIS

3.1 Debit Card Holding and Use

To further examine debit card use, we estimate a series of probit regressions. The previous univariate results indicate that card holding is itself an important determinant of use. For this reason, we first predict debit card *holding* among checking account holders; the results are shown in the first column in Table 6. The second column shows the results of a probit predicting debit card *use* among the same set of banked households. The third column shows results from predicting debit card use, restricting the sample to debit card *holders*.[17]

The first column shows that age, education, and regional variation drive debit card holding. Using the probit model to predict debit holdings, respondents in the youngest age category (age 18–24) are predicted to be the most likely to hold a debit card, at 84%. This percentage drops to 51% in the 55–64 age category and down to 36% for households age 65 and older. The educational differences appear between those with no college education and those with at least some years in college. Divorced respondents are more likely to use debit, perhaps due to the divorced households' slightly higher holdings of revolving credit card debt.[18] The analysis also shows regional variation, with households in the West much more likely to have a debit card.

17. Another approach would be to jointly estimate the household's decisions to hold a debit card and to use it. To obtain identification in such a model would require variables that affect one decision but not the other. These would include information on respondents' depository institutions or geographic location that could be linked to bank-specific or regional variables on card issuance. Unfortunately, the Michigan Survey does not collect information on the identity of depository institutions, and confidentiality restrictions prevent us from learning the geographic location of the household.

18. Source: Authors' calculations using the 2004 SCF.

TABLE 6

PROBITS: PREDICT HOLDING, USE, AND FREQUENCY OF DEBIT CARDS

Dependent variable: (subsample)	Hold debit (chk acct holders)	Use debit (chk acct holders)	Use debit (debit holders)	Freq. of use (debit users)
Midwest	−.477***	−.539***	−.496**	−.150
	(.123)	(.120)	(.193)	(.122)
Northeast	−.318**	−.420***	−.503***	−.304**
	(.129)	(.125)	(.194)	(.130)
South	−.361***	−.360***	−.234	−.108
	(.116)	(.113)	(.182)	(.112)
25–34 yrs	.007	−.003	−.020	.090
	(.223)	(.211)	(.329)	(.174)
35–44 yrs	−.362*	−.393*	−.312	−.147
	(.213)	(.203)	(.313)	(.181)
45–54 yrs	−.742***	−.709***	−.359	−.251
	(.210)	(.202)	(.318)	(.188)
55–64 yrs	−.972***	−.994***	−.643**	−.388*
	(.218)	(.210)	(.327)	(.199)
65 and older	−1.356***	−1.480***	−1.007***	−.883***
	(.215)	(.209)	(.333)	(.222)
$35,000–$59,999	.074	.096	.137	.092
	(.120)	(.119)	(.202)	(.128)
$60,000–$99,999	.201	.103	−.140	.197
	(.127)	(.126)	(.201)	(.136)
$100,000 or more	.042	.107	.161	.300*
	(.143)	(.142)	(.234)	(.154)
Female	.080	.207***	.394***	.058
	(.080)	(.079)	(.127)	(.085)
Single	.038	.078	.040	.021
	(.114)	(.113)	(.177)	(.122)
Divorced	.225*	.243**	.157	−.022
	(.119)	(.117)	(.195)	(.126)
Has one or more children	−.071	−.043	.064	.188*
	(.098)	(.096)	(.151)	(.097)
Some college	.317***	.337***	.220	.130
	(.102)	(.101)	(.171)	(.111)
Bachelors degree	.334***	.260**	−.054	.094
	(.114)	(.113)	(.179)	(.122)
Graduate degree	.347***	.184	−.222	−.028
	(.128)	(.127)	(.191)	(.142)
Non-white	.233**	.169	−.019	−.073
	(.115)	(.109)	(.165)	(.107)
Owns home	−.034	−.031	−.016	.008
	(.115)	(.113)	(.179)	(.118)
Business phone in household	.094	−.092	−.352*	.055
	(.135)	(.131)	(.185)	(.144)
Const.	.926***	.715***	1.592***	
	(.268)	(.257)	(.395)	
Obs.	1205	1205	743	640

Asterisks represent statistical significance at 1% (***), 5% (**), and 10% (*) levels.

