

The Impact of Credit Cards on Spending: A Field Experiment

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Abstract: In a field experiment, we measure the impact of payment with credit card as compared with cash on insurance company employees' spending on lunch in a cafeteria. We exogenously changed some diners' payment medium from cash to a credit card by giving them an incentive to pay with a credit card. Surprisingly, we find that credit cards do not increase spending. However, the use of credit cards has a differential impact on spending for revolvers (who carry debt) and convenience users (who do not): Revolvers spend less when induced to spend with a credit card, whereas convenience users display the opposite pattern.

Keywords: Credit cards, consumer spending, field experiments

JEL Codes: C9, D1

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1 Introduction

In this paper, we report results from a field experiment to examine the impact of credit cards on spending, a question of great interest for economics, law, and public policy. At a regulatory level, if credit card use causes people to spend more and save less, and if there is a long-term desire to increase personal saving, this might provide a rationale for the regulation, or even the banning, of credit cards. In the 1980s, the U.S. personal savings rate, which had hovered in the 6–12% range for decades, began a secular decline, culminating by the middle of the first decade of the millennium at a rate close to zero. This decline in savings roughly coincided with a secular increase in the dissemination and use of credit cards, raising at least the possibility that the proliferation of credit cards contributed to the downward trend. While it is true that the total level of credit card debt is too small to account for much of the decrease in the savings rate (Parker 1999), it is possible that credit cards could contribute to low savings if accumulated credit card debt is being transferred to other forms of debt, such as borrowing against real estate.

Beyond the rationale for regulation based on macroeconomic goals, there might also be a rationale for the regulation of credit cards based on individual welfare. If credit card use leads to supra-optimal spending and ultimately to personal financial hardship, their regulation could be potentially justified on much the same basis as the regulation of certain types of drugs, which are outlawed because they are viewed as too tempting and dangerous. There is, in fact, some evidence of a correlation between debt and financial distress. For example, Brown et al. (2005) observe a negative correlation between unsecured debt, including credit card debt, and psychological well-being. Brown et al. also found no comparable relationship between secured—i.e. mortgage—debt and well-being. But again, one cannot infer causation; it may be that credit card debt is one way that financially strapped households temporarily avoid penury, in

which case they might be worse off, and even less happy, without such debt. Indeed, credit cards are probably not the worst method of obtaining an instant loan; payday loans and pawn shops offer even higher effective interest rates, although the evidence on whether these loans are beneficial or harmful is mixed.¹

Clearly, it would be useful to have an answer to the question of whether credit card use *causes* the average individual to spend more. A finding that credit cards promote spending for reasons other than liquidity constraints would pave the way for future research into the psychological reasons of this effect.² Moreover, documenting a spending-facilitating effect of credit cards would also contribute to research on mental accounting (Thaler 1985) by showing that spending varies as a function of payment medium.

2 Literature

Surprisingly, there have been very few attempts to measure the connection between credit card usage and levels of spending, perhaps because the endogeneity problem is so difficult to solve. Although prior cross-sectional research has found that consumers generally tend to spend more with credit cards than with cash (e.g., Hirschman 1979), there are many reasons why this might be the case, including that credit card users are different (e.g., more affluent) from users of cash, or that people tend to pay for larger purchases with credit cards and for smaller purchases with cash. Similarly, although the very limited prior experimental research examining the impact

¹ See Morgan and Strain (2007), Carrell and Zinman (2008), Zinman (2009), Skiba and Tobacman (2010), Karlan and Zinman (2010), Melzer (2011), and Morse (forthcoming).

² Some of these might be pain of paying (Prelec and Loewenstein 1998), credit limit effects (Soman and Cheema 2002), consumer's perception (Chattrejee and Rose 2012), and misunderstanding (Soll et al. 2011).

of credit card use on spending has found some evidence of a positive impact, most of this research is vulnerable to the possibility that cash users may have spent less owing to liquidity constraints. Several empirical and theoretical investigations, however, do explore closely related issues.

One important line of inquiry has focused not on whether credit cards promote spending, but on whether consumers underpredict their own credit card use and/or the level of credit card debt they will accumulate. Ausubel (1991) distinguishes three groups of consumers: convenience users, who pay their balance in full each month and do not pay interest; revolvers, who pay interest on their balances; and a third group, who believe that they are not going to borrow on their cards but end up borrowing because of commitment problem. The last group's underestimation of their own future borrowing, Ausubel (1991) argues, makes them less sensitive to the interest rate on the card than they would be if they correctly predicted their own borrowing; hence, their underestimation leads to higher credit card interest rates than one would expect in a competitive market with fully rational consumers. In a subsequent study, Ausubel (1999) finds support for this "underestimation hypothesis" from the results of market experiments conducted by a major bank in United States in which six different preapproved credit card solicitations (with different introductory interest rates and durations) were randomly mailed to potential customers. The major finding is that people end up paying more interest in total because they over-respond to introductory interest rates, but pay insufficient attention (1) to how long the introductory rate will be in effect and (2) to the interest rate that will go into effect at the end of the introductory period. Although the underestimation hypothesis deals with mispredictions of spending rather than levels of spending with credit cards (which is our focus),

such underprediction would be consistent with a story in which credit card use causes people to spend more but they fail to notice this effect.

DellaVigna and Malmendier (2004) and Hafalir (2008) show how naïve hyperbolic time discounting can potentially help to explain the psychological mechanisms underlying the underestimation effect proposed by Ausubel (1999), and also how this underestimation can allow credit card companies to charge supra-competitive interest rates. These two papers both predict that naïve consumers with access to credit cards will consume more than they anticipate they will consume, which again is consistent with the idea that credit cards promote spending, although, again, neither paper deals directly with this issue.

