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Payment Discounts and Surcharges: The Role of Consumer Preferences

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Abstract:

We use new data from the 2015 Diary of Consumer Payment Choice to analyze price discounts and surcharges based on the payment method used for transactions. We examine consumer preferences for specific payment instruments and test whether consumer demand for payment instruments is price elastic. Specifically, we test whether consumers are likely to deviate from their preferred methods in order to get a discount or to avoid a surcharge. We find that the occurrence of price incentives is low, but consumers who preferred other payment methods had an 11.7 percent probability of switching to cash because of cash discounts, after controlling for merchant category and dollar value of the transaction. Payment method choice is affected very strongly by consumer individual preferences, but steering by merchants may be effective under some circumstances. Both merchants' reluctance to offer price discounts and consumers' limited response to them lead to the low observed occurrences of such incentives.

Keywords: consumer payments, consumer preferences, merchant steering, discounts, surcharges

JEL classifications: D03, D14, G02

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I. Introduction

Shy and Stavins (2015) showed that U.S. merchants rarely took advantage of their recent freedom to differentiate prices based on the method of payment in 2012. Using data from the 2015 Diary of Consumer Payment Choice (DCPC), we find that the prevalence of discounts and surcharges based on payment method did not increase from 2012 to 2015. However, a small number of surcharges on credit card transactions and discounts on cash or debit card transactions were recorded by the survey respondents. In this paper, we take advantage of detailed information on individual transactions and on payment preferences of a representative sample of U.S. consumers and analyze consumer preferences and their behavior in response to such pricing incentives.

We find that consumer preferences are correlated with demographic and income attributes, but that they also vary by the value and type of transaction. We look closely at who received a discount or paid a surcharge, which types of merchants utilized such pricing incentives, and how the price incentives varied by dollar values of transactions. Finally, we examine the role of consumer preferences with respect to payment methods and test whether consumers are likely to shift away from their preferred payment method in order to receive a discount or avoid a surcharge. In other words, we test whether consumer demand for payment instruments is elastic with respect to the differentiated cost of making a payment.

As was the case in 2012, the occurrence of price incentives based on the payment method used continued to be low in 2015. For the majority of transactions, consumers tend to use their preferred payment instruments. They deviate from their preferred payment method choices mainly because of the dollar values of transactions—for example, by switching to cash for low-value transactions—or because of the merchant type. For consumers who prefer to use cash, they typically shift to another payment method because of insufficient cash on person to conduct a cash transaction. However, we found that consumers are significantly likely to switch to using cash specifically because of cash discounts offered, even after controlling for transaction value and merchant type: consumers who prefer other payment methods have an

11.7 percent probability of switching to cash because of the cash discounts, after controlling for merchant category and dollar value of the transaction. As the amount of cash discount is typically low, the result indicates that consumers' demand is highly elastic with respect to discounts.[1]

The low occurrence of price incentives might be caused by merchants' reluctance to offer them. Although merchants have been allowed to impose credit card surcharges in order to recover their credit card processing costs since January 27, 2013, they must follow certain rules, such as the following: merchants must notify consumers that they are being charged for using credit cards, both at the register and on the receipt; merchants are allowed to pass on their credit card merchant fees, but are not allowed to make a profit on credit card surcharges; and surcharges are limited to credit card transactions (merchants cannot surcharge debit card transactions). Because the rules may be difficult to follow, most merchants—including gasoline station proprietors—prefer to provide cash discounts rather than credit card surcharges.

In addition to the legal and regulatory restrictions associated with imposing surcharges, merchants may be reluctant to do so in expectation of losing potential customers or receiving bad publicity. Even offering cash discounts may not protect merchants from criticism. For example, *Consumer Reports* warned their readers: "Don't be tricked by gas station cash discounts. Not paying attention could leave you paying more at the pump" (*Consumer Reports*, August 9, 2013).

However, it is important to note that what we observe is an intersection of supply and demand—for either a discount or a surcharge to be observed in the data, a merchant must offer the price incentive *and* the consumer must conduct the transaction. Thus, we do not observe

[1] For example, the difference between the cash and credit prices at gasoline stations is typically about 5 cents per gallon, according to the National Association of Convenience Stores: "Amounts of the discount vary, but most retailers offer approximately 5 cents off per gallon to customers paying by cash." (www.nacsonline.com)

cases where consumers ignored the offer of a discount or avoided paying a surcharge because they used a different payment method.

We compared the pace of credit card surcharging in the United States with that in Australia. Starting in 2003, the Reserve Bank of Australia (RBA) removed the "non-surcharge rule" and merchants were allowed to impose surcharges on credit card transactions there.[2] Australian merchants were slow and reluctant to take up surcharging, perhaps due to fear of public backlash and reputation damage. By 2006, only 7 percent of merchants were surcharging. However, the incidence of merchant surcharging increased quickly after that: in 2007, RBA reported that 15 percent of very large merchants, 9 percent of large merchants, 6 percent of small merchants, and 5 percent of very small merchants surcharged credit card transactions. By 2010—or 7 years after the change in regulation—20 percent of small merchants and 40 percent of large merchants had started to surcharge. However, the number of transactions surcharged was substantially smaller, as consumers avoided using credit cards where surcharges were imposed.

Our dataset is uniquely suitable for analyzing consumers' response to price incentives. We use transaction-level data that also include consumer-specific (demographics and income) and payee-specific (merchant type) information, all needed to conduct the analysis. The rest of the paper is as follows. Section II summarizes the relevant literature and shows how our paper contributes to the existing literature. Section III describes the data. Section IV discusses consumers' payment method preferences, including the use of consumers' preferred methods and the probability of deviating from those preferred methods. Section V focuses on surcharges and discounts, and Section VI estimates the effect of price incentives on the probability of deviating from a preferred payment method. Section VII concludes.

[2] For more details, see Reserve Bank of Australia (2011) and http://www.fairtrading.nsw.gov.au/biz_res/ftweb/pdfs/About_us/Credit_card_surcharges_part1.pdf.

II. Literature review

Our study adds to a growing literature on the effect of price incentives on consumer payment choice. In particular, existing papers focus primarily on three different mechanisms: reward or loyalty programs, bank-imposed fees, and merchant-imposed surcharges and discounts.

There exists evidence that reward programs can steer consumers toward greater card use. Ching and Hayashi (2010) find that payment card rewards have statistically significant effects on consumer choice of payment methods. Agarwal, Chakravorti, and Lunn (2010) use actual credit card transaction data from a large U.S. financial institution and find that cash-back rewards lead to an increase in credit card spending and debt. Using Australian transaction-level diary data, Simon, Smith, and West (2010) note that consumers who participate in loyalty programs and have access to an interest-free period tend to use credit cards more. Arango, Hyunh, and Sabetti (2015) focus on how reward program incentives and merchant acceptance affect consumer payment choice.

Some earlier papers also note that bank-imposed fees may negatively affect the use of debit cards. Humphrey, Kim, and Vale (2001) measure price elasticities of ATM cash withdrawals, checks, and debit cards at the point of sale using aggregate Norwegian data. Borzekowski, Kiser, and Ahmed (2008) study the relationship between an increase in bank-imposed fees and a decline in debit card use at the point of sale.

More closely related to the context of this paper are studies that consider merchant-imposed discounts and surcharges. Barron, Staten, and Umbeck (1992) look at trends in cash discounting in retail gasoline during the 1980s. Amromin, Jankowski, and Porter (2007) utilize data on toll payments on the Illinois Tollway and discover that consumers rapidly switched to electronic toll payments when toll fees doubled for cash payers. Using survey data from the Netherlands, Bolt, Jonker, and van Renselaar (2010) show that surcharges on debit card transactions do steer Dutch consumers away from debit cards to cash. Briglevics and Shy (2014) discuss potential theoretical reasons for the low number of observed instances of merchant steering via cash and debit card discounts.

Our dataset is uniquely suitable for analyzing consumers' response to price incentives. Similar to Klee (2008) and Wang and Wolman (2014), we have transaction-level data with the transaction value, merchant type, and payment method used, but we also have detailed demographic and income data on every consumer, the information that Klee (2008) lacked. Cohen and Rysman (2013) used scanner data with demographic information, but could not separate debit cards from credit cards, and had no information on price incentives. O'Brien (2016) shows that consumers' stated payment instrument preferences are a very strong predictor of consumers' payment behavior, but his analysis is limited to cash. As far as we know, this is the best transaction-level dataset that also includes consumer-specific and payee-specific information, all needed to conduct this kind of analysis.

Shy and Stavins (2015) analyze data from an earlier version of the Diary of Consumer Payment Choice to investigate whether U.S. merchants are actively steering consumers to certain payment methods post recent legislative changes. Our current paper not only provides an extension to previous work on the effect of discounting and surcharging, but also incorporates information from self-reported consumer preferences for certain payment instruments. We test whether consumers deviate from their preferred payment instrument in response to price incentives. This study brings new insights that—to our knowledge—have not yet been fully explored in the existing literature.

III. Data

The data used in this paper are from two consumer surveys: the Survey of Consumer Payment Choice (SCPC) and the Diary of Consumer Payment Choice (DCPC), both conducted by the Federal Reserve Bank of Boston in the fall of 2015. The SCPC is an annual survey of a representative sample of U.S. adult consumers that collects data on payment instrument adoption, use, and assessments of characteristics of major payment instruments: cash, check, money order, debit cards, credit cards, prepaid cards, bank account number payments, and online banking bill payments. Moreover, the SCPC gathers detailed information about the

respondents' bank, cash, virtual currency, credit, prepaid, and non-bank account holdings, as well as demographic and income data. The 2015 SCPC includes responses from 2,040 adults.

As a complement to the SCPC, the 2015 DCPC collected detailed transaction-level data from the same set of respondents. Each respondent filled out the diary for three consecutive specified days. For each transaction conducted during a specified three-day period, respondents recorded dollar value, type of merchant, type of transaction, and the payment instrument used. Transactions included all retail purchases conducted in person and online, bill payments, and person-to-person payments. As in Shy and Stavins (2015), our analysis is limited to non-bill purchases, because the discount and surcharge questions were asked only in reference to the purchases. The 2015 DCPC includes 6,823 individual non-bill transactions[3] across 1,623 diaries by 1,242 unique respondents. (The reason the number of diaries is greater than the number of respondents is because 381 diarists filled the diary twice, as that was the best way to reach the desired number of diaries and also allowed us to test whether consumers conduct more transactions closer to the holiday period.) Excluding extreme values, the median non-bill transaction amount was $17.57, and the mean was $39.58.

We do not use data from the 2012 DCPC, because that earlier survey was conducted by another vendor and the questionnaire was changed for the 2015 DCPC. In particular, the 2015 DCPC asked for payment preferences for bills and non-bills separately, while the 2012 DCPC asked for overall preferences only. Respondents typically vary their preferred payment methods by type of transaction. Moreover, the 2012 DCPC did not ask follow-up questions as to why the respondent deviated from his or her preferred payment method, while the 2015 DCPC did ask the question. The analysis may be reviewed using the 2016 diary data.