These differences in predicted debit card holdings may result from differences in the underlying desire to use debit or from other sources. Households without debit cards may choose not to have them because they would not use them. Another explanation is that supply-side factors may affect card ownership. For example, some people may choose not to have a debit card because they have little opportunity to

use them.[19] However, this effect should be fairly limited today by the widespread acceptance of debit cards by merchants. More likely, some consumers may actually have these cards and not know it; in this case, marketing and education campaigns could spur use. Finally, some banks may choose not to offer their customers (or *all* of their customers) point-of-sale-enabled debit cards.

The next column shows results from the probit modeling the probability that the household *uses* debit cards, taken among all households with a checking account. As in the holdings regression, region, age, marital status, and education are statistically significant predictors of debit card use. Unlike the holdings regression, gender is a strong predictor of debit card use.

The age and regional results are weaker in the third column, where use is predicted only for debit card *holders*. This regression shows no effect of education or marital status. The region and age variables still have some predictive power; however, the coefficient on gender is still significant and is larger. Respondents in the two youngest age categories (age 18–34) are predicted to be the most likely to use a debit card, at 94%; this is consistent with the conditional means in the sample. This percentage drops slightly to 82% in the 55–64 age category and to 71% for households age 65 and older. Thus, conditional on having a debit card, consumers across age categories are very likely to use them.

Taken together, these estimates indicate that overall, younger female adults with at least some college education are the most likely to use debit cards, as are households in the West and South. Women are no more likely to have cards, but are more likely to use them. This pattern likely stems from household division of labor and the respective shopping patterns of women and men (note that supermarkets were among the earliest merchants to accept debit cards). The regional and age differences derive both from a lower likelihood of having a card and a lower probability of use conditional on possessing a card (and both of these are likely based, at least historically, on differing regional patterns of merchant acceptance of debit cards). In contrast, well-educated respondents are more likely to report having a debit card than those without any college education, but they are no more likely to use the cards, conditional on having them.

3.2 Frequency of Debit Card Use

Total debit card transactions in the economy depend not only on debit card holdings and the likelihood of using a card at all, but also on the intensity of card use. For debit card users, the survey included a question on the frequency of debit card purchases per week. The data show that the median U.S. debit-using household performs three debit transactions per week, with a slightly skewed distribution (Figure 1).[20]

19. In the early years of debit cards, slow adoption of debit cards by consumers likely resulted from low acceptance rates of debit cards by retail merchants. Borzekowski and Kiser (2005) identify these network effects between consumer use and merchant acceptance of debit cards over the period 1985–2002.

20. The ABA/Dove study provides some information on the frequency of card use in their sample of checking account holders; using numbers in their report, we calculate that the mean number of transactions

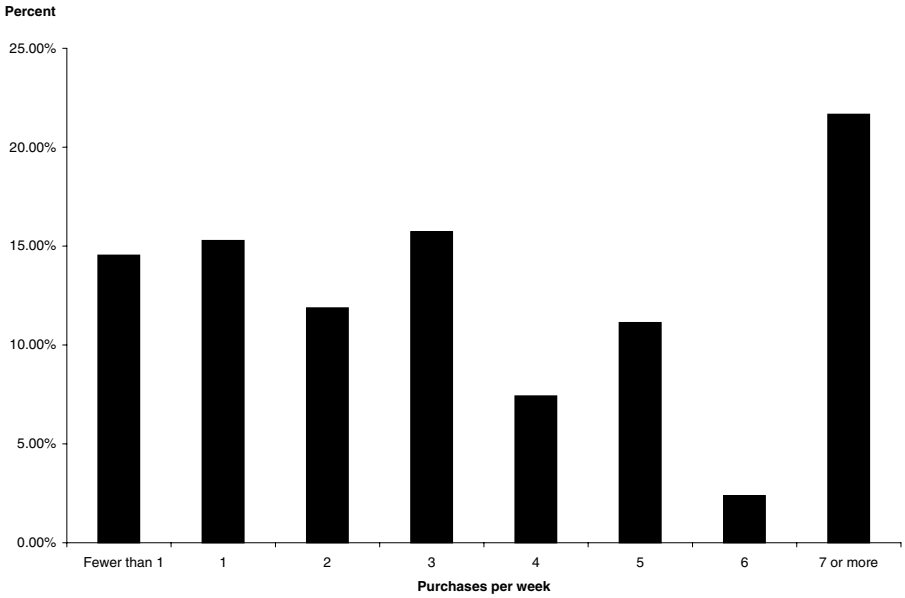

FIG. 1. Frequency of Debit Card Use among Card Users.