Two papers in the economics literature come closest to addressing the issue of whether credit card use promotes spending. The first, by Gross and Souleles (2000), finds that an increase in the credit limit on a credit card leads, on average, to an increase in consumer debt. Importantly, this effect even holds for consumers who do not carry balances close to their credit limits. The second paper, a study by Agarwal et al. (2011), investigates the impact of credit card rewards, rather than credit card payment medium per se, on spending. They find that relatively small rewards, like cash-backs, generate large spending, especially for convenience users, and result in debt accumulation.³

³ Other studies dealing with credit cards in the economics literature focus on credit card debt puzzles, such as the common pattern of holding credit card debt and substantial quantities of savings (e.g., Bertaut, Haliassos, and Reiter 2008; Lehnert and Maki 2002; Telkuyova 2008; and Laibson, Repetto and Tobacman 2003), on consumers' suboptimal contract choices (e.g., Ausubel 1999; and Agarwal et al. 2007), and on the consumer's choice of using credit cards versus debit cards (e.g., Fusaro 2008, Zinman 2009).

In addition to the economic literature on credit cards, marketing researchers have also examined various phenomena related to credit card use, including, more closely, the impact of credit card use on spending. Hirschman (1979), for example, conducted a survey of consumers shopping in different branches of a department store chain and found a correlation between using a bank-issued or store-issued credit card and levels of spending. Raghurir and Srivastava (2008), in a laboratory experiment, found that estimates of the total cost of a hypothetical Thanksgiving party were significantly higher when the specified payment medium was credit card rather than cash.

Soman (2001) found, in a laboratory experiment, that the medium used to make past payments affected consumers' *future* spending behavior. He focuses on two features of the payment mechanisms: rehearsal (writing down the amount paid) and immediacy (immediate depletion of the consumer's wealth as a result of spending). He argues that payment mediums that involve rehearsal (e.g., paying with check) will cause consumers to recall past expenses more accurately, and that mechanisms that lead to an immediate depletion of wealth (e.g., paying with cash) will make consumers more averse to spending. He then predicts, and finds support for, the hypothesis that use of payment media that involve either rehearsal or immediacy tends to decrease subsequent spending.

In a subsequent field study (though not a randomized experiment), Soman (2003) found a negative relationship between "payment transparency" and spending. He collected receipts from shoppers at the exit of a large supermarket store and coded each item on their receipts as inflexible ("needed irrespective of changes in price and other factors") or flexible ("an expense which may vary on a number of factors like price and quantity available"). For flexible items, he found that average credit card spending was significantly higher than check spending, which was

in turn higher than cash spending, but there was no difference between payment media in spending on inflexible items. Although this result shows that people spend more on flexible items with a credit card than with cash, either liquidity constraints or self-selection into credit card use could provide plausible accounts of the results.

Thomas et al. (2011) find that consumers buy more unhealthy and impulsive food items when they use credit or debit cards to pay for their purchases. They explain this finding by arguing that pain of paying, when shoppers pay with cash, inhibits the urges to buy impulsive food items. When they pay with credit or debit card, however, there is less pain of paying, which makes it harder to resist impulse buying.

Finally, in the only true experiments examining the impact of paying with a credit card on spending, Prelec and Simester (2001) investigated whether credit card use increased willingness to pay for specific items. In one experiment, they sold tickets for different sport events to MBA students using a second-price sealed-bid auction. The average price paid by the group who were expecting to pay by credit card was significantly higher than the average price paid by the group who were expecting to pay cash. In a second experiment, they sold a \$175 gift card for a local restaurant, but did not find a significant difference between the valuations of those randomly assigned to pay with credit card versus with cash. Rather than interpreting the second experiment as evidence against greater willingness to pay with credit card, they argue that the lack of a difference in the second experiment argues against a liquidity constraint interpretation of the first. That is, if liquidity constraints were driving the results of the first experiment, they should have also been observed in the second.⁴

⁴ Other differences between these two experiments could also account for the results, such as unknown value of the tickets in the first experiment as opposed to known value of the gift cards in the second experiment.

3 Experimental Design

Our study is different from the previous attempts in two important ways. First, it randomly assigns payment method in a real market setting. Second, it eliminates concerns of liquidity constraints by focusing on small purchases, and by investigating the current financial status of the participants with survey questions. In addition, our experimental manipulation is designed to encourage people who were spending with cash to instead spend with credit cards. We did this, but not the reverse (giving some an incentive for using cash), because we were concerned that people who choose to use a credit card in the absence of our intervention might do so because they were cash-constrained. If this was the case, then inducing them to spend with cash would lead to a reduction of spending for the uninteresting reason that they had less cash to pay with.

In October and November of 2008 and February of 2009, we conducted three waves of data collection with lunch-time customers at two different cafeterias of a major insurance company. The cafeterias accepted either cash or credit card only, which was a necessary condition to run the study. The cafeterias also offered a broad selection of differently priced items and had changing menus. The variety and range of prices meant that diners could pay more or less for their lunch, so that if credit cards did promote spending, it would be possible to observe such an effect. The changing menu meant that it was much less likely that diners would arrive at cafeteria knowing what they would buy, which again could have suppressed any impact of paying with credit.

3.1 Assigning Payment Mediums

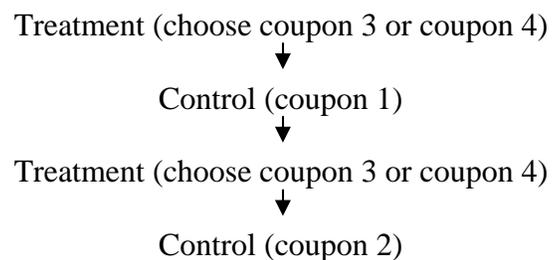
We exogenously assigned consumers to the payment medium they used through a randomly assigned incentive for paying by credit card.