On the first day of each diary, respondents were asked to provide their payment instrument preferences for non-bill, bill, in-person, and online purchases. For all purchases paid with cash, debit cards, or credit cards, they were asked whether they received a discount or a

[3] The number of transactions refers to the number of purchases. Including bill payments, there were 9,082 transactions in the 2015 DCPC. For consistency, we exclude respondents from an additional survey conducted by another vendor.

surcharge because of the payment instrument they used for the transaction. Respondents answered the following questions about each purchase they made:

For cash transactions:

Question: Did you receive a discount from the merchant specifically for using cash? [Yes/No]

For debit card transactions:

Question: Did you receive a discount from the merchant specifically for using this debit card? [Yes/No]

For credit card transactions:

Question: Did you pay an extra charge, surcharge, or convenience fee to the merchant specifically for using this credit card? [Yes/No]

Because all DCPC respondents also answered the SCPC, we merged the SCPC data and added many other variables to the DCPC data using unique respondent identifiers: demographics, household income, and assessments of payment instrument characteristics.

IV. Payment method preferences

To assess the effect of price incentives on payment choice, we start with an analysis of consumer preferences concerning payment methods. Before the diary period begins, each respondent is asked which payment method he or she most prefers to use for non-bill purchases, separately for in-person and online transactions (respondents are also asked which payment method they prefer for bills). We assume that the act of specifying the preferred payment method does not affect the respondents' payment behavior during the subsequent three-day diary period.

The survey results show that consumers prefer to use different payment methods for in-person versus online purchases, bill versus non-bill payments, and small versus large dollar value transactions. Figures A1 and A2 in Appendix A show the distribution of preferred payment methods. Figure A1 shows preferred payment methods for in-person purchases across

the income distribution, broken down by the transaction value, and, separately, for online purchases. Figure A2 shows a similar breakdown by transaction value for bills and for non-bill transactions. Note that as the value of a transaction rises, consumers become less likely to prefer cash and more likely to prefer credit or debit cards for in-person payments. Not surprisingly, credit or debit cards are almost universally preferred for online transactions (Figure A1). Payment preferences differ greatly between bills and non-bills (Figure A2), one of the reasons why the earlier version of the diary lacks the necessary information for our study.

The survey asks about the most important characteristic of the preferred payment method, but that single feature may not fully explain consumers' preferences. Some demographic and income attributes tend to be correlated with consumers' payment preferences. To understand what affects a consumer's preference for a given payment method, we estimate regressions of payment preferences on consumers' demographic attributes and consumers' assessments of payment instrument characteristics.

We focus on the payment instruments used most commonly for purchases: cash, debit cards, and credit cards, and we separately analyze cash preferences and card preferences. The sample in model (1) includes all respondents who prefer cash, debit cards, or credit cards, whereas the sample in model (2) includes only respondents who prefer cards.

$$\Pr(CASHPREF_i) = f(X_i, CASHCHAR_i) \quad (1)$$

$$\Pr(CCPREF_i) = f(X_i, CCCHAR_i) \quad (2)$$

where:

$$CASHPREF_i = \begin{cases} 1 \text{ if consumer } i \text{ prefers cash over credit and debit cards} \\ 0 \text{ if consumer } i \text{ prefers credit and debit cards over cash} \end{cases}$$

$$CCPREF_i = \begin{cases} 1 \text{ if consumer } i \text{ prefers credit cards over debit cards} \\ 0 \text{ if consumer } i \text{ prefers debit cards over credit cards} \end{cases}$$

X_i = set of exogenous attributes of consumer i, including demographics and income

$CASHCHAR_i$ = vector of consumer *i*'s relative ratings of characteristics of cash compared with cards (see below for a detailed explanation of how these characteristics are constructed)

$CCCHAR_i$ = vector of consumer *i*'s relative ratings of characteristics of credit compared with debit cards.

All respondents are asked to assess each payment instrument according to certain characteristics. The characteristics include: acceptance, setup, cost, convenience, records, and security, and are rated on an absolute scale of 1 to 5, where 1 is least desirable (for example, most expensive, or rarely accepted) and 5 is most desirable (for example, very secure, or very convenient). Following Schuh and Stavins (2010 and 2013) we calculate average relative characteristics by applying the following transformation to the respondents' absolute rating:

$$RCHAR_{zit}(k,k') \equiv log\left(\frac{CHAR_{zikt}}{CHAR_{zik't}}\right),$$

where *z* indexes the characteristics (acceptance, setup, cost, convenience, records, and security),[4] *i* indexes the consumer, k is the payment instrument in question, and k' is every payment instrument other than k. Thus, $RCHAR_{zit}(k,k')$ is characteristic z of payment instrument k relative to payment instrument k'. The average relative characteristic of each payment characteristic *z* is constructed by:

$$AVG\_RCHAR_{zit}(k) \equiv \frac{1}{K}\sum_{k'\neq k} RCHAR_{zit}(k,k'),$$

over all payment instruments for consumer *i*. To provide a concrete example, let *z* = security, *k* = cash, then $AVG\_RCHAR_{zit}(k)$ is the average of the log ratios of security of cash relative to the security of each of the other payment instruments assessed by consumer *i*. The higher the $AVG\_RCHAR_{zit}(k)$ the more secure is cash relative to all other payment instruments, according to consumer *i*. The average relative characteristic is relative to all payment instruments, not just the payment instruments adopted by the consumer.

[4] In 2009, the characteristics include only: acceptance, cost, convenience, and security, because the SCPC did not ask about setup or records.

The vector $CASHCHAR_i$ comprises the relative characteristics of cash relative to cards, while the vector $CCCHAR_i$ comprises the relative characteristics of credit cards relative to debit cards for consumer i. The results in Table 1 indicate that consumers who perceive cash to be more widely accepted and more secure than cards tend to prefer cash over cards. Among consumers who prefer cards, those who consider credit cards more accepted, more convenient, and more secure tend to prefer credit cards over debit cards.

Consumers who have low education, low income, are Latino, and are male are more likely to prefer cash over cards (Table 1). Among consumers who prefer to use cards over cash, those having high education and/or high income, are non-Latino, male, and/or unemployed are significantly more likely to prefer credit cards over debit cards. Note that this model explains stated preferences only and not the actual use of each payment instrument.

Although unemployed respondents are more likely to *prefer* credit cards than those who are employed, there is no significant difference in the *use* of credit cards (measured as the share of all non-bill transactions) between the employed and the unemployed consumers. Thus, there is no evidence that the unemployed rely more heavily on credit cards than those who are employed. In fact, among consumers who prefer credit cards, there is some evidence that the employed tend to use credit cards more intensively than the unemployed when use is measured as a share of all transactions conducted with a given payment instrument. In addition, unemployed consumers tend to use cash more than employed consumers do, while the reverse is found for debit cards.

To test whether experiencing financial difficulty affects consumer payment preferences, we ran alternative regressions that include a measure of financial fragility.[5] The variable is equal to 1 for consumers reporting that they would have difficulty coming up with $1,000 to address an unexpected emergency.[6] Approximately 26 percent of respondents are financially fragile based on that measure. We find that individuals who are financially fragile are more likely to

[5] The results of those specifications are available from the authors.

[6] The amount was randomized across respondents, but we created an indicator variable for all respondents equal to 1 if a person can come up with at least $1,000 for emergency expenditures.

prefer cash over cards, and more likely to prefer debit cards over credit cards, controlling for all the other consumer demographic and financial attributes. Additionally, consumers who use payday loans tend to prefer cash over cards. One explanation could be that financially fragile individuals—who tend to be more credit constrained—try to avoid accumulating further debt and want to commit to spending less and so would be more likely than other consumers to prefer cash over cards, and debit over credit. All the other coefficients remain qualitatively unchanged when these measures of financial difficulties are included in the model.

A. Use of preferred payment methods

Above, we discussed consumers' stated preferences for specific payment methods. Here, we analyze the actual use of payment instruments and how use relates to preferences. Figures 1a, 1b, and 1c show the probabilities of using cash, debit cards, and credit cards, respectively, by the dollar value of transaction for non-bill transactions, and by the stated preferences. The probability of using cash declines with transaction value for transactions below $50, and the probability of using cards increases with transaction value (at least initially) for all consumers; but for all transaction values consumers have a higher probability of using their preferred payment method. This finding is similar to the finding in O'Brien (2016). Thus, consumers who prefer cash are more likely to use cash even for large-value transactions, and those who prefer debit or credit are more likely to use their preferred payment methods even for low-value transactions. The probability of using the preferred method also varies across demographic groups, location of transaction, and merchant categories (see Tables 2a and 2b).

Briglevics and Schuh (2014) found that having at least as much cash in wallet or purse as the transaction value is a strong predictor of whether the consumer used cash for that transaction, especially when the consumer was one who faced higher withdrawal costs and had diverse payment instrument bundles. In our model below we control for whether the consumer had sufficient cash with him or her to pay for the transaction.

B. Why do consumers deviate from their preferred method?

Table 3 shows the percentage of consumers who prefer each payment instrument—cash, debit, and credit—and the percentage of transactions for which the preferred payment instrument is used. Consumers use their preferred method for approximately two-thirds of their transactions. For the transactions where consumers deviate from their preferred payment instrument, they were asked why they deviated. As the table shows, the most common reason why consumers who prefer cash used another payment was because they did not have enough cash with them. In contrast, the main reason why consumers deviated from using credit or debit was transaction size. Consumers who prefer cards may decide to switch to cash for low-value transactions, while consumers who prefer cash may have to use cards when they do not have enough cash on their person.

We compared the survey responses where consumers stated that they did not have enough cash on person to conduct their transactions in cash with an interpolated measure of how much the person was carrying in their wallet, purse, or pocket at the time of payment (we refer to this amount as "cash in wallet."). Our cash-in-wallet measure takes into account all relevant cash activities throughout the day, such as bill and non-bill cash payments, cash deposits, cash withdrawals, and prepaid card loadings (see Briglevics and Schuh 2014 for a more detailed discussion). For the most part, the cash-in-wallet amount is consistent with respondents' indication of whether they had enough cash at the time of the transaction: 91 percent of transactions for which the respondent had enough cash on person were reported consistently, and 86 percent of transactions for which the respondent did not have enough cash on person were reported consistently. Analyzing the data slightly differently, among the respondents who stated that they did not have cash on hand to complete the transaction, our measure confirmed this to be true 89 percent of the time. Therefore, insufficient cash on person is the main reason why consumers deviate from cash use when that is their preferred payment method.