Twenty-two percent of households reported seven or more debit transactions per week. Thus, although only about half of households use debit cards, many of those who do use the cards use them intensively.

The estimates from an ordered probit on the frequency of debit card use, conditional on using a debit card at all, are shown in the fourth column of Table 6.[21] Overall, age and family structure appear to have an influence on how often respondents use debit cards. The age coefficients show some similarity to those in the probit of debit card use: Households aged 65 and older use their cards less frequently than younger households. However, several differences are present between the use and frequency models. Conditional on using the card, households with incomes of $100,000 or more use debit cards more frequently than other groups. Households with one or more children also use debit more frequently, a result that is unsurprising given the likelihood of an overall higher frequency of shopping for these households.[22] Finally, women, while more likely to use a debit card, use it no more frequently than men, conditional on use. Northeastern households use debit less frequently than those in the other three regions.

for debit card users in their sample is about 5.3 transactions per week. See Dove Consulting and the American Bankers Association (2005, p. 53).

21. The seven frequency bins used to construct the dependent variable are: less than once a week, once a week, twice a week, three times, four times, five times, and six or more times a week.

22. Bawa and Ghosh (1999) document that shopping frequency increases with family size.

3.3 Consumer Expectations and Debit Card Use

Because the Michigan Survey is also used as a key source of information on consumer confidence and economic expectations, we are able to link responses to these types of questions to debit card use. Although prior work has been done on how credit card debt factors into the consumption decision, less is known about how payment choice and consumption interact.[23] From this set of consumer financial condition variables, we can investigate how consumers' financial outcomes and expectations about the future may influence the decision to draw from liquid assets (debit cards) versus an instrument that can be used to draw on credit (credit cards).

Table 7 shows the results from two probits predicting debit card use as a function of demographics and variables on household financial expectations. The first column shows results for all checking account holders. The coefficients on the demographic variables mirror the prior results on debit card use (Table 6). The coefficients on financial expectations variables show mixed results: while households that report a better financial situation now than 1 year ago show a higher propensity to use debit, so do those that perceive a high probability of future job loss. These seemingly contradictory results may be driven by the fact that households can compare debit with *any* of the alternative payment methods, thus conflating the results. For example, those reporting a better financial situation may no longer desire to use the float on checks, while those expecting a job loss may be attempting to avoid credit.

Because differences in financial expectations are most likely to manifest as the substitution between liquid and a (potential) credit instrument, we narrow our focus by performing the probit on the subset of respondents who reported that they substitute between debit cards and credit cards.[24] Compared to the sample of checking account holders, these households are slightly better educated, have higher income, and are more likely to be younger than 55 years; all inferences should be limited to this population. The coefficient estimates show that this subset of respondents is less likely to use debit cards (i.e., more likely to use credit cards) if their financial situation is worse now than a year ago. They are more likely to use debit (and less likely to use credit) if they expect their financial situation to be worse in a year, or if they expect a high probability of job loss over the next year. This result is consistent with Sullivan's (Forthcoming) finding that some consumers use credit cards to smooth consumption during spells of unemployment.

These estimates suggest that these households choose to spend from a liquid account if they expect their economic situation to worsen, and choose (or have chosen) to spend using a potential credit instrument if their economic situation has already declined. Together, the results indicate that consumers prefer to spend from liquid assets unless they are cash constrained, and use credit cards as a source of liquidity in times of financial stress. Like the descriptive finding on reasons for using debit cards, this

23. For example, Gross and Souleles (2002) use credit card data to investigate the relationship between liquidity constraints and consumption.

24. The subset of consumers defined as substituting between debit and credit includes both debit card users who report preferring debit to credit, and debit card non-users who report preferring credit to debit.