In the credit card treatment, consumers were asked to choose between two different coupons just before they entered the cafeteria. One of the coupons entitled its holders to receive an \$8 Amazon gift card if they paid for lunch with a credit card; the other entitled its holders to receive a \$5 Amazon gift card if they paid for their lunch with cash. The difference in the two amounts was intended to encourage some consumers who would have paid with cash to instead pay with a credit card. We had consumers choose between the two coupons *before* entering the cafeteria to be sure they would know, when they made their food selections, which medium they would be using. To receive the Amazon gift cards, upon exiting the cafeteria consumers had to bring their receipt to us (together with the coupon) and fill out a one-page survey (reproduced in the Appendix).

In the control condition, consumers were randomly assigned to receive a coupon that could be redeemed for either a \$5 or \$8 Amazon gift card. Subjects in the control condition also had to give us their receipt and complete a survey to receive payment. We randomly assigned those in the control group a \$5 or \$8 coupon because those in the experimental condition received one or the other coupon amount depending on whether they paid with cash or credit, and we wanted to control for any impact of the coupon amount on consumers' spending decisions.

We prepared four different coupons to be given to participants before they entered the cafeteria (see Appendix). The first and the second coupons were for the control group, and the third and the fourth coupons were for the treatment group. We offered the coupons for control

and treatment groups in an alternating way. For example, if a specific participant was assigned to the credit card treatment group, which meant that he was offered a choice between coupons, the next participant was assigned to the control group and was offered either the \$5 or \$8 gift card (with the value alternating from one control participant to the next). The following diagram summarizes this process:⁵



3.2 *Survey*

As they passed a table positioned at the exit of the cafeterias, we asked each participant to hand their coupon and receipt to us. For the treatment group, we checked whether the specified payment medium in the coupon had been used. We crossed out any identifying information (e.g., name or credit card number) on the receipt. Then, we stapled the participant's coupon and receipt to the questionnaire and handed it back to the participant, who then completed the questionnaire. When we got the completed questionnaire back from the participant, along with the stapled receipt and coupon, we gave him or her the promised Amazon gift card.

The first question of the survey asked participants whether the promise of a gift card had affected the payment medium they used, and which payment medium they would have used without the promise of a gift card. A second question asked whether they paid for anyone else's lunch, since this would affect total spending. A third question asked whether they had known

⁵ If there were group of people going to lunch together, we assigned them to the same condition.

what food they would buy before entering the cafeteria. As discussed above, we are less likely to observe an impact of payment medium on spending if consumers already knew what they would buy beforehand. Other questions asked whether they had a credit card, were carrying that credit card with them at that moment, whether they paid interest on the credit card, and if they knew the interest rate on their credit card. We also asked, as another potential control for liquidity, whether they had an ATM card and if they were carrying it with them at that moment. The last question before the demographics questions asked them the amount of cash they had with them at that moment. Demographics included age, gender, race, education, and yearly household income.

4 Data Analysis

There were 436 observations in total. We dropped 23 observations that were not usual lunch purchases (e.g. purchase of a snack or a drink only). We dropped an additional 7 observations that were purchases for more than one person. We also dropped 5 observations that included participants who stated that they used cash but would have used credit card if it weren't for our intervention in the treatment condition (which rewarded them for using a credit card). These five people might have chosen to use cash instead of credit in order not to disclose identifying information (although we told them we would erase any identifying information on the receipts beforehand) or because they felt manipulated. We excluded these people since the aim of the treatment was to induce consumers to switch from cash to credit but not the other way around, although our results are barely affected by including them. We also dropped 12 participants who had participated before and 1 observation from a consumer who used a coupon to pay for lunch rather than either cash or a credit card. After these deletions from the sample, we have 388 observations.

Summary statistics for lunchtime spending, whether respondents were carrying a positive credit card balance (and hence paying interest), the amount of cash left after the purchase, and demographics are reported in Table 1 for all included participants and by condition. Several points are worth noting. First, the control and treatment groups are quite closely matched in terms of age, gender, race, education, and income. They are also reasonably well matched in how much cash they report carrying and whether they are carrying credit card debt (50% were carrying credit card debt in the control condition as compared with 47% in the treatment condition). Overall, it appears that randomization was successful in producing roughly comparable groups.

The first row of Table 1 shows that the experimental treatment was successful in inducing people to use credit cards: 43% of participants in the treatment condition paid with credit cards as compared with 20% who did in the control ($z=-4.83$, $p<0.00$). This suggests that about 23% of participants in the treatment condition who would have paid with cash without our intervention instead paid with credit card; the treatment effectively doubled the usage of credit cards as a method of payment. In our survey, we ask people whether the promise of a gift card affected whether they paid with a credit card or with cash. Fourteen percent (28 out of 201) of participants in the treatment condition said that they would have used cash instead of credit if there was not a promise of a gift card. It is possible that not everyone who was induced by the promised reward to change from paying with cash to paying with a credit card were aware that they had been so influenced, or they may not have chosen to report it.

The ideal way to determine the impact of credit card use on spending would be to compare the spending of consumers who paid credit but would have paid cash without the incentive in the treatment group to the spending of cash users in the control condition who would

have changed to credit cards if they had been in the treatment condition. Even if we accept subjects' self-reports of having changed their behavior because of the treatment, and use this to identify the former group, we cannot identify the latter.