In order to assess whether price incentives have an effect on consumers' use of payment instruments, we first investigate the effect of other factors on payment choice. Consumers could

"deviate" from their preferred payment method and use another method because of supply-side restrictions, or because their preferences vary with other payment-specific factors, such as dollar value, location, or type of merchant (demand side). To test which factors affect the probability of deviating from a preferred payment method, we estimate a set of "FROM_PI" probit regressions where the dependent variable is the probability of deviating from the preferred payment instrument. For example, for those respondents who prefer cash we estimate the probability of deviating from cash. Here, the sample includes all consumers who prefer the given payment instrument, and the dependent variable equals 1 if the transaction is conducted with another payment instrument and 0 otherwise:

$$\Pr\left(FROM\_CASH_{ij}\right) = f\left(AMOUNT_j,\ MERCHANT_j,\ AMTMERCH_j, CASH_{ij}, X_i\right) \quad (3)$$

$$\Pr\left(FROM\_DEBIT_{ij}\right) = f\left(AMOUNT_j,\ MERCHANT_j,\ AMTMERCH_j, DC_i, X_i\right) \quad (4)$$

$$\Pr\left(FROM\_CREDIT_{ij}\right) = f\left(AMOUNT_j,\ MERCHANT_j,\ AMTMERCH_j, CC_i, X_i\right), \quad (5)$$

where:

$$FROM\_CASH_{ij} = \begin{cases} 1 \text{ if consumer } i \text{ prefers cash and uses not cash for transaction } j \\ 0 \text{ if consumer } i \text{ prefers cash and uses cash for transaction } j \end{cases}$$

$$FROM\_DEBIT_{ij} = \begin{cases} 1 \text{ if consumer } i \text{ prefers debit and uses not debit for transaction } j \\ 0 \text{ if consumer } i \text{ prefers debit and uses debit for transaction } j \end{cases}$$

$$FROM\_CREDIT_{ij} = \begin{cases} 1 \text{ if consumer } i \text{ prefers credit and uses not credit for transaction } j \\ 0 \text{ if consumer } i \text{ prefers credit and uses credit for transaction } j \end{cases}$$

$AMOUNT_j$ = dollar value of the transaction j

$MERCHANT_j$ = merchant category for transaction j

$AMTMERCH_j = AMOUNT_j * MERCHANT_j$ interaction term of dollar amount and merchant type

$CASH_{ij}$ = 1 if consumer i had enough cash on person for transaction j

DC_i = 1 if consumer *i* has a debit card on person

CC_i = 1 if consumer *i* has a credit card on person.

Even though we do not control for which payment instrument the consumer switched to, we know that he switched away from his preferred payment. We find that all consumers—regardless of their preferred method—are more likely to deviate from cash and less likely deviate from cards for high-value transactions (Table 4). Our results indicate that a $1 increase in transaction amount raises the probability of switching from cash by 0.4 percent, and lowers the probability of switching from debit cards and credit cards by 0.3 percent and 0.2 percent, respectively.

Carrying the payment instrument on one's person is a necessary condition for using that payment method for a transaction and is therefore a significant predictor of behavior: Consumers who had sufficient cash on person to conduct the transaction were significantly less likely to deviate from using cash (or more likely to pay cash), and consumers who carried their debit or credit card were less likely to deviate from using that method. To focus on demand-side effects, for the cash regression we restricted the sample to in-person transactions only. For the cards regressions, there was no significant difference between in-person and online transactions.

Controlling for having the payment instrument on person, older and less-educated consumers are less likely to deviate from cash. Less-educated consumers are more likely to deviate from credit cards, while Latinos and men are less likely to deviate from credit cards.

Surprisingly, we find that high-income consumers (those with household income over $100K) are more likely to deviate from credit cards than other consumers. Looking more closely at the transactions where high-income consumers who prefer credit cards use other methods, the most frequently cited reason for the deviation is the transaction amount, the most frequent merchant category is food, and the payment method used most frequently for those

transactions is cash. High-income people tend to prefer credit cards overall, but are likely to use cash when making small-value food purchases (see Appendix B).

When comparing the effect of merchant categories on the probability of deviating from preferred methods, consumers who prefer credit cards are more likely to deviate from credit cards for automobile-related transactions. However, the coefficient on the interaction term of merchant type and transaction value is negative and statistically significant, so consumers are less likely to deviate from credit cards for higher-value auto transactions. The evidence suggests that relatively low-value transactions such as gasoline purchases and tolls are paid with cash, but auto repairs or parts are paid with cards. As we found in other specifications, for higher-value transactions, consumers are more likely to deviate from cash and less likely to deviate from cards.

Figures 2a, 2b, and 2c show the reasons consumers gave for deviating from their preferred payment method. Consumers deviated from cash either because they did not have cash on hand or because of the transaction size (especially for transactions over $40). Consumers deviated from using debit or credit cards mainly because of the transaction size, especially for transactions under $10, for which they used cash. Receiving a discount was rarely mentioned as a reason for deviating, and surcharges were mentioned even less frequently. We analyze surcharges and discounts in greater detail below.

V. Surcharges and discounts

As was the case in 2012 (Shy and Stavins 2015), discounts and surcharges based on the payment instrument continued to be very rare in 2015. Tables 5a and 5b show the percentage of transactions that received a discount for using cash or debit card, and the percentage of transactions that received a surcharge for using a credit card. In 2015, consumers reported receiving cash discounts on 1.9 percent of in-person cash transactions, debit card discounts on 2.2 percent of in-person debit card transactions, and credit card surcharges on only 0.9 percent of in-person credit card transactions (all non-bills). In 2012, the comparable numbers were 1.7

percent, 1.8 percent, and 1.2 percent, respectively. We have no information on the percentage of transactions or merchants where discounts or surcharges were offered but not received or paid, only the percentage where the discount or surcharge was actually applied. Therefore, it is possible that a consumer decided not to use a credit card because he or she would have had to pay a surcharge, but it is also possible that a consumer decided to use a debit card because of the discount and that otherwise he or she would have used another payment method instead. Thus, we would expect the incidence of surcharges to be much lower than the incidence of discounts. Below we investigate these potential shifts in payment instrument choices induced by price incentives.

Figure 3 plots the occurrence of discounts and surcharges by transaction value. We observe only the intersection of supply and demand—that is, only when a merchant decides to offer a discount or impose a surcharge *and* when a consumer uses the payment method associated with the price incentive. We do not see discounts that were not received or surcharges that were not paid. As Figure 3 shows, cash discounts are more likely to occur at higher transaction values—the probability rises for transactions over $15, but starts declining for transactions over $30. The supply of either discounts or surcharges by merchants may be independent of the transaction value, and the fact that the occurrence of discounts or surcharges varies with value may be tracing out a demand curve of consumers.

There is relatively little variation in the occurrence of discounts or surcharges by consumers' demographic attributes (Table 5a). Looking at the breakdown by merchant sector (Table 5b), the percentage of cash transactions with discounts is higher in the auto or transportation sectors. In particular, 8.1 percent of cash transactions at gas stations receive cash discounts, compared with 1.8 percent of cash transactions elsewhere (all weighted). Debit card discounts are more likely to be received in general merchandise transactions, and credit card surcharges are most likely in medical/education services and transportation. The transportation credit card surcharges are likely the same types of transactions that would receive cash discounts if the consumers paid cash instead of credit cards. Probit regressions on consumers' demographic and income attributes, of the probability of receiving a discount or paying a

surcharge (not reported here), show no significant differences in the probability of receiving debit card discounts among the various demographic groups, while cash discounts are more likely to be received by older consumers and credit card surcharges are more likely to be paid by white consumers.

VI. Price incentives and payment preferences

In this section, we address the question whether payment preferences are related to discounts and surcharges. In particular, do people deviate to a non-preferred payment method because of such price incentives? In other words, is consumer demand for payment instruments elastic with respect to price incentives?

When we examine respondents' explanations for their deviating to other (non-preferred) payment methods, summary statistics show very low occurrence of discounts or surcharges as the reported reason (Table 6). In only between 2 and 4 percent of transactions did consumers deviate from their preferred payment method because they received a discount, and in only 1.1 percent of transactions did they deviate from using a credit card to avoid a surcharge. Furthermore, there were no statistically significant differences in the probability of receiving a discount or paying a surcharge between consumers who used their preferred method and those who did not use their preferred method: of the transactions in which the respondent did not choose (did choose) his preferred method, 2.3 percent (2.2 percent) received a cash discount, 2.8 percent (2.6 percent) received a debit discount, and 1.3 percent (0.7 percent) paid a credit card surcharge (unweighted).

We model consumer payment choice as a function of discounts and surcharges. Consumer *i* selects payment instrument (*PI*) *k* among his adopted set of payment instruments, based on whether there is a discount or a surcharge, on his perceived characteristics of *k*, which include the consumer's preferences and the merchant's acceptance:

$$\Pr\left(PI_{ikj}\right) = f\left(DISCOUNT_{kj}, SURCHARGE_{kj}, CHAR_{ik}, AMOUNT_{j}, MERCHANT_{j}, X_{i}\right) \quad (9)$$

where:

$\Pr\left(PI_{ikj}\right)$ = probability that consumer *i* selects payment instrument *k* for transaction *j*

k = cash, debit card, credit card.

$DISCOUNT_{kj}$ = 1 if there is a discount for using *k* on transaction *j* (for cash or debit card only); if there is a discount for choosing payment instrument *k*, then the probability of selecting *k* is expected to increase.

$SURCHARGE_{kj}$ = 1 if there is a surcharge for using *k* on transaction *j* (for credit card only); if there is a surcharge for choosing payment instrument *k*, then the probability of selecting *k* is expected to decrease.

$CHAR_{ik}$ = vector of consumer *i*'s relative ratings of characteristics of payment instrument *k*, including cost; a higher cost rating means the respondent actually perceives the *PI* to be *less* costly to use (more desirable).

In Equation (9) we test whether a consumer's probability of selecting a payment instrument is significantly affected by a discount or a surcharge. However, we cannot easily test this hypothesis unless we observe all potential discounts and surcharges: the DCPC respondents only report such events when they actually occurred. Therefore, we use an alternative approach, incorporating the survey's information on consumers' preferred payment instrument. To estimate the marginal effect of a discount or a surcharge on the probability of switching away from one's preferred payment instrument, we estimate a set of "TO PI" regressions, the probability of shifting away from a preferred payment method to the PI, where the sample includes all transactions conducted with the given payment instrument PI, and the dependent variable equals 1 if the consumer prefers another payment instrument and 0 otherwise:

$$\Pr\left(TOCASH_{ij}\right) = f\left(DISCOUNT_{kj},\ AMOUNT_{j},\ MERCHANT_{j},\ AMTMERCH_{j}, X_{i}\right) \quad (10)$$

$$\Pr\left(TODEBIT_{ij}\right) = f\left(DISCOUNT_{kj},\ AMOUNT_{j},\ MERCHANT_{j},\ AMTMERCH_{j}, X_{i}\right) \quad (11)$$

where:

$$TOCASH_{ij} = \begin{cases} 1 \text{ if consumer } i \text{ uses cash for transaction } j, \text{ and he prefers not cash} \\ 0 \text{ if consumer } i \text{ uses cash for transaction } j, \text{ and he prefers cash} \end{cases}$$

$$TODEBIT_{ij} = \begin{cases} 1 \text{ if consumer } i \text{ uses debit for transaction } j, \text{ and he prefers not debit} \\ 0 \text{ if consumer } i \text{ uses debit for transaction } j, \text{ and he prefers debit} \end{cases}$$

We estimate the probability of using a non-preferred payment method as a function of receiving a discount (Table 7), as described in Equations (10) and (11). We do not estimate an equation for the $\Pr\left(TOCREDIT_{ij}\right)$, because we assume that consumers minimize their cost and would not switch to using a credit card because of a surcharge. Among cash transactions, it is more likely that a consumer switched to using cash from his preferred payment method if there was a cash discount. The dependent variable equals 1 if a respondent used cash for the transaction, but preferred another payment instrument, and equals 0 if a respondent used and preferred cash. Thus, receiving a cash discount increases the probability of switching to cash by 11.7 percent, even after controlling for the dollar amount, merchant sector, interaction of dollar amount and merchant sector, consumers' demographic attributes, and income. The result suggests that discounts can steer people away from other payment methods to cash. We did not find any evidence that a debit card discount significantly affected the probability of using a debit card if the consumer preferred another payment method. Note that even though we cannot determine for sure whether a consumer decided *not* to use a credit card because of a surcharge on credit card transactions, very few consumers cited surcharges as a reason for deviating from credit cards.