TABLE 7

PROBITS: PREDICT DEBIT USE WITH FINANCIAL INDICATORS

Dependent variable: (subsample)	Use debit (chk acct holders)	Use debit (credit substituters)
Midwest	−.579***	−.923**
	(.123)	(.383)
Northeast	−.427***	−.740**
	(.129)	(.374)
South	−.386***	.138
	(.116)	(.349)
25–34 yrs	−.015	−.609
	(.214)	(.906)
35–44 yrs	−.370*	−1.075
	(.207)	(.873)
45–54 yrs	−.643***	−1.198
	(.206)	(.890)
55–64 yrs	−.877***	−1.671*
	(.216)	(.918)
65 and older	−1.299***	−2.571***
	(.218)	(.960)
$35,000–$59,999	.058	−.945**
	(.125)	(.467)
$60,000–$99,999	.048	−1.145**
	(.130)	(.451)
$100,000 or more	.057	−.798
	(.150)	(.517)
Female	.228***	1.027***
	(.082)	(.298)
Single	.095	−.121
	(.117)	(.381)
Divorced	.227*	.561
	(.120)	(.544)
Has one or more children	−.062	−.054
	(.098)	(.357)
Some college	.352***	.277
	(.104)	(.444)
Bachelors degree	.240**	.276
	(.116)	(.429)
Graduate degree	.189	.072
	(.132)	(.431)
Non-white	.147	−.055
	(.112)	(.354)
Owns home	.020	.119
	(.117)	(.403)
Business phone in household	−.146	−.585
	(.135)	(.393)
Financial situation better now	.214**	.250
	(.105)	(.348)
Financial situation worse now	−.002	−.678*
	(.112)	(.397)
Financial situation will be better in a year	.090	−.547
	(.091)	(.339)
Financial situation will be worse in a year	.141	1.010*
	(.137)	(.530)
Income will increase in next 12 mos.	.166	−.037
	(.105)	(.413)
Income will decrease in next 12 mos.	−.121	−.706
	(.149)	(.514)
25–49% chance of losing job	.201*	−.039
	(.105)	(.322)
50–100% chance of losing job	.253*	1.218**
	(.146)	(.620)
Const.	.363	2.604**
	(.289)	(1.105)
Obs.	1168	182

NOTE: Credit substituters are defined as respondents who indicate that they view debit cards as a substitute for credit cards. Asterisks represent statistical significance at 1% (***), 5% (**), and 10% (*) levels.

finding does not provide direct support for commitment-based use of debit cards. Rather, it points to an inherent preference for spending from liquidity, which may have (unobserved in this sample) either pecuniary or behavioral motives.[25]

4. EFFECTS OF FEES ON DEBIT CARD USE

We now expand the analysis to examine the role of bank fees in households' choices regarding debit card use. As described earlier, at the time of the survey, about 15% of banks charged consumers to use their debit cards for PIN-based transactions at the point of sale. The primary motivation for these fees was to encourage consumers to use signature debit instead of PIN debit. Survey respondents' reports of whether their banks charge fees for debit card transactions are used in the analysis below to measure the consumer response to these fees.

4.1 Estimation of Price Response

To explore consumer response to debit card transaction fees, probits were estimated that predict debit card use as a function of demographics and the presence and level of per-transaction debit card fees.[26] Table 8 shows the probit results among debit card holders. The effect of the fees can be seen in the first and second columns of the table. Column 1 includes a dummy variable for *whether* the bank charges a fee for using debit; column 2 includes the *level* of the fee. (The dummy variable takes on a value of 1 if the respondent reports that his or her bank charges either a PIN fee or a signature fee; however, results from our bank survey indicate that most household reports of a signature fee are likely incorrect.)

In both cases, the results indicate that the imposition of the fee significantly lowers the household's probability of using debit. Ninety percent of households whose banks do not charge a debit card fee are predicted to use their debit cards; this predicted probability drops to 79% among households whose bank charges a fee—about a 12% decline in the likelihood of use.[27] This response is substantial when compared with the magnitude of the typical debit card fee and purchase amount. Because the median fee charged by depository institutions is about 75 cents, with a mean purchase amount of about $42, the median fee represents about 1.8% of the purchase amount. A 12% decline in overall use in reaction to a 1.8% fee charged on only a subset of debit transactions is in our view a substantial price response. Although not directly comparable, these estimates are larger than those found by Humphrey et al. (2001)

25. Telyukova and Wright (2006) model this preference for spending from liquidity formally and find evidence consistent with their model using SCF data.