An alternative approach that does not rely on self-reports of behavior is a so-called intention to treat analysis (Lachin 2000) that compares the spending of all control group subjects to that of all treatment group subjects, regardless of which payment medium they actually used. To obtain an unbiased estimator for the average intention-to-treat effects, two important assumptions should be made, namely SUTVA (Stable Unit Treatment Value Assumption), which requires the independence of the consumer's chosen payment medium from the treatment status of others, and random assignment (Angrist et al. 1996). We can reasonably expect that these two assumptions are satisfied because of the random assignment of the treatment. In comparison of spending across conditions, any possible significant difference between these two groups is driven solely by the approximately 23% of participants who complied with the experimental treatment. So, this difference provides an extremely conservative estimate of the effect of credit card payment on spending. While there is a difference in average spending between the control group ($M=\$4.74$) and the treatment group ($M=\$5.03$), it is only nearly significant in a two-tailed test ($t(386)=1.62$, $p<.11$; $p<.05$ one-tailed). Table 2 provides the summary statistics when we exclude people who do not carry credit card with them at that moment. The original sample and this sample are balanced in terms of age, gender, race, education, and income. For this sample, the difference in average spending between the control group ($M=\$4.69$) and the treatment group ($M=\$5.05$) is marginally significant ($t(286)=1.79$, $p<.07$; $p<.04$ one-tailed).

Table 3 shows the results of regressing spending on a treatment dummy, as well as other independent variables in three different specifications. The first column presents results from

regressing spending on the treatment dummy alone, the second column adds demographic controls, and the third column will be discussed later. These regressions reinforce the conclusions from the simple comparisons of spending across conditions: being in the treatment group has no significant effect on spending.

The first two columns of Table 4 compare the spending (as well as background characteristics) of the overall sample as a function of whether they spent with cash or credit card. The other columns give the same comparison for control group and treatment group separately. As can be seen in the first row of the table, in the overall sample those who spend with credit spent \$.56 more, on average, than those who spent with cash ($t(386)=3.02$, $p<.003$). This result is consistent with other research showing a positive cross-sectional relationship between spending and credit card use. Additionally, those in the control group who spent with credit spent \$.75 more, on average, than those who spent with cash ($t(185)=2.41$, $p<.02$). Those in the experimental group who spent with credit spent \$.38 more than those who spent with cash, though the difference does not reach conventional levels of statistical significance ($t(199)=1.54$, $p<.12$). Of course, even if these differences were both significant, it would not indicate that the use of credit spurred spending, since credit card users are likely to be different, in many ways, from cash users.

From Table 4 it can also be seen that liquidity constraints are a major problem for correlational studies of the relationship between credit card use and spending. Those who pay cash are, indeed, carrying much more of it—from 2 to 3 times more in the full sample and in both the treatment and control group subsets. These results also reinforce the logic behind our decision to include an experimental treatment that shifted diners from cash to credit, but not vice versa. Any observed reduction in spending by those incentivized to pay with cash could be

attributable, at least in part, to limited liquidity. No other obvious differences stand out, other than that credit users are younger and more likely to be revolvers (i.e., carrying credit card debt) than cash users. Credit card users and cash users are similar in terms of gender, race, education, and income.

Table 5 compares the spending of those in the control group who were randomly assigned to receive a \$5 or \$8 gift card. As we expected, this did not affect the amount they spent on lunch. Indeed, those receiving the smaller gift card spent more, although the difference was not significant ($t(185)=1.35$, $p<.18$).

Revolvers versus convenience users

The numbers just reported hide an interesting pattern, a difference between participants who report carrying a credit balance (“revolvers”) and those who do not (“convenience users”). Figure 1 illustrates the nature of the difference; it suggests that the treatment, which encouraged diners to pay with credit cards, increased the spending of convenience users, but decreased the spending of revolvers. When we run a separate t-test for convenience users and revolvers, comparing spending in the treatment versus the control conditions, we find that spending in the treatment group is significantly higher than the spending in the control group for convenience users ($t(199)=2.88$, $p<.004$), but there is no significant difference in spending between the groups for revolvers ($t(185)=0.71$, $p<.48$).

The third column of Table 3 presents regression results when we add to the specification of the second column a dummy for revolvers, which is equal to 1 if the consumer carries a credit card balance, and also an interaction of this revolver dummy with the treatment dummy. The results from this regression reinforce the conclusion that the treatment has opposite effects for

convenience users and revolvers. We see the positive and significant effect of the treatment on convenience users, and the negative and insignificant effect of it on revolvers. If we did not separate the convenience users from revolvers, the effect of the treatment would have been insignificant, as in the first and second columns.

From the coefficient on the treatment dummy, we can infer that credit cards increase the spending of convenience users by approximately 15% ($=\$0.74$). It would be interesting to compare the magnitude of this effect, observed in the choice of how much to spend on lunch, to other types of consumer spending decisions.

There are different possible reasons for the differential effect of credit card use on convenience users and revolvers. A higher cost of using credit (due to increased interest charges), or adverse prior experiences with credit, might discourage credit card use by revolvers, potentially offset what might otherwise be a spending-increasing effect of paying by credit card. This explanation would be consistent with work by Zinman (2009), who finds that revolvers are less likely to use credit cards and explains the pattern on the basis of their higher cost of using credit cards (the interest rate). It might appear that the fact that the switch rate (from cash to credit) is similar among convenience users and revolvers is inconsistent with such an account, but the \$3 reward for switching may be more meaningful to revolvers (who tend to be poorer) than to convenience users.

5 Conclusion and Discussion

The main finding of this paper, that credit card use did not significantly, on average, increase spending, was a surprise to us. Indeed, based on a firm belief that credit cards do promote spending, one of the authors of this paper has argued (Loewenstein and O'Donoghue

2006) that credit cards should be banned and replaced with a combination of debit cards and/or charge cards, which must be paid off in full at the end of each month. Although we believe that, as one of the first randomized controlled experiments to examine the impact of credit cards on spending, the study and its results are worthy of note, we recognize that, even beyond the usual caveats, it is important to take account of limitations of this study and of reasons why the results should be treated with caution.

