Managing Mental Accounts: Payment Cards and Consumption Expenditures

Michael Gelman Nikolai Roussanov *

October 15, 2021

Abstract

Do multiple methods of payment cause households to treat them as non-fungible budgets in a way that effects total expenditure? We use a unique setup in which individuals received a new credit card without requesting it at an exogenously random time. We show that individuals increase expenditure only on the new card, as it is perceived as a new budget category beyond the existing ones. At the same time, consumers preserve the other budget categories, thus the spending pattern on the previously held card does not change. We do not observe a corresponding increase in indebtedness. Thus, adding a new method of payment to the household's portfolio of liquidity services causes a temporary increase in total consumption expenditures. Positive income shocks, changes in liquidity constraints, precautionary savings, heterogeneity in consumption preferences or models of inattention cannot fully explain our results.

JEL Code: D12, D14, E21, G41, G51.

Keywords: Mental Accounting, Budget Categories, Consumption, Credit Cards.

*Michael Gelman: University of Delaware, Newark, DE 19716. Email: gelmanm@udel.edu; Wharton School, University of Pennsylvania (visitor). Nikolai Roussanov: Wharton School, University of Pennsylvania, Philadelphia, PA 19104. Email: nroussan@wharton.upenn.edu.

Permanent income hypothesis (PIH) suggests that only persistent changes in household income should alter the path of consumption expenditures. Combined with the fact that money is fungible it makes the analysis of household budgeting conceptually simple, but also renders attempts at stimulating aggregate demand via fiscal policy largely ineffective, as transfers from the government simply crowd out spending out of existing wealth for all but the most liquidity constrained households.[1]. In contrast, mental accounting heuristic posits that consumers use mental accounts rather than the sum of their available resources when making consumption expenditure decisions. Households divide spending into non-fungible budget categories and money in one mental account is not a perfect substitute for money in another account (Thaler, 1985, 1999). This facilitates trade-offs between competing uses for funds in a way that potentially violates the PIH. While there is evidence that mental accounting affects spending on individual budget categories (Hastings and Shapiro, 2013, 2018), little is known about its role in driving households' total consumption expenditures.

We document novel evidence that individuals manage non-fungible budgets using different payment cards in a fashion consistent with the mental accounting heuristic. Analyzing the expenditure response of individuals when they exogenously receive a new credit card, we show that they perceived it as a new budget category beyond the existing categories managed using other payment methods. Therefore, they temporarily increase total expenditure on the new card, without changing the spending pattern on the previously held cards, as they preserve the pre-existing budget categories. Importantly, we do not observe a corresponding increase in debt balances, implying that the effect is driven by the new mental account rather than availability of credit. While the new card does increase

[1]Extant literature discusses the effect of stimulus payments on total consumption and the consumption response following tax refunds (Baker, Farrokhnia, Meyer, Pagel, and Yannelis, 2020; Johnson, Parker, and Souleles, 2006; Kan, Peng, and Wang, 2017; Kim and Lee, 2021; Parker, 2017). In order to ensure that households use stimulus payments for current consumption rather than saving governments increasingly turn to timed payment programs, such as the recent experiment in Hong Kong - see https://www.economist.com/finance-and-economics/2021/08/07/does-perishable-e-money-represent-the-future-of-fiscal-stimulus.

household's liquidity, we observe a substantial effect even among households that do not appear to be liquidity constrained.[2]

Associating and grouping expenses by cards is a convenient tool of mental accounting that helps mitigating the complexity of tracking various expenditures. It enables preserving the budget per card, as the credit line on each card serves as an observable binding limit and spending is traceable. Our results can be applied to the different stimulus programs aimed at temporarily increasing household consumption during economic downturns. We show in a clean setting that a new payment card is enough to generate additional temporary spending, as it serves as a budgeting tool and creates a new mental account. Hence, programs that provide income in an apparently non-fungible way might lead to a larger effect on consumption expenditure than, for example, a direct deposit of a stimulus payment into a household's bank account.

We use a unique setup where individuals received a new general purpose store credit card at a random time, without requesting it. A large retail chain in Israel signed an agreement with a card provider to start distributing a new store card. It notified members that, after a three-month transition period, they would be able to continue enjoying the store's special member discounts only if they pay for them with the new card. However, 70% of the members did not apply for the card. Therefore, the retailer decided to require those members to use the store card in order to take advantage of the store discounts starting from the expiration date of their previous membership card (which was not a payment method). On the first purchase in the expiration month, each member was notified by the cashier that their membership had expired, and the only way continue enjoying the special discounts is by paying for them with the new store card. Members filled in the application forms on spot and the card was delivered to them by mail within

[2]Recent research shows that even relatively wealthy households tend to have a large portion of their assets held in highly illiquid forms, such as real estate and retirement accounts, leading to high propensities to consume out of liquidity injections such as tax rebates/stimulus payments - e.g., Kaplan and Violante (2014), Kaplan, Violante, and Weidner (2014).

7-10 business days. By the end of this staggered process, most of the members that had not previously applied for the new card nevertheless ultimately received it.

The process was not advertised and members were not notified in advance. Memberships expired three years from previous renewal or issuing date. Members were not required to present their previous membership cards at the store, as the identification was conducted using the individual's state ID number. Thus, the probability that individuals remembered the membership expiration date and anticipated to get offered the new credit card is negligible, especially given that the previous membership benefits did not involve any payment methods. Indeed, analyzing spending patterns close to the membership expiration, we do not find evidence of anticipation.

This staggered process presents an advantage, as the timing of customers receiving the new credit card is independent of their spending needs. It enables us to isolate the effect of the new card from the individual's motivation to apply and use it,[3] and from an increase in credit supply when issuers expect credit demand to rise (Gross and Souleles, 2002).

The setup offers several advantages. First, we observe most of the individual's daily private consumption— credit card transactions and cash withdrawals.[4] In addition, the setup enables us to avoid card specific implications of receiving a new payment card (Bachas, Gertler, Higgins, and Seira, 2021), as credit cards serve as a central means of payment, used on a daily basis and held by the majority of the population with bank accounts.[5] Further, individuals did not receive any promotions or rewards for using the new card. The only incentive they had to use it was to continue enjoying this specific store's special discounts, not transferable or redeemable in other stores. Therefore, the decision

[3]Typically, households apply for new credit cards to take advantage of better rewards, interest rates, or fees, using as a cushion for emergencies, increasing future consumption, accruing debt or payoff of existing debt, or improving credit scores.

[4]Debit cards are not common and the usage of checks accounted for 10% of the total household's spending (Israel Central Bureau of Statistics for 2013).

[5]The number credit cards in circulation was six million in 2011 (Knesset Research and Information Center, 2012) out of total population of 8 million.

to use the new card for out-of-store purchases is isolated from any benefits. Moreover, during the years of the sample, no credit scoring was conducted by dedicated agencies. This enables us to remove credit score considerations that could motivate individuals