26. If consumers choose their financial institutions based upon the presence or level of these fees, then these regressors will be correlated with the probit error. However, two factors mitigate this concern. First, consumers rarely switch banks; second, when choosing an institution, branch location and branch and ATM network size are empirically the dominant factors in the consumer's choice. See, e.g., Kiser (2002).

27. These predicted probabilities are evaluated at the mean values of the other regressors.

TABLE 8

PROBITS: EFFECTS OF FEES ON DEBIT CARD USE AND FREQUENCY

Dependent variable: (subsample)	Use debit (debit holders)	Use debit (debit holders)	Use signature (debit users)	Freq. of use (debit users)	Freq. of use (debit users)
Midwest	−.454**	−.468**	.421**	−.146	−.146
	(.194)	(.194)	(.178)	(.122)	(.122)
Northeast	−.471**	−.476**	−.045	−.303**	−.303**
	(.195)	(.195)	(.200)	(.130)	(.130)
South	−.207	−.202	.210	−.108	−.100
	(.183)	(.184)	(.169)	(.112)	(.112)
25–34 yrs	−.041	−.043	−.140	.086	.086
	(.331)	(.333)	(.265)	(.174)	(.174)
35–44 yrs	−.357	−.373	.249	−.152	−.157
	(.315)	(.318)	(.268)	(.181)	(.181)
45–54 yrs	−.409	−.420	−.066	−.258	−.264
	(.321)	(.324)	(.284)	(.188)	(.188)
55–64 yrs	−.710**	−.720**	.044	−.400**	−.406**
	(.331)	(.334)	(.301)	(.200)	(.200)
65 and older	−1.060***	−1.093***	.109	−.896***	−.906***
	(.336)	(.339)	(.321)	(.222)	(.223)
$35,000–$59,999	.134	.135	.134	.093	.091
	(.202)	(.202)	(.183)	(.128)	(.128)
$60,000–$99,999	−.146	−.141	−.292	.191	.184
	(.201)	(.202)	(.205)	(.137)	(.137)
$100,000 or more	.147	.143	.008	.298*	.291*
	(.234)	(.235)	(.220)	(.154)	(.154)
Female	.401***	.416***	−.102	.058	.060
	(.127)	(.128)	(.122)	(.085)	(.085)
Single	.023	.031	−.072	.018	.020
	(.178)	(.178)	(.183)	(.122)	(.122)
Divorced	.158	.143	−.049	−.026	−.032
	(.196)	(.196)	(.182)	(.126)	(.126)
Has 1 + children	.067	.078	−.006	.187*	.189*
	(.152)	(.152)	(.142)	(.097)	(.097)
Some college	.241	.206	.010	.131	.123
	(.172)	(.172)	(.162)	(.111)	(.111)
Bachelors degree	−.070	−.075	−.063	.092	.088
	(.179)	(.180)	(.179)	(.122)	(.122)
Graduate degree	−.240	−.246	.168	−.033	−.034
	(.192)	(.192)	(.200)	(.142)	(.142)
Non-white	−.004	−.021	−.378**	−.068	−.071
	(.166)	(.166)	(.173)	(.107)	(.107)
Owns home	−.020	−.045	.175	.010	.006
	(.180)	(.181)	(.177)	(.118)	(.118)
Business phone in HH	−.293	−.294	.118	.058	.063
	(.190)	(.189)	(.208)	(.144)	(.144)
Bank charges fee w/PIN			.451**		
			(.194)		
Bank charges fee	−.458**			−.095	
	(.184)			(.138)	
Fee level		−.301**			−.107
		(.120)			(.096)
Const.	1.668***	1.690***	−1.129***		
	(.399)	(.401)	(.374)		
Obs.	743	743	640	640	640

NOTE: Asterisks represent statistical significance at 1% (***), 5% (**), and 10% (*) levels.

using aggregate data; their own-price elasticities range for each payment instrument range between 0.3 and −1.1.