The first is that the experimental manipulation operated by inducing people who would not have naturally paid for lunch with a credit card to do so. Someone who is induced, by the prospect of a larger Amazon gift card, to pay with credit when they otherwise would have paid with cash, might feel manipulated and determined not to spend more than they would have with cash. This is especially important if credit cards increase spending through reducing the salience of the purchase, because our treatment increases the salience by requiring people to make a deliberate choice between paying with cash and credit card. Thus, it is difficult to generalize these results to people who choose on their own to pay with credit. This effect works against showing a spending-enhancing effect of credit cards, even if such an effect exists.

Second, the timing of the study was unfortunate, and could easily have influenced the results. We collected the data at the end of October 2008, the beginning of November 2008, and the end of February 2009, which is well after the start of the financial crisis that the United States is still immersed in as we write. Consumers feeling the pinch of shrinking home values and threatened jobs may have been much more reluctant to spend, and may have been especially leery of spending with credit cards, especially if excess spending with credit cards in the past had increased their vulnerability to the economic downturn. Consumers may also have become more alert to the risk of using credit cards as a result of the increased media coverage of credit card

debt issues (e.g. documentaries like *MaxedOut* and *The Secret History of the Credit Card* and books like *Credit Card Nation*). Given these concerns about external validity, further research needs to be conducted, ideally in more prosperous times, to assess the generality of our findings.

Additionally, we find a differential impact of credit card use on the spending of revolvers and convenience users, consistent with the pattern observed by Agarwal et al. (2011) that convenience users respond more to cash-back programs. However, this finding should be treated as tentative until it is replicated in future studies, since it was unexpected. Note also that, although the observed pattern is consistent with consumer learning in credit card markets, from our cross-sectional data set we cannot tell whether this is evidence of long-term learning since we do not observe whether the convenience users of today were revolvers of yesterday. Moreover, recent research points to the conclusion that the knowledge consumers gain from experience with credit cards tends to depreciate rapidly (Agarwal et al. 2008).

While these findings do not give new ammunition to those prone to eliminate credit cards, we continue to believe that there is good reason for regulating certain types of practices. First, many practices of many credit card companies, such as usurious late fees, missed payment fees, and over-limit fees, raising interest rates on those who fail to make payments, and displaying minimum payment amounts very prominently on credit card statements while making overall balance amounts much more difficult to locate, play on consumer vulnerabilities (in fact, the Credit Card Act of 2009 has regulated some of these practices). Second, we are persuaded by the arguments of Issacharoff and Delaney (2006) and others that the stipulation in most credit card contracts that disputes will be arbitrated at the individual level gives too much power to the credit card companies. Individual debtors constitute atomized agents, any one of whom is unlikely to have a claim that would be too expensive to initiate justifiably.

This study shows that it is possible to conduct a randomized field experiment to examine the impact of credit card use on spending. We suspect and hope, however, that it is only the first of many studies that will finally bring us to a definitive answer to this important question.

6 References

- Agarwal, S., Chakravorti, S., and Lunn, A., 2011. Why Do Banks Reward Their Customers to Use Their Credit Cards? FRB of Chicago Working Paper.
- Agarwal, S., Chomsisengphet, S., Liu, C., and Souleles., N., 2007. Do Consumers Choose the Right Credit Contracts? Unpublished results.
- Agarwal, S., Driscoll, J., Gabaix, X., and Laibson, D., 2008. Learning in the Credit Card Market. NBER Working Paper.
- Angrist, J, Imbens, G., and Rubin, D., 1996. Identification of Causal Effects Using Instrumental Variables, *Journal of American Statistical Association*, 91: 444–455.
- Ausubel, L., 1991. The Failure of Competition in Credit Card Market, *American Economic Review*, 81(1): 50–81.
- Ausubel, L., 1999. Adverse Selection in the Credit Card Market. Unpublished results.
- Bertaut, C., Haliassos, M., and Reiter, M., 2009. Credit Card Debt Puzzles and Debt Revolvers for Self Control, *Review of Finance*, 13 (4): 657–692.
- Brito, D., Hartley, P., 1995. Consumer Rationality and Credit Cards, *Journal of Political Economy*, 103(2): 400–433.
- Brown, S., Taylor, K., and Price., S., 2005. Debt and Distress: Evaluating the Psychological Cost of Credit. *Journal of Economic Psychology*, 26: 642–663.
- Calem, P., Gordy, M., and Mester., L., 2006. Switching Costs and Adverse Selection in the Market for Credit Cards: New Evidence, *Journal of Banking and Finance*, 30: 1653–1685.
- Calem, P., Mester, L., 1995. Consumer Behavior and the Stickiness of Credit-Card Interest Rates, *American Economic Review*, 85(5): 1327–1336.

Carrell, S., Zinman, J., 2008. In Harm's Way? Payday Loan Access and Military Personnel Performance, FRB of Philadelphia Working Paper.

Chatterjee, P., Rose, R., 2012. Do Payment Mechanisms Change the Way Consumer Perceive Products?, *Journal of Consumer Research*, 38(6): 1129-1139.

DellaVigna, S., Malmendier, U., 2004. Contract Design and Self Control: Theory and Evidence, *Quarterly Journal of Economics*, 119(2): 353–402.

Feinberg, R., 1986. Credit Cards as Spending Facilitating Stimuli: A Conditioning Interpretation, *Journal of Consumer Research*, 12: 248–356.

Fusaro, M., 2008. Debit vs. Credit: A Model of Self-Control with Evidence from Checking Accounts. Unpublished results.

Gross, D., Souleles., N., 2002. Do Liquidity Constraints and Interest Rates Matter for Consumer Behavior? Evidence from Credit Card Data, *Quarterly Journal of Economics*, 117(1): 149–185.