Consumers who have reward credit cards might be less likely to switch payment methods when facing credit card surcharges, because their net cost of surcharges is smaller than the cost for those without rewards. However, including a dummy variable for having a reward credit card did not show that reward credit cardholders were less likely to switch payment methods to avoid credit card surcharges.

VII. **Conclusion**

Despite the fact that U.S. merchants have been allowed to price differentiate based on payment method for a few years, such price incentives—discounts on cash and debit card transactions,

and surcharges on credit card transactions—continued to be very rare in 2015, as was found in 2012 (Shy and Stavins 2015). We analyze in detail who receives discounts and surcharges, and whether such price incentives induce consumers to deviate from their preferred payment methods. We find evidence that consumers switch from their preferred payment methods to cash if a discount is offered. However, most of the switching from a preferred payment method continues to take place for low-value automobile transactions, such as gasoline purchases, where cash discounts have been offered for a long time, compared with other retail sectors. More research is needed to determine whether the infrequent occurrence of price incentives is caused by merchants' reluctance to offer them or by consumers' inelastic demand for payment instruments.

References

Agarwal, S., S. Chakravorti, and A. Lunn. 2010. "Why Do Banks Reward their Customers to Use their Credit Cards?" Federal Reserve Bank of Chicago Working Paper WP 2010-19.

Amromin, G., C. Jankowski, and R.D. Porter. 2007. "Transforming Payment Choices by Doubling Fees on the Illinois Tollway." *Economic Perspectives*.

Arango, C., K. Hyun, and L. Sabetti. 2015. "Consumer Payment Choice: Merchant Card Acceptance Versus Pricing Incentives." *Journal of Banking & Finance.*

Barron, J., M. Staten, and J. Umbeck. 1992. "Discounts for Cash in Retail Gasoline Marketing." *Contemporary Economic Policy.*

Bolt, W., N. Jonker, and C. van Renselaar. 2010. "Incentives at the Counter: An Empirical Analysis of Surcharging Card Payments and Payment Behavior in the Netherlands." *Journal of Banking & Finance.*

Briglevics, T., and S. Schuh. 2014. "This Is What's in Your Wallet...and Here's How You Use It." Federal Reserve Bank of Boston Working Paper 14-5.

Briglevics, T., and O. Shy. 2014. "Why Don't Most Merchants Use Price Discounts to Steer Consumer Payment Choice?" *Review of Industrial Organization.*

Borzekowski, R., E. Kiser, and S. Ahmed. 2008. "Consumers' Use of Debit Cards: Patterns, Preferences, and Price Response." *Journal of Money, Credit and Banking.*

Ching, A., and F. Hayashi. 2010. "Payment Cards Reward Programs and Consumer Payment Choice." *Journal of Banking & Finance.*

Cohen, M., and M. Rysman. 2013. "Payment Choice with Consumer Panel Data." Federal Reserve Bank of Boston Working Paper 13-6.

Humphrey, D., M. Kim, and B. Vale. 2001. "Realizing the Gains from Electronic Payments: Costs, Pricing, and Payment Choice." *Journal of Money, Credit and Banking.*

Klee, Elisabeth. 2008. "How People Pay: Evidence from Grocery Store Data." *Journal of Monetary Economics* 55(3): 526–541.

O'Brien, S. 2016. "Consumer Preferences and the Use of Cash: Evidence from the Diary of Consumer Payments Choice." Federal Reserve Bank of San Francisco Working Paper.

Reserve Bank of Australia. 2011. *Review of Card Surcharging: A Consultation Document.* http://www.rba.gov.au/publications/consultations/201106-review-card-surcharging/pdf/201106-review-card-surcharging.pdf

Schuh, S., and J. Stavins. 2010. "Why Are (Some) Consumers (Finally) Writing Fewer Checks? The Role of Payment Characteristics." *Journal of Banking and Finance.* 34(8): 1745–1758.

Schuh, S., and J. Stavins. 2013. "How Consumers Pay: Adoption and Use of Payments," *Accounting and Finance Research*, 2(2).

Shy, O., and J. Stavins. 2015. "Merchant Steering of Consumer Payment Choice: Evidence from a 2012 Diary Survey." *Journal of Behavioral and Experimental Economics*.

Simon, J., K. Smith, and T. West. 2010. "Price Incentives and Consumer Payment Behavior." *Journal of Banking & Finance*.

Wang, Z., and A. Wolman. 2014. "Payment Choice and the Future of Currency: Insights from Two Billion Retail Transactions." Federal Reserve Bank of Richmond Working Paper No. 14-09.

Table 1 Diarist-level probit regressions estimating the marginal probability of preferring cash over cards (column 1) and credit cards over debit cards (column 2)

Categories	Variables	Cash Preference		Credit Preference	
Age	Age	0.001		-0.003	
	Age * Age	0.000		0.000	
	Less than High School	0.330	***	-0.349	***
Education	High School	0.200	***	-0.156	***
[College omitted]	Some College	0.110	***	-0.042	
	Graduate Degree	-0.095	***	0.143	***
Ethnicity	Latino	0.093	*	-0.201	***
Race	White	-0.048		0.015	
Gender	Male	0.064	**	0.085	**
	< $25,000	0.108	**	-0.083	
Income	$25,000–$49,999	-0.012		0.001	
[$40K–$75K omitted]	$75,000–$99,999	-0.079	**	0.105	*
	≥ $100,000	-0.069	*	0.190	***
Employment Status	Employed	-0.057	*	-0.145	***
	Acceptance	0.089	***		
	Cost	-0.030			
Characteristics	Convenience	0.030			
[Cash]	Security	0.091	**		
	Setup	0.022			
	Records	0.058			
	Acceptance			0.117	*
	Cost			0.060	
Characteristics	Convenience			0.127	*
[Credit cards]	Security			0.146	**
	Setup			0.046	
	Records			0.091	
	Number of Observations	999		768	

Cash Preference = 1 if prefer cash over credit or debit cards for non-bill purchases

Credit Preference = 1 if prefer credit cards over debit cards for non-bill purchases

* p<0.10 ** p < 0.05 *** p < 0.01

Source: Authors' calculations based on the 2015 Diary of Consumer Payment Choice. *Note*: All diarists who prefer cash, debit cards, or credit cards for non-bill purchases (Cash Preference column) and all diarists who prefer credit cards or debit cards (for Credit Preference column).

Table 2a Occurrence and median transaction size for using preferred and non-preferred payment method, by demographic groups

	Cash Preference			Debit Preference			Credit Preference		
	Percent	Median Amount		Percent	Median Amount		Percent	Median Amount	
	Non-Preferred	Non-Preferred	Preferred	Non-Preferred	Non-Preferred	Preferred	Non-Preferred	Non-Preferred	Preferred
Total	**33.9**	**$ 21.65**	**$ 10.00**	**40.6**	**$ 13.32**	**$ 21.00**	**39.3**	**$ 10.59**	**$ 25.42**
Age									
Under 25	**36.7**	**$ 17.50**	**$ 8.56**	**33.8**	**$ 35.00**	**$ 10.85**	**62.1**	**$ 10.00**	**$ 22.00**
25–34	**47.1**	**$ 12.00**	**$ 13.28**	**38.1**	**$ 15.97**	**$ 19.20**	**36.0**	**$ 10.49**	**$ 29.68**
35–44	**41.4**	**$ 27.09**	**$ 10.00**	**34.5**	**$ 11.99**	**$ 21.66**	**30.1**	**$ 15.00**	**$ 23.19**
45–54	**26.2**	**$ 24.42**	**$ 8.75**	**39.2**	**$ 10.69**	**$ 24.85**	**33.8**	**$ 10.50**	**$ 24.05**
55–64	**27.7**	**$ 36.87**	**$ 10.00**	**44.2**	**$ 10.00**	**$ 23.78**	**52.0**	**$ 10.00**	**$ 25.31**
Over 64	**26.0**	**$ 39.00**	**$ 7.66**	**55.1**	**$ 15.00**	**$ 23.60**	**42.3**	**$ 11.00**	**$ 27.70**
Income									
<$25k	**19.2**	**$ 27.10**	**$ 10.00**	**49.3**	**$ 11.13**	**$ 16.93**	**56.5**	**$ 17.10**	**$ 24.00**
$25k–$49k	**39.9**	**$ 20.00**	**$ 10.00**	**49.0**	**$ 15.00**	**$ 21.34**	**45.7**	**$ 15.00**	**$ 24.00**
$50k–$74k	**37.7**	**$ 16.91**	**$ 9.54**	**38.4**	**$ 12.00**	**$ 18.74**	**37.6**	**$ 11.00**	**$ 22.94**
$75k–$99k	**29.7**	**$ 32.09**	**$ 10.00**	**32.6**	**$ 10.00**	**$ 22.88**	**38.9**	**$ 8.44**	**$ 31.51**
$100k–$124k	**43.7**	**$ 19.00**	**$ 10.00**	**34.6**	**$ 15.97**	**$ 25.76**	**42.5**	**$ 10.48**	**$ 32.29**
$125k–$199k	**33.1**	**$ 33.14**	**$ 7.27**	**44.5**	**$ 21.00**	**$ 24.67**	**33.4**	**$ 10.91**	**$ 24.05**
≥$200k	**31.6**	**$ 45.00**	**$ 13.00**	**24.7**	**$ 14.00**	**$ 42.00**	**30.2**	**$ 9.49**	**$ 23.00**
Education									
Less HS	**17.6**	**$ 38.30**	**$ 13.28**	**40.3**	**$ 20.00**	**$ 22.41**	**60.1**	**$ 10.59**	**$ 353.24**
High School	**37.9**	**$ 18.09**	**$ 8.67**	**37.7**	**$ 12.32**	**$ 24.85**	**48.1**	**$ 12.00**	**$ 36.00**
Some College	**31.0**	**$ 19.48**	**$ 9.00**	**46.2**	**$ 15.00**	**$ 20.45**	**46.3**	**$ 9.00**	**$ 22.86**
College	**46.9**	**$ 18.74**	**$ 9.54**	**41.5**	**$ 14.00**	**$ 20.00**	**39.3**	**$ 11.00**	**$ 25.38**
Graduate	**45.6**	**$ 19.00**	**$ 8.00**	**38.9**	**$ 10.69**	**$ 20.27**	**37.2**	**$ 9.09**	**$ 25.42**
Gender									
Male	**34.8**	**$ 20.00**	**$ 9.62**	**39.6**	**$ 12.47**	**$ 22.56**	**39.3**	**$ 10.54**	**$ 24.63**
Female	**32.7**	**$ 23.00**	**$ 10.00**	**41.4**	**$ 14.88**	**$ 20.00**	**39.2**	**$ 10.95**	**$ 27.45**
Ethnicity									
Latino	**41.6**	**$ 20.00**	**$ 10.00**	**37.3**	**$ 20.00**	**$ 20.21**	**40.3**	**$ 15.00**	**$ 25.00**
Not Latino	**31.9**	**$ 23.00**	**$ 10.00**	**41.3**	**$ 12.32**	**$ 21.34**	**39.2**	**$ 10.59**	**$ 25.43**
Race									
White	**34.2**	**$ 22.25**	**$ 10.00**	**40.6**	**$ 13.00**	**$ 21.17**	**40.2**	**$ 10.00**	**$ 27.79**
Black	**35.9**	**$ 20.00**	**$ 6.00**	**40.1**	**$ 10.99**	**$ 19.68**	**56.1**	**$ 10.00**	**$ 24.39**
Asian	**26.8**	**$ 37.00**	**$ 9.38**	**43.1**	**$ 30.24**	**$ 15.78**	**28.3**	**$ 16.21**	**$ 21.06**
Other	**25.0**	**$ 29.36**	**$ 15.25**	**59.5**	**$ 16.75**	**$ 25.00**	**33.2**	**$ 18.40**	**$ 39.21**

Source: 2015 Diary of Consumer Payment Choice.
Note: Non-bill transactions only. Percent columns indicate percentage of transactions where non-preferred payment method was used. Median Amount columns refer to the amount of the transaction.