Recall that the bank's incentive to charge a fee on PIN debit transactions is to "steer" customers away from PIN-secured debit and toward signature-secured debit; this is due to the higher interchange fee revenue currently received by the card-issuing bank for a signature debit transaction. Because the survey asked respondents whether they use a PIN or a signature at the point of sale, we included the type of debit transaction used as a dependent variable in the regression shown in the third column of Table 8, using as a regressor an indicator for whether the respondent reports that his or her bank charges a PIN fee.[28] This allows us to test whether the PIN fee serves to steer debit cardholders toward signature-secured transactions. We coded a respondent as using signature debit if he or she reports using *only* signature debit, that is, never uses a PIN. The probit shows that the imposition of PIN debit fees does indeed appear to drive consumers to signature debit.

Thus, we find that PIN fees steer customers to use signature debit, but also reduce the likelihood that they use debit at all. This finding is noteworthy from the perspective of bank pricing. It is unlikely that banks setting these fees intend for consumers to stop using debit cards altogether. Presumably, a bank would rather receive a (lower-than-signature) PIN interchange fee than no interchange fee at all (and an associated higher processing cost for checks or cash). The result that PIN fees discourage debit card use altogether raises a few possibilities: the difference between PIN and signature debit is too subtle a distinction for some consumers to recognize, some consumers are constrained by merchant acceptance of PIN debit only, or some consumers would rather not use debit at all if they do not have the option of using a PIN.

If customers turn away from debit altogether, to which other payment methods do they turn? In another paper using the same data set used here, Borzekowski and Kiser (Forthcoming) explore this question in a demand framework that allows for counterfactual experiments on payment choice. In the hypothetical case that debit is removed from the consumer choice set, they find that cash receives the greatest share, followed by checks, then credit. Thus, the bulk of transactions from debit are predicted to flow toward traditional "paper" payment methods.[29]

Note that in our sample, the frequency of debit card use appears unaffected by either the presence or the level of the debit fee (columns 4 and 5 in Table 8). However, the small sample size of respondents reporting both a fee and the frequency of use limits the broad applicability of this finding.

4.2 Implications for the Effects of Fees on the U.S. Payment System

Although differences exist between merchant-imposed fees at the point of sale and the bank-imposed fees we observe in our data, it is still worthwhile to examine

28. Although we believe most household reports of signature debit fees to be erroneous (as fewer than 1% of banks report a signature fee), we take the conservative approach of restricting our PIN fee dummy variable to take on a value of 1 only if the respondent reports a PIN fee.

29. Check payments may now be electronified through check truncation, in which a check is converted to an electronic version that is sent to the issuing bank for payment, or through check conversion, in which the request and payment are made through the Automated Clearing House system.

the implications of debit cards fees for payment method pricing more generally. Consistent with Amromin et al.'s (2005) finding of a strong response to doubling cash-paid highway tolls, the consumer response to PIN debit fees estimated here suggests that any increase in the relative price of a single payment method at the point of sale could have a considerable effect on payment choice. While the bank-levied PIN fee applies only to PIN-based debit transactions and is made known to cardholders only through fee disclosure mailings, or after the fact on bank statements, merchant-levied surcharges presumably would be posted clearly at the point of sale, potentially eliciting an even stronger response than PIN fees.[30] Thus, we believe our estimate represents a lower bound of consumer response to a surcharge that raises the relative price of a particular payment method at the point of sale.

Changes in the merchant payment mix resulting from fees could affect merchant cost, card issuer cost and revenue, and payment card network traffic, and could also impact Automated Clearing House volumes, check clearing volumes, and the demand for cash. More specifically, the findings on bank fees have implications for merchant "surcharging" for certain payment instruments. Payment card network operating rules (and some state laws) typically place restrictions on the degree to which merchants are permitted to differentially price by payment method.[31] These rules often explicitly prohibit merchants from charging consumers extra for credit or debit card transactions. These "no-surcharge rules" have been contested by some merchants, and complaints about them have been incorporated into some of the recent merchant-led lawsuits. And although some merchants may be reluctant to surcharge (if permitted) for fear of losing customer business, some may not.[32] Our results suggest that the consumer response to a merchant surcharge would be strong, even for surcharges that are small relative to the total purchase amount.