Hirschman, E., 1979. Difference in Consumer Purchase Behavior by Credit Card Payment System, *Journal of Consumer Research*, 6(1): 58–66.

Incekara-Hafalir, E., 2008. Credit Card Competition and Naive Hyperbolic Consumers. Unpublished results.

Issacharof, S., Delaney, E., 2006. Credit Card Accountability, *University of Chicago Law Review*, 73: 157–182.

Karlan, D., Zinman, J., 2010. Expanding Credit Access: Using Randomized Supply Decisions to Estimate the Impacts. *Review of Financial Studies*, 23(1): 433.

Lachin, J., 2000. Statistical Considerations in the Intent-to-Treat Principle, *Controlled Clinical Trials* 21 (3): 167–189.

Lehnert, A., Maki, D., 2002. Consumption, Debt, and Portfolio Choice: Testing the Effect of Bankruptcy Law, Board of Governors of the Federal Reserve Bank.

Laibson, D., Repetto, A., and Tobacman, J., 2003. A Debt Puzzle, in Knowledge, Information, and Expectations in Modern Economics: In Honor of Edmund S. Phelps, Ed. Philippe Aghion, Roman Frydman, Joseph Stiglitz, and Michael Woodford, Princeton University Press.

Loewenstein, G., O'Donoghue, T., 2006. "We can do this the easy way or the hard way": Negative emotions, self-regulation and the law, *University of Chicago Law Review*, 73(1): 183–206.

Melzer, B., 2011. The Real Costs of Credit Access: Evidence from the Payday Lending Market, *Quarterly Journal of Economics*, 126: 517–555.

Morgan, D., Strain, M., 2007. Payday holiday: How households fare when states ban payday loans, Federal Reserve Bank of New York Working Paper.

Morse, A., 2011. Payday Lenders: Heroes or Villains?, *Journal of Financial Economics*, 102(1), 28–44.

Parker, J., 1999. Spendthrift in America? On Two Decades of Decline in the U.S. Saving Rate, *NBER Macroeconomics Annual*, 14: 317–370.

Parlour, C., Rajan, U., 2001. Competition in Loan Contracts, *American Economic Review*, 91(5): 1311–1328.

Prelec, D., Loewenstein, G., 1998. The Red and the Black: Mental Accounting of Savings and Debt, *Marketing Science*, 17(1): 4–28.

Prelec, D., Simester, D., 2001. Always Leave Home Without It: A Further Investigation of the Credit-Card Effect on Willingness to Pay, *Marketing Letters*, 12(1): 5–12.

Raghubir, P., Srivastava, J., 2008. Monopoly Money: The Effect of Payment Coupling and Form on Spending Behavior, *Journal of Experimental Psychology: Applied*, 14(3): 213–225.

Skiba, P., Tobacman, J., 2010. Do Payday Loans Cause Bankruptcy? Unpublished results.

Soll, J., Ralph, K., Larrick, R., 2011. Consumer Misunderstanding of Credit Card Use, Payments, and Debts: Causes and Solutions, Unpublished results.

Soman, D., 2001. Effects of Payment Mechanism on Spending Behavior: The Role of Rehearsal and Immediacy of Payments, *Journal of Consumer Research*, 27(4): 460–474.

Soman, D., 2003. The Effect of Payment Transparency on Consumption: Quasi-Experiments from the Field, *Marketing Letters*, 14(3): 173–183.

Soman, D., Cheema, A., 2002. The Effect of Credit on Spending Decisions: The Role of Credit Limit and Credibility, *Marketing Science*, 21(1): 32-53.

Stango, V., 2000. Competition and Pricing in the Credit Card Market, *Review of Economics and Statistics*, 82(3): 499–508.

Telkuyova, I., 2008. Household Need for Liquidity and the Credit Card Debt Puzzle. Unpublished results.

Thaler, R., 1985. Mental Accounting and Consumer Choice, *Marketing Science*, 4: 199–214.

Thomas, M., Desai, K., Seenivasan, S., 2011. How Credit Card Payments Increase Unhealthy Food Purchases: Visceral Regulation of Vices, *Journal of Consumer Research*, 38(1), 126–140.

Zinman, J., 2009. Debit or Credit?, *Journal of Banking and Finance*, 33(2): 358–366.

Zinman, J., 2009. Restricting Consumer Credit Access: Household Survey Evidence on Effects Around the Oregon Rate Cap, *Journal of Banking and Finance*, 34(3), 546–556.

TABLE 1-SUMMARY STATISTICS: BY CONDITION

	Control Group (n=187)	Treatment Group (n=201)	All (n=388)
% using credit card	20% (38/187)	43% (87/201)	32% (125/388)
Average spending	\$4.74 (1.73)	\$5.03 (1.72)	\$4.89 (1.73)
% revolvers	50%	47%	48%
Cash held after lunch	\$30.02 (46.32)	\$25.49 (30.09)	\$27.65 (38.72)
Age	44.61 (10.93)	43.65 (11.24)	44.12 (11.09)
Female	80%	76%	78%
White	79%	74%	76%
Education	2.99 (.72)	3.07 (.63)	3.03 (.68)
Income	3.49 (.84)	3.47 (.80)	3.48 (.82)
% having credit card	94%	95%	94%
% carrying credit card	72%	76%	74%
% having ATM card	91%	96%	94%
% carrying ATM card	70%	77%	73%

Notes: Table reports means and standard deviations (in parentheses). Education denotes the highest level of schooling: 1 = less than high school, 2 = high school, 3 = college, 4 = post graduate. Income shows the level of income in six categories: 1 = less than \$10,000, 2 = \$10,000–\$30,000, 3 = \$30,000–\$80,000, 4 = \$80,000–\$160,000, 5 = \$160,000–\$360,000, 6 = more than \$360,000. Joint F-test of treatment assignment on baseline variables gives $F(11, 353) = .89$, $p = 0.55$.

TABLE 2-SUMMARY STATISTICS: BY CONDITION (INCLUDING ONLY INDIVIDUALS CARRYING A CREDIT CARD)

	Control Group (n=134)	Treatment Group (n=152)	All (n=286)
% using credit card	25% (34/134)	55% (84/152)	41% (118/286)
Average spending	\$4.69 (1.74)	\$5.05 (1.67)	\$4.88 (1.71)
% revolvers	53%	49%	51%
Cash held after lunch	\$34.36 (51.83)	\$28.03 (31.37)	\$30.96 (42.14)
Age	44.57 (10.75)	43 (11.51)	43.73 (11.17)
Female	74%	73%	73%
White	82%	75%	78%
Education	3.05 (.73)	3.07 (.64)	3.05 (.68)
Income	3.55 (.82)	3.43 (.79)	3.49 (.81)

Notes: Table reports means and standard deviations (in parentheses). Education denotes the highest level of schooling: 1 = less than high school, 2 = high school, 3 = college, 4 = post graduate. Income shows the level of income in six categories: 1 = less than \$10,000, 2 = \$10,000–\$30,000, 3 = \$30,000–\$80,000, 4 = \$80,000–\$160,000, 5 = \$160,000–\$360,000, 6 = more than \$360,000.

TABLE 3- OLS REGRESSIONS EXAMINING THE IMPACT OF TREATMENT AND OTHER VARIABLES ON AMOUNT SPENT

	Model 1	Model 2	Model 3
Constant	4.74*** (.126)	4.971*** (.631)	4.720*** (.642)
Treatment	.284 (.176)	.248 (.180)	.744** (.25)
Revolver			.613* (.257)
Revolver*Treatment			-1.008** (.357)
Age		-.018* (.008)	-.018* (.008)
Female		-.319 (.219)	-.362 [†] (.217)
White		.140 (.224)	.144 (.222)
High School		-1.193 (1.230)	-.979 (1.224)
College		-1.175 (1.220)	-0.968 (1.214)
Post-graduate		-.781 (1.230)	-.578 (1.223)
Income1		1.104 (.971)	.901 (.968)
Income2		.404 (.575)	.352 (.571)
Income3		.813 (.473)	.706 (.474)
Income4		.865 (.470)	.764 (.469)
Income5		.686 (.542)	.577 (.541)
Income6		.987 (1.091)	.922 (1.09)
R-squared	.004	.019	.033
N	388	384	384
F	2.62	1.57	1.87

Notes: The dependent variable is the total amount spent on lunch. Standard errors are in parentheses. Treatment and Revolver are dummies for the treatment condition and for paying interest respectively. High school, college, and post graduate are dummies for the highest education level completed. Income1, Income2, Income3, Income4, Income5, and Income6 are dummies for less than \$10K, \$10K-\$30K, \$30K-\$80K, \$80K-\$160K, \$160K-\$360K, and more than \$360K of income respectively. [†] p<0.10, * p<0.05, ** p<0.01, *** p<0.001

TABLE 4-SUMMARY STATISTICS: BY PAYMENT MEDIUM

	All (n=388)		Control Group (n=187)		Treatment Group (n=201)	
	Cash (n=263)	Credit (n=125)	Cash (n=149)	Credit (n=38)	Cash (n=114)	Credit (n=87)
Average spending	\$4.71 (1.76)	\$5.27 (1.61)	\$4.59 (1.78)	\$5.34 (1.42)	\$4.86 (1.72)	\$5.24 (1.70)
% revolvers	45%	54%	49%	53%	40%	55%
Cash held after lunch	\$32.72 (42.68)	\$17.12 (25.93)	\$34.67 (49.45)	\$12.18 (24.81)	\$30.22 (32.03)	\$19.28 (26.25)
Age	46.83 (9.90)	38.48 (11.33)	46.15 (10.22)	38.58 (11.62)	47.74 (9.42)	38.44 (11.26)
Female	78%	77%	79%	84%	77%	74%
White	77%	74%	79%	81%	75%	71%
Education	3.01 (.68)	3.07 (.68)	2.97 (.72)	3.05 (.73)	3.06 (.61)	3.07 (.66)
Income	3.56 (.81)	3.31 (.81)	3.54 (.81)	3.30 (.91)	3.59 (.81)	3.31 (.76)

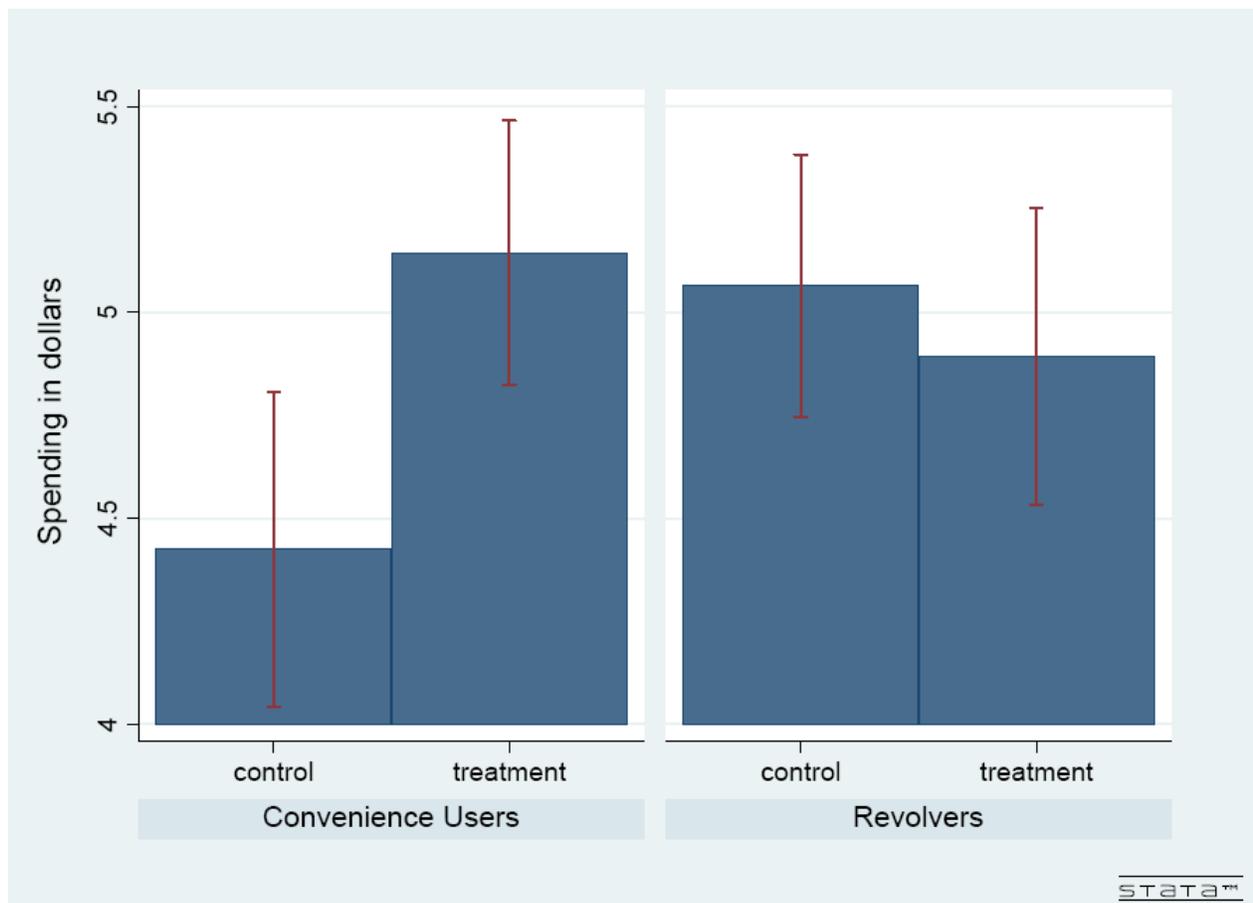
Notes: Table reports means and standard deviations (in parentheses). Education denotes the highest level of schooling: 1 = less than high school, 2 = high school, 3 = college, 4 = post graduate. Income shows the level of income in six categories: 1 = less than \$10,000, 2 = \$10,000–\$30,000, 3 = \$30,000–\$80,000, 4 = \$80,000–\$160,000, 5 = \$160,000–\$360,000, 6 = more than \$360,000.

TABLE 5-SUMMARY STATISTICS: BY CONTROL GROUP

	\$5 Control Group (n=88)	\$8 Control Group (n=99)
Average spending	\$4.92 (1.67)	\$4.58 (1.79)
% revolvers	49%	51%
Cash held after lunch	\$26.13 (32.01)	\$33.60 (56.23)
Age	44.20 (10.64)	44.98 (11.22)
Female	83%	77%
White	80%	79%
Education	2.97 (.72)	3.01 (.73)
Income	3.48 (.73)	3.51 (.93)

Notes: Table reports means and standard deviations (in parentheses). Education denotes the highest level of schooling: 1 = less than high school, 2 = high school, 3 = college, 4 = post graduate. Income shows the level of income in six categories: 1 = less than \$10,000, 2 = \$10,000–\$30,000, 3 = \$30,000–\$80,000, 4 = \$80,000–\$160,000, 5 = \$160,000–\$360,000, 6 = more than \$360,000.

**FIGURE 1- AVERAGE SPENDING BY CONDITION FOR CONVENIENCE USERS
AND REVOLVERS**



Notes: Bars indicate two standard errors.

7 Appendix

Carnegie Mellon Survey

1. You were given a slip of paper that entitles you to receive an Amazon gift card. Did the promise of receiving that card affect whether you paid with cash or a credit card?

no yes

If yes, what would you have used if you had not been promised the card?

cash

credit card

other. Please specify_____

2. Did you pay only for yourself? no yes

3. Did you know what food you would buy before you entered?

no yes

4. Please check all that apply

I have a credit card.

I am carrying my credit card with me right now.

I pay interest on at least one of my credit cards.

I know the interest rate on my primary credit card. It is about _____ percent.

I have an ATM card.

I am carrying my ATM card with me right now.

5. About how much cash do you have with you right now? \$_____

6. Year of birth: _____

7. Your gender: Male Female

8. Which of these categories best describes your ethnicity:

White African-American Hispanic Asian Other

9. Highest level of education completed:

Less than High School High School College Post-graduate

10. Your yearly household income (before tax):

less than \$10,000 \$80,000–\$160,000

\$10,000–\$30,000 \$160,000–\$360,000

\$30,000–\$80,000 more than \$360,000

11. Have you participated in this study before? no yes

Get a \$5 Amazon Gift Card!

Simply bring your receipts and this coupon to us on your way out, and fill out a very short (single-page) survey.

(All identifying information will be deleted)

Get an \$8 Amazon Gift Card!

Simply bring your receipts and this coupon to us on your way out, and fill out a very short (single-page) survey.

(All identifying information will be deleted)

Get a \$5 Amazon Gift Card!

Simply **pay with cash**, bring your receipts and this coupon to us on your way out, and fill out a very short (single-page) survey.

(All identifying information will be deleted)

Get an \$8 Amazon Gift Card!

Simply **pay with a credit card**, bring your receipts and this coupon to us on your way out, and fill out a very short (single-page) survey.

(All identifying information will be deleted)