Table 2b Occurrence and median transaction size for using preferred and non-preferred payment method, by merchant category and location

	Cash Preference			Debit Preference			Credit Preference		
	Percent	Median Amount		Percent	Median Amount		Percent	Median Amount	
	Non-Preferred	Non-Preferred	Preferred	Non-Preferred	Non-Preferred	Preferred	Non-Preferred	Non-Preferred	Preferred
Total	**33.9**	**$ 21.65**	**$ 10.00**	**40.6**	**$ 13.32**	**$ 21.00**	**39.3**	**$ 10.59**	**$ 25.42**
Merchant Type									
Food and Personal Care Supplies	**28.0**	**$ 17.89**	**$ 8.37**	**38.5**	**$ 9.51**	**$ 18.20**	**41.6**	**$ 8.00**	**$ 19.98**
Auto and Vehicle Related	**35.6**	**$ 20.00**	**$ 15.00**	**36.4**	**$ 16.50**	**$ 21.75**	**26.1**	**$ 12.00**	**$ 25.18**
General Merchandise	**50.7**	**$ 31.81**	**$ 15.26**	**36.6**	**$ 25.00**	**$ 30.00**	**29.4**	**$ 24.13**	**$ 40.00**
Entertainment and Transportation	**45.9**	**$ 7.99**	**$ 10.00**	**45.5**	**$ 10.00**	**$ 11.16**	**46.9**	**$ 12.00**	**$ 20.00**
Housing Related	**54.6**	**$ 39.60**	**$ 16.28**	**26.5**	**$ 58.72**	**$ 28.05**	**22.3**	**$ 17.10**	**$ 37.25**
Medical, Education, Person Services	**27.9**	**$ 26.00**	**$ 17.00**	**51.0**	**$ 36.00**	**$ 20.00**	**69.8**	**$ 18.00**	**$ 39.00**
Financial, Professional, Miscellaneous Services	**56.2**	**$ 23.00**	**$ 11.00**	**33.0**	**$ 84.75**	**$ 41.18**	**68.6**	**$ 75.00**	**$ 10.27**
Government and Nonprofit	**35.5**	**$ 4.60**	**$ 5.00**	**77.8**	**$ 20.00**	**$ 15.00**	**76.9**	**$ 20.00**	**$ 8.50**
Gifts and Transfers to People	**13.3**	**$ 30.00**	**$ 20.00**	**95.3**	**$ 20.00**	**$ 58.47**	**98.1**	**$ 22.00**	**$ 10.00**
I don't know	**73.2**	**$ 70.78**	**$ 3.00**	**44.6**	**$ 20.00**	**$ 57.00**	**61.1**	**$ 64.96**	**$ 6.54**
Location									
In Person	**31.1**	**$ 22.63**	**$ 10.00**	**40.1**	**$ 11.80**	**$ 20.27**	**39.5**	**$ 10.00**	**$ 24.63**
Not In Person	**88.7**	**$ 18.74**	**$ 6.11**	**45.7**	**$ 40.00**	**$ 30.21**	**37.6**	**$ 64.96**	**$ 39.96**

Source: 2015 Diary of Consumer Payment Choice.
Note: Non-bill transactions only. Percent columns indicate percentage of transactions where non-preferred payment method was used. Median Amount columns refer to the amount of the transaction.

Table 3 Summary statistics for preferences and reason for deviation for non-bill transactions

Payment Instrument (PI)	Cash	Debit	Credit
% who prefer PI	21.7%	45.8%	29.2%
% who used preferred PI	65.4%	57.9%	59.8%
% who deviated from preferred PI	34.6%	42.1%	40.2%
Top reasons for deviating			
Transaction size	17.1%	**30.1%**	**32.4%**
Merchant type	15.9%	19.9%	17.5%
PI not on hand	**31.4%**	4.3%	4.5%
Speed of payment	10.8%	12.6%	15.9%

Source: 2015 Diary of Consumer Payment Choice. Non-bill transactions only.

Table 4 Transaction-level probit regressions estimating the marginal probability of deviating from the preferred payment method.

Categories	Variables	From Cash		From Debit		From Credit	
Amount	Amount	0.004	**	-0.003	***	-0.002	***
	Amount * Amount	0.000	***	0.000	***	0.000	***
	Food	-0.030		-0.096	**	-0.040	
Merchant	Auto	0.000		-0.160	***	0.239	**
	General	0.136		-0.166	***	-0.178	***
	Food * Amount	0.001		-0.003	***	-0.002	***
Merchant * Amount	Auto * Amount	0.008	**	-0.002		-0.023	***
	General * Amount	0.002		0.000		0.000	
Location	In person			0.023		-0.012	
	Cash	-0.738	***				
Payment Adoption	Debit Card			-0.388	***		
	Credit Card					-0.354	***
Age	Age	-0.020	**	0.003		0.008	
	Age * Age	0.000	*	0.000		0.000	
	Less than High School	-0.231	***	-0.025		0.481	***
Education	High School	-0.190	***	-0.028		0.170	**
[College omitted]	Some College	-0.190	***	0.008		0.077	**
	Graduate Degree	-0.029		-0.019		0.011	
Ethnicity	Latino	-0.069		-0.006		-0.137	*
Race	White	0.022		0.048	*	-0.002	
Gender	Male	0.026		0.013		-0.062	**
	< $25,000	-0.166	***	0.018		0.040	
Income	$25,000–$49,999	0.016		0.016		0.076	*
[$40K–$75K omitted]	$75,000–$99,999	-0.153	***	-0.065	**	0.056	
	≥ $100,000	0.117	*	-0.023		0.120	***
Employment Status	Employed	-0.001		0.020		-0.046	
	Number of Transactions	911		2491		1854	

* p < 0.10 ** p < 0.05 ** p < 0.01

Source: Authors' calculations based on the 2015 Diary of Consumer Payment Choice. *Note*: Non-bill transactions only. For example, "From Cash" regression includes all transactions associated with diarists who prefer cash. Dependent variable = 1 if transaction is conducted with payment method different from cash and = 0 otherwise. The numbers represent marginal effects.

Table 5a Occurrence and median transaction size for receiving a discount or paying a surcharge, by demographic groups

	Cash Discount			Debit Discount			Credit Surcharge		
	Percent	Median Amnt		Percent	Median Amnt		Percent	Median Amnt	
	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Total	1.9	$ 20.00	$ 8.78	2.2	$ 32.24	$ 21.11	0.8	$ 40.00	$ 28.01
Age									
Under 25	1.7	$ 40.00	$ 10.00	0.8	$ 20.00	$ 10.85	0.0	$ -	$ 25.00
25–34	1.2	$ 9.00	$ 10.00	1.4	$ 44.36	$ 18.09	0.8	$ 18.81	$ 28.35
35–44	2.6	$ 20.00	$ 8.00	5.0	$ 25.00	$ 21.87	1.4	$ 40.00	$ 25.00
45–54	1.3	$ 25.00	$ 8.00	1.2	$ 20.00	$ 24.00	0.7	$ 300.00	$ 28.14
55–64	3.1	$ 20.00	$ 8.26	3.0	$ 67.17	$ 25.00	0.4	$ 28.85	$ 31.50
Over 64	1.5	$ 20.00	$ 7.80	0.7	$ 37.31	$ 24.04	1.0	$ 67.59	$ 30.00
Income									
<$25k	2.9	$ 25.00	$ 9.00	2.1	$ 7.33	$ 20.00	1.0	$ 54.56	$ 20.80
$25k–$49k	1.6	$ 20.00	$ 10.00	1.1	$ 25.00	$ 20.00	0.4	$ 2.12	$ 26.06
$50k–$74k	2.7	$ 23.00	$ 8.75	1.9	$ 44.36	$ 18.01	0.3	$ 43.00	$ 26.49
$75k–$99k	0.9	$ 30.00	$ 6.75	3.5	$ 19.80	$ 23.91	1.2	$ 67.59	$ 31.51
$100k–$124k	2.2	$ 20.00	$ 8.80	1.9	$ 50.96	$ 24.22	0.7	$ 300.00	$ 34.60
$125k–$199k	0.6	$ 33.62	$ 7.27	4.1	$ 67.17	$ 24.04	1.5	$ 40.00	$ 28.34
≥$200k	1.7	$ 41.00	$ 8.00	1.1	$ 148.73	$ 42.00	0.5	$ 35.59	$ 27.64
Education									
Less HS	1.4	$ 25.00	$ 11.32	3.5	$ 44.36	$ 30.00	0.0	$ -	$ 44.72
High School	1.7	$ 30.00	$ 9.38	1.5	$ 5.28	$ 24.44	2.5	$ 40.00	$ 31.50
Some College	1.2	$ 20.00	$ 7.80	1.5	$ 32.24	$ 20.00	0.3	$ 28.85	$ 27.55
College	2.0	$ 25.00	$ 8.42	2.9	$ 21.00	$ 20.00	0.7	$ 18.81	$ 29.68
Graduate	2.4	$ 29.00	$ 6.58	3.0	$ 87.25	$ 21.07	0.7	$ 58.28	$ 27.42
Gender									
Male	1.6	$ 30.00	$ 8.76	1.2	$ 25.71	$ 21.77	0.8	$ 28.85	$ 27.21
Female	2.2	$ 20.00	$ 8.87	3.0	$ 37.31	$ 20.21	0.9	$ 40.00	$ 28.65
Ethnicity									
Latino	3.5	$ 25.00	$ 10.00	1.5	$ 32.24	$ 20.00	3.8	$ 40.00	$ 25.00
Not Latino	1.6	$ 20.00	$ 8.50	2.4	$ 36.42	$ 21.48	0.6	$ 54.56	$ 28.35
Race									
White	1.8	$ 20.00	$ 8.74	1.7	$ 37.31	$ 20.92	1.0	$ 40.00	$ 29.69
Black	2.6	$ 10.00	$ 7.13	4.1	$ 9.89	$ 20.00	0.0	$ -	$ 27.55
Asian	1.4	$ 25.00	$ 9.95	4.0	$ 30.00	$ 31.29	0.0	$ -	$ 24.80
Other	8.7	$ 30.00	$ 15.00	0.0	$ -	$ 36.20	0.0	$ -	$ 26.63

Source: 2015 Diary of Consumer Payment Choice.
Note: Non-bill transactions only. Percent columns indicate percentage of transactions with a discount or a surcharge. Median Amount columns refer to the amount of the transaction.

Table 5b Occurrence and median transaction size for receiving a discount or paying a surcharge, by merchant category and location

	Cash Discount			Debit Discount			Credit Surcharge		
	Percent	Median Amnt		Percent	Median Amnt		Percent	Median Amnt	
	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Total	**1.9**	**$ 20.00**	**$ 8.78**	**2.2**	**$ 32.24**	**$ 21.11**	**0.8**	**$ 40.00**	**$ 28.01**
Merchant Type									
Food and Personal Care Supplies	**1.0**	**$ 9.00**	**$ 7.51**	**0.9**	**$ 17.76**	**$ 18.67**	**0.8**	**$ 40.00**	**$ 20.84**
Auto and Vehicle Related	**8.2**	**$ 20.00**	**$ 10.00**	**3.2**	**$ 37.00**	**$ 20.21**	**1.3**	**$ 43.00**	**$ 25.66**
General Merchandise	**0.9**	**$ 170.00**	**$ 10.84**	**5.1**	**$ 37.89**	**$ 30.18**	**0.6**	**$ 220.61**	**$ 43.92**
Entertainment and Transportation	**5.1**	**$ 40.00**	**$ 10.00**	**2.9**	**$ 1.59**	**$ 11.50**	**4.0**	**$ 23.68**	**$ 34.29**
Housing Related	**0.0**	**$ -**	**$ 13.66**	**0.0**	**$ -**	**$ 28.89**	**0.0**	**$ -**	**$ 42.99**
Medical, Education, Person Services	**0.9**	**$ 24.00**	**$ 20.00**	**0.0**	**$ -**	**$ 20.00**	**5.7**	**$ 149.00**	**$ 37.94**
Financial, Professional, Miscellaneous Services	**0.0**	**$ -**	**$ 10.00**	**0.0**	**$ -**	**$ 25.98**	**0.0**	**$ -**	**$ 10.27**
Government and Nonprofit	**2.1**	**$ 10.00**	**$ 7.99**	**0.0**	**$ -**	**$ 15.00**	**0.0**	**$ -**	**$ 8.50**
Gifts and Transfers to People	**0.0**	**$ -**	**$ 20.00**	**0.0**	**$ -**	**$ 58.47**	**0.0**	**$ -**	**$ 10.00**
I don't know	**0.0**	**$ -**	**$ 6.00**	**0.0**	**$ -**	**$ 20.00**	**0.0**	**$ -**	**$ 70.78**
Location									
In Person	**1.9**	**$ 20.00**	**$ 8.80**	**2.2**	**$ 30.00**	**$ 20.16**	**0.9**	**$ 40.00**	**$ 26.75**
Not In Person	**0.0**	**$ -**	**$ 6.11**	**2.2**	**$ 37.31**	**$ 32.99**	**0.0**	**$ -**	**$ 45.62**

Source: 2015 Diary of Consumer Payment Choice.
Note: Non-bill transactions only. Percent columns indicate percentage of transactions with a discount or a surcharge. Median Amount columns refer to the amount of the transaction.

Table 6 Occurrences of deviating from preferred payment method because of a discount or a surcharge.

Deviated from	Number of transactions	Received discount	Avoided surcharge
Cash	423	3.3%	0.0%
Debit	1225	4.1%	1.0%
Credit	921	2.1%	1.1%

Source: 2015 Diary of Consumer Payment Choice. Non-bill transactions only.

Table 7 Transaction-level probit regressions estimating the marginal probability of deviating to a specific payment instrument from a preferred payment instrument

Categories	Variables	To Cash		To Debit	
Discounts/Surcharges	Cash Discount	0.117	*		
	Debit Discount			0.028	
Amount	Amount	-0.001		0.001	
	Amount * Amount	0.000	*	0.000	
Merchant	Food	-0.011		0.056	
	Auto	-0.125	*	0.178	**
	General	0.025		0.008	
Merchant * Amount	Food * Amount	-0.003	**	-0.001	
	Auto * Amount	-0.004		-0.003	**
	General * Amount	-0.002		0.000	
Location	In person			0.022	
Age	Age	-0.004		-0.007	*
	Age * Age	0.000		0.000	
Education [College omitted]	Less than High School	-0.465	***	0.070	
	High School	-0.241	***	0.091	***
	Some College	-0.128	***	0.028	
	Graduate Degree	0.131	***	0.039	
Ethnicity	Latino	-0.118	**	-0.013	
Race	White	0.044		-0.023	
Gender	Male	-0.134	***	0.069	***
Income [$40K–$75K omitted]	<$25,000	-0.179	***	0.072	*
	$25,000–$49,999	-0.101	***	0.157	***
	$75,000–$99,999	0.030		-0.011	
	≥$100,000	-0.033		0.119	***
Employment Status	Employed	0.109	***	-0.081	***
	Number of Transactions	1895		1798	

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Source: Authors' calculations based on the 2015 Diary of Consumer Payment Choice.
Note: Non-bill transactions only. For example, "To Cash" regression includes all cash transactions. Dependent variable = 1 if transaction was conducted with cash by a respondent who does not already prefer cash and = 0 otherwise.

Figure 1a Probability of cash use, by payment preference as a function of transaction size

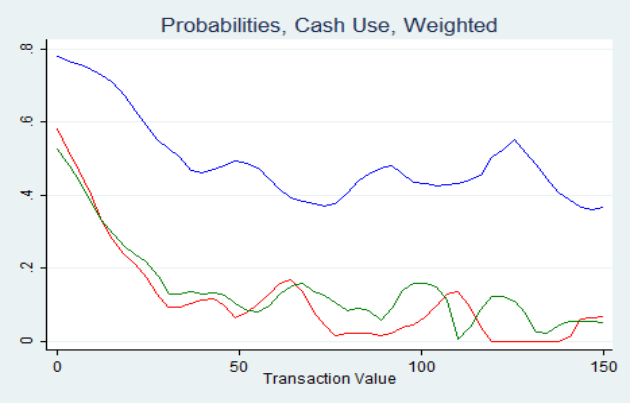


Figure 1b Probability of debit card use, by payment preference as a function of transaction size

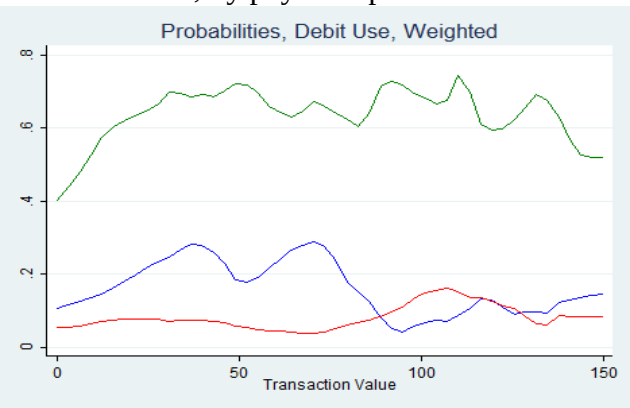
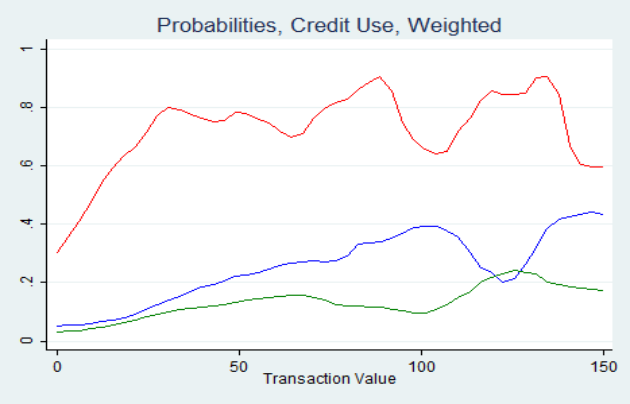
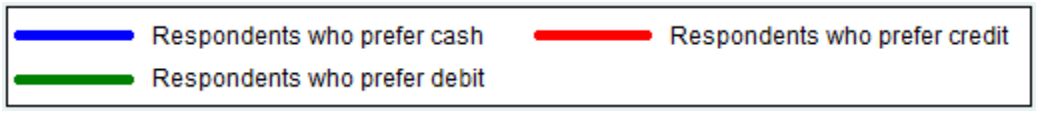


Figure 1c Probability of credit card use, by payment preference as a function of transaction size





Source: 2015 Diary of Consumer Payment Choice. Non-bill transactions only.
Note: The lines indicate estimated probabilities. Confidence intervals are available from the authors.

Figure 2a Why do people deviate from cash?

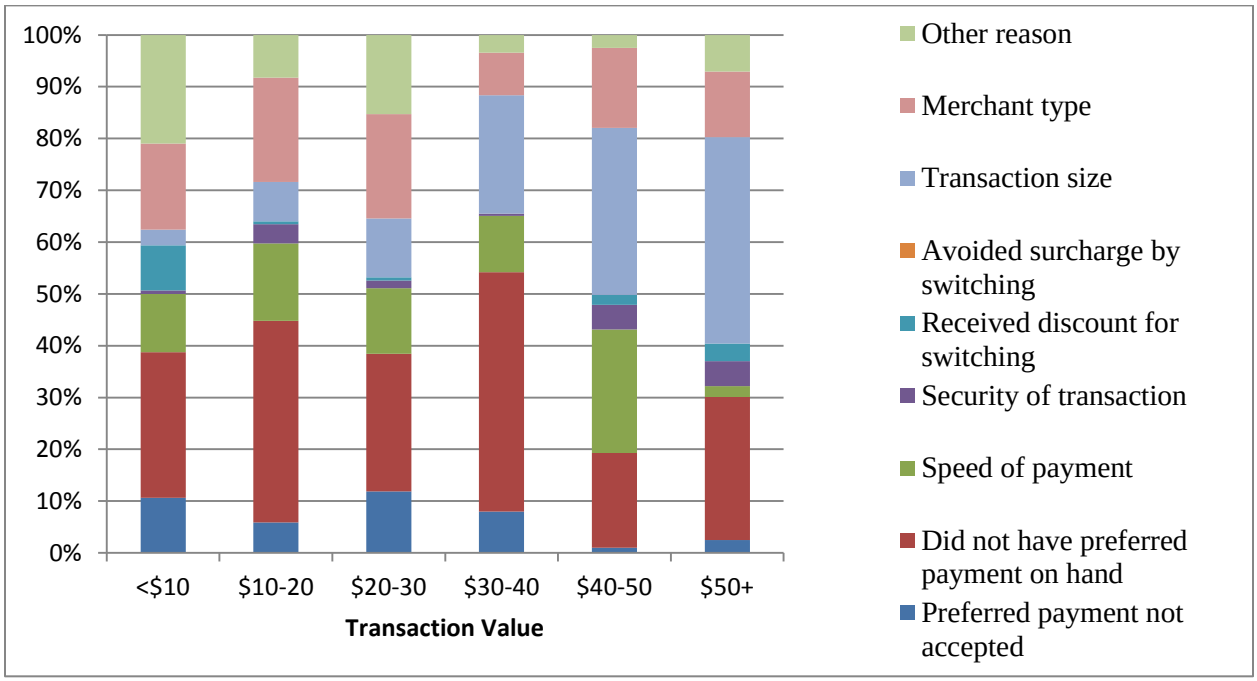
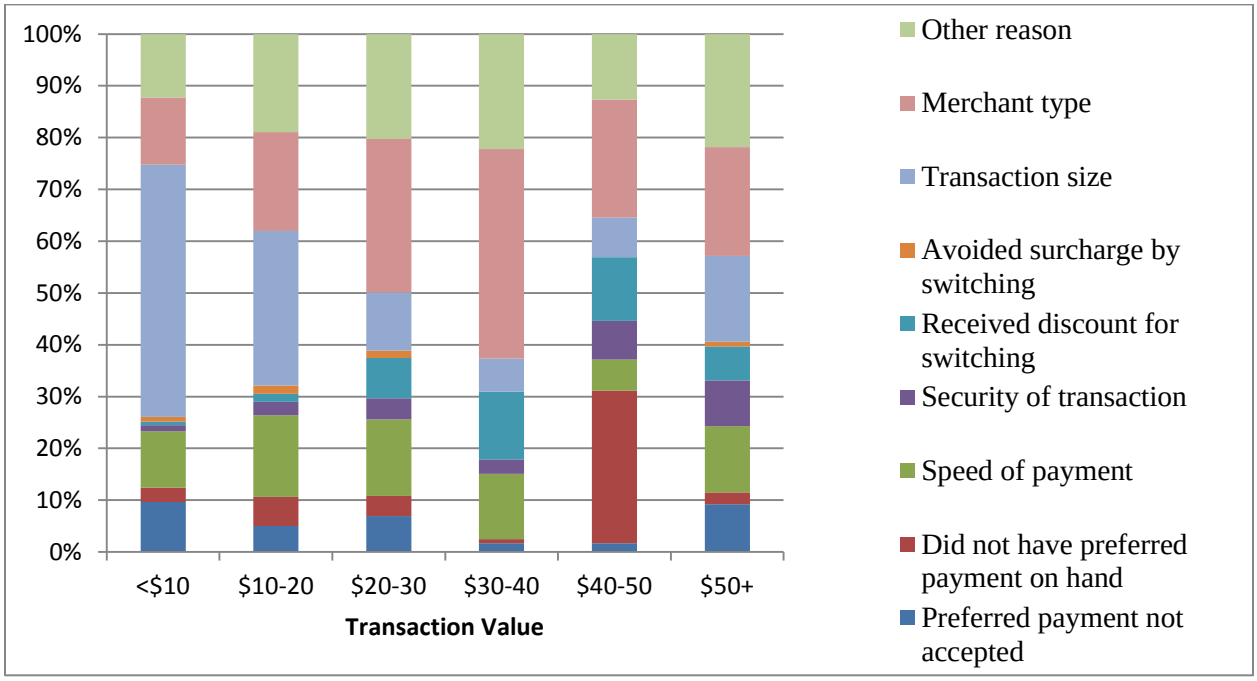
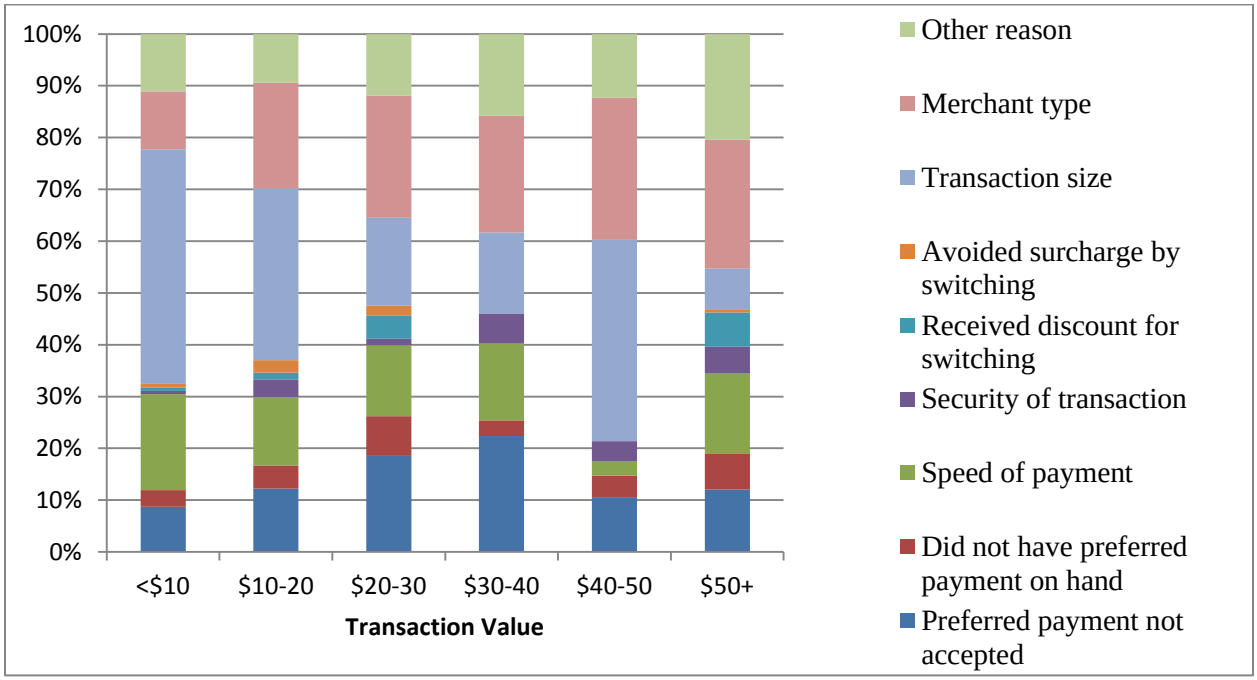


Figure 2b Why do people deviate from debit cards?



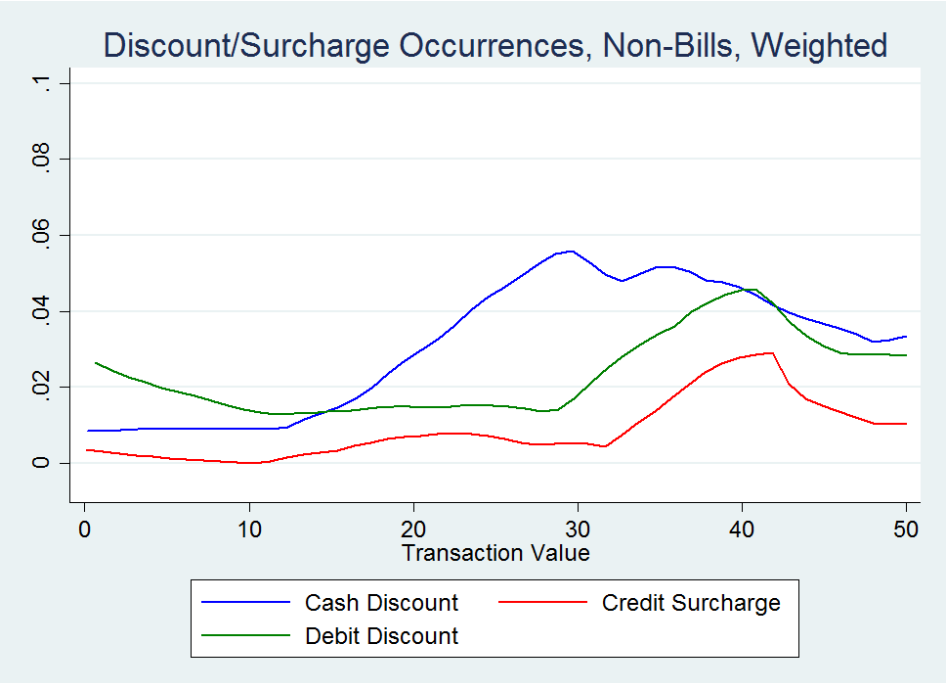
Source: 2015 Diary of Consumer Payment Choice. Non-bill transactions only.

Figure 2c Why do people deviate from credit cards?



Source: 2015 Diary of Consumer Payment Choice. Non-bill transactions only.

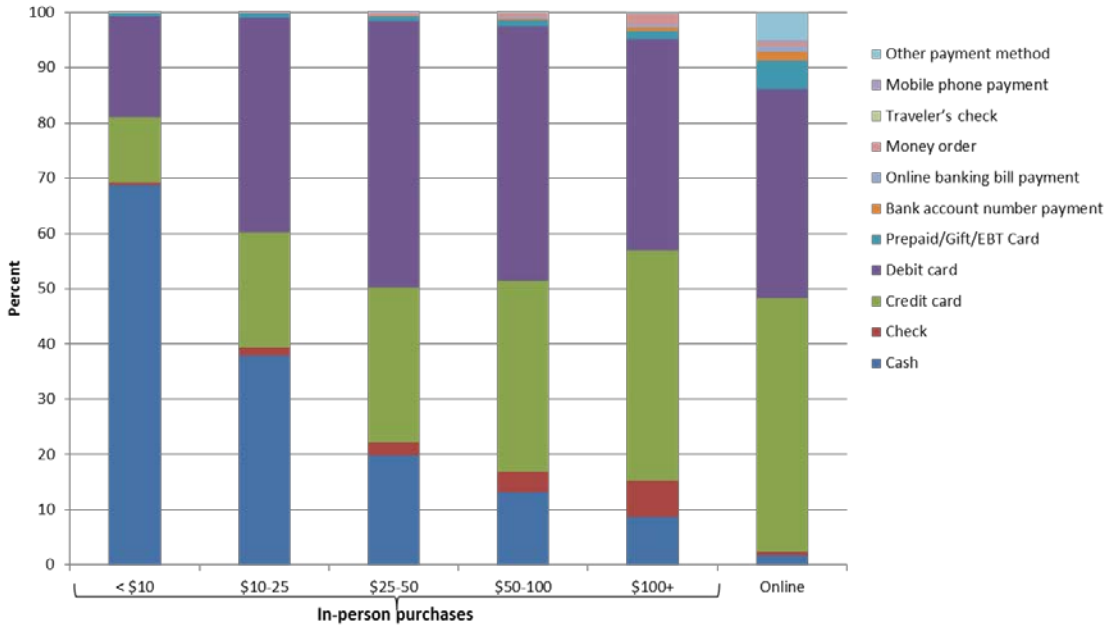
Figure 3 Occurrence of discounts and surcharges by transaction size



Source: 2015 Diary of Consumer Payment Choice. Non-bill transactions only. $50 includes all transactions greater than $50.

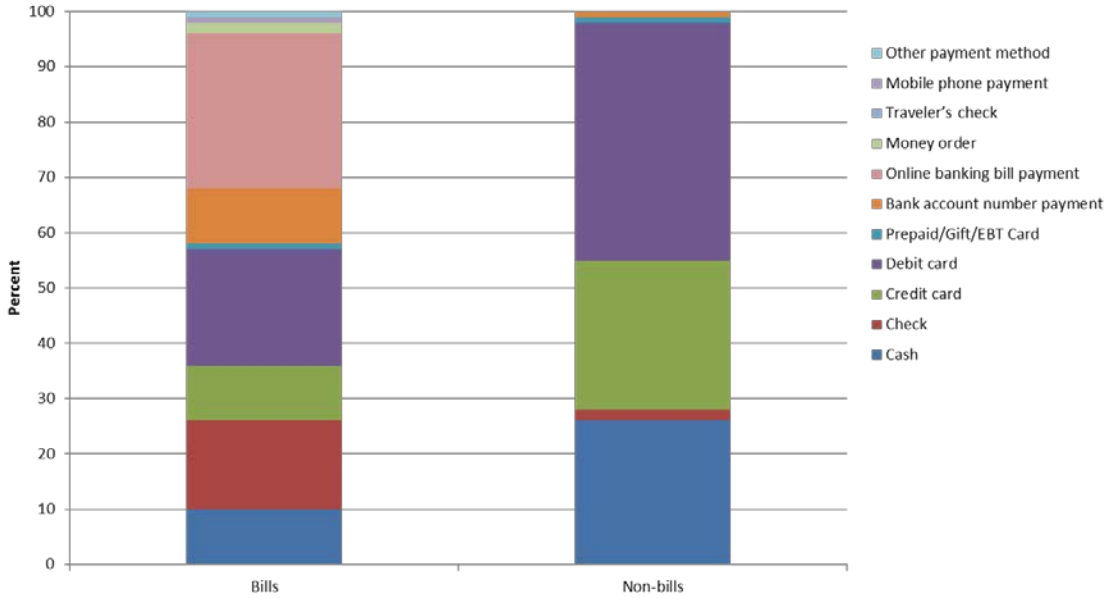
Appendix A:
Preferences for in-person vs. online purchases, and bill-payment vs. non-bill-payment transactions

Figure A1 Preferences: in-person vs. online purchases



Source: 2015 Diary of Consumer Payment Choice.

Figure A2 Preferences: bill-payments vs. non-bill-payments transactions

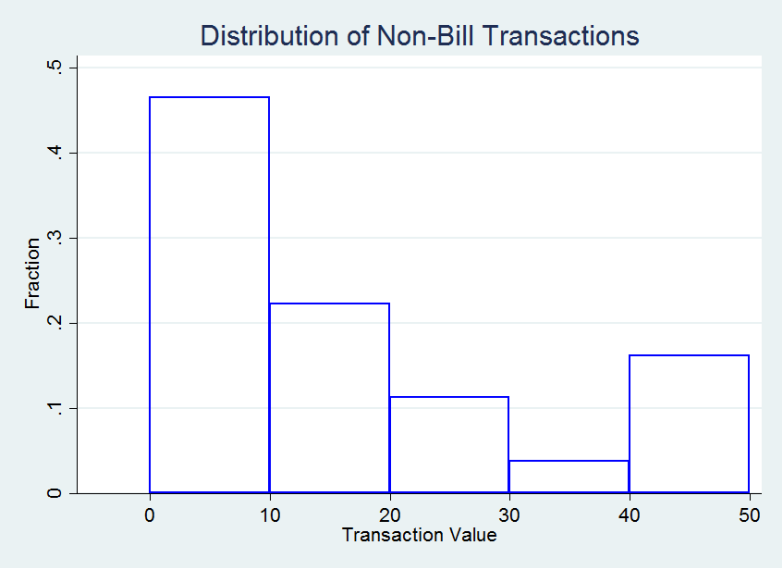


Source: 2015 Diary of Consumer Payment Choice'

Appendix B: Why do high-income consumers deviate from credit cards?

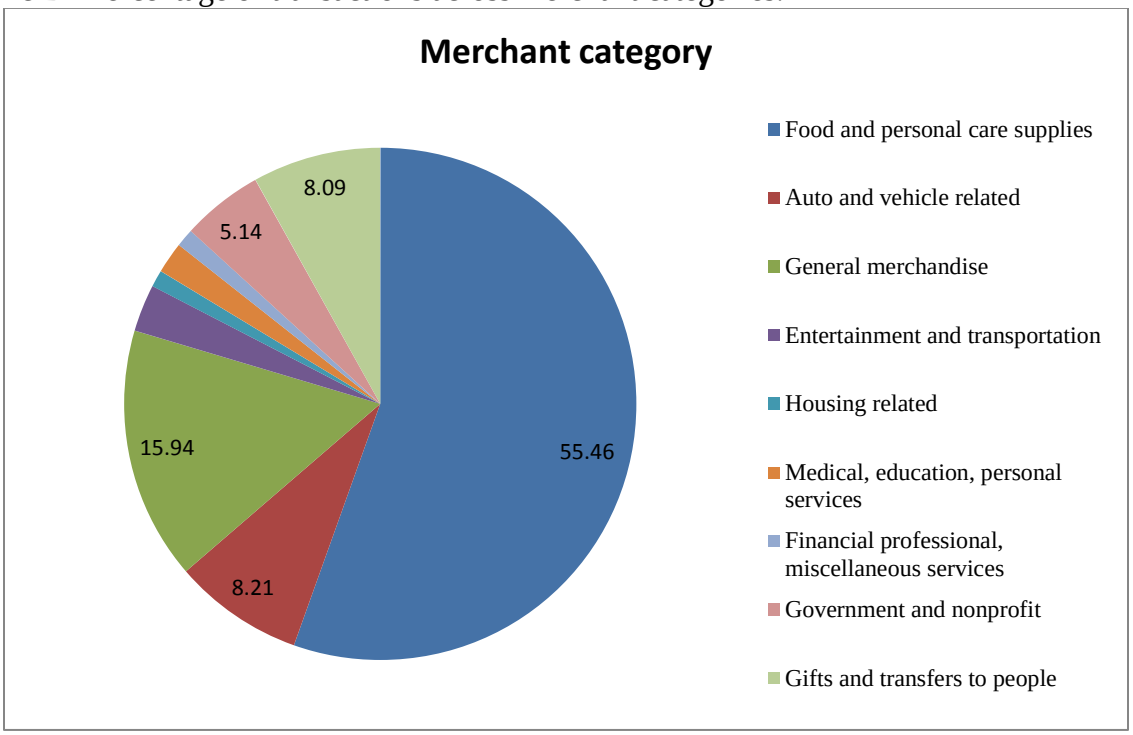
All figures in this section are generated using non-credit card, non-bill transactions associated with credit-preferred respondents who report yearly household income of $100,000 or more.

Figure B1 Distribution of transaction sizes.



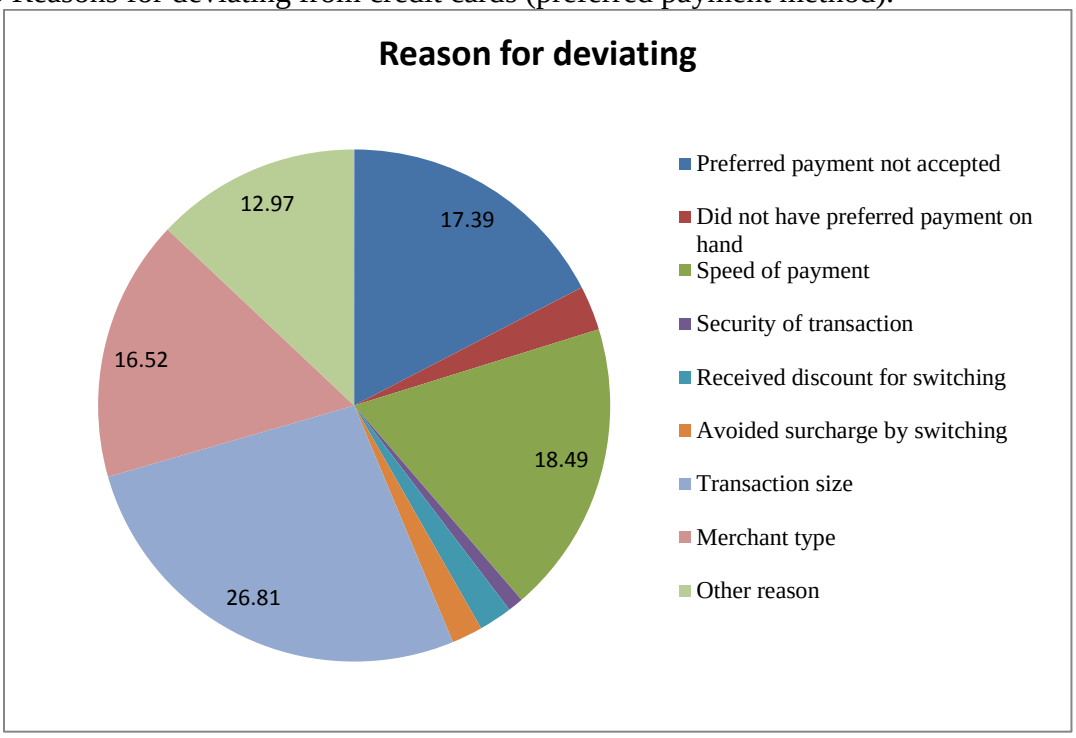
Source: 2015 Diary of Consumer Payment Choice. The $50 bucket includes all transactions equal to or greater than $50.

Figure B2 Percentage of transactions across merchant categories.



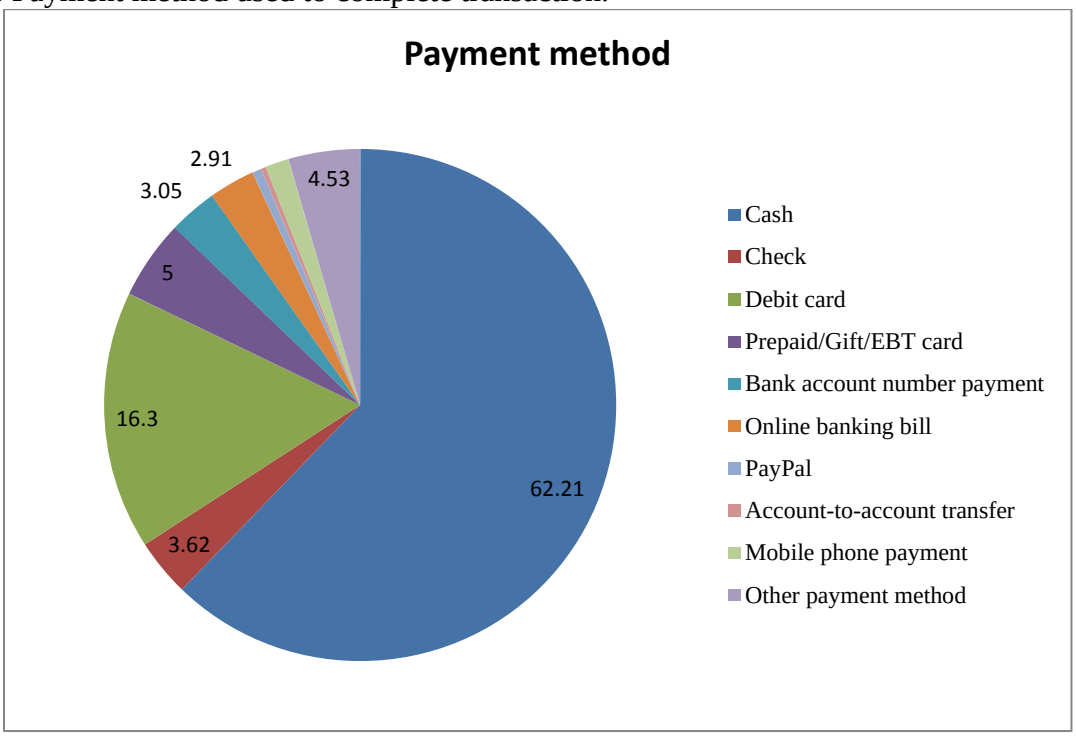
Source: 2015 Diary of Consumer Payment Choice.

Figure B3 Reasons for deviating from credit cards (preferred payment method).



Source: 2015 Diary of Consumer Payment Choice.

Figure B4 Payment method used to complete transaction.



Source: 2015 Diary of Consumer Payment Choice.