The strength of consumer response to fees is highly relevant for optimality in the theoretical literature on network effects in two-sided markets.[33] One important implication is that a strong consumer response to fees, should they be charged, could result in underuse of an electronic card-based system. Underuse would occur for a particular payment instrument if consumers' marginal private net benefit of using the method were less than the marginal social net benefit. The primary concern is that consumers already do not perceive the external benefit that consumer card use confers to the payment system as a whole; raising the marginal private cost would provide a disincentive to use the card. One additional implication is that if surcharging were permitted, merchant bargaining power relative to the card networks could increase: The *threat* of a surcharge could increase the level of "merchant resistance"

30. In fact, 28.5% of debit cardholders in our survey reported that they were unaware of their bank's policy on debit card fees; we recorded these consumers as facing no fee.

31. Federal law prohibits card associations from prohibiting cash discounts; some state statutes mirror this law. Ten states explicitly forbid surcharging of credit card payments, with certain exceptions.

32. In 2003, the Reserve Bank of Australia (RBA) prohibited the no-surcharge rule in the Australian credit card market; the initial evidence suggests that relatively few merchants choose to surcharge (see Chang, Evans, and Garcia Swartz 2005, p. 341). However, because the RBA simultaneously lowered interchange fees, the incentive for merchants to surcharge has fallen as well.

33. See, for example, Rochet and Tirole (2002), Gans and King (2003), Schwartz and Vincent (2006),Wright (2002), and Chakravorti and To (2007).

mentioned in some of the theoretical models, providing issuers with the incentive to lower interchange fees.

5. CONCLUSION

This paper uses a nationally representative survey on payment use at the point of sale to investigate consumers' use of debit cards. The demographic information allows us to document usage patterns by consumer characteristics and financial conditions. The information on bank-assessed fees on debit card use lets us evaluate consumer price response for payment methods. Further, our coding of open-ended questions on reasons underlying payment choice lets us parse out both substitution patterns across payment methods as well as the drivers in consumer utility that give rise to consumer preferences across payment methods. Finally, the questions on fees charged by banks for certain types of debit card transactions allow us to evaluate consumer price sensitivity to debit card fees at the point of sale.

As expected, we find that debit cards serve as a substitute primarily for cash and checks. The probability of using debit cards is decreasing with age and increasing with education, and women use debit cards at a higher rate than men. Convenience is cited overwhelmingly as a main reason for using debit cards. The frequency of debit card use is lower for older respondents and higher for households with children.

In addition, consumers respond negatively to fees charged for debit card transactions. The fee charged by banks for PIN-based debit transactions does appear to steer consumers away from PIN debit and toward signature debit. In addition, this fee also appears to dissuade consumers from using debit cards at all: a fee that comprises less than 2% of the average purchase amount is associated with a 12% reduction in the likelihood of using the card. Because this fee is charged after the transaction rather than at the point of sale, we view this price response as a lower bound on the consumer response to a surcharge on a single payment method.

For only a small set of consumers (about 6% of debit card holders) is debit mentioned explicitly as a method of behavioral restraint; due to the structure of the survey questions, we view this as a lower bound on the share of debit card holders who use debit cards to avoid running up credit card balances. Consumer use of debit varies with household financial conditions and expectations about the future: respondents are more likely to use debit cards if they have negative expectations about their future financial condition, and are more likely to use credit cards rather than debit cards if their financial situation has worsened recently. Thus, consumers appear to have an underlying preference for spending from liquidity, and may use credit to smooth consumption during periods of financial stress.

Several questions remain open as areas for future research. First, why has debit rather than credit taken the bulk of business away from checks and cash (even for higher-income, non-credit-revolving households)? For the overwhelming share of debit card users who report that debit is more 'convenient' than other payment methods, what does 'convenience' mean specifically? What is the saturation point for debit

card use—is there a base level of cash and check use that will remain even after debit cards have diffused fully into the economy? Answers to these questions and others will help us to understand more fully the recent changes and trends in consumer payment choice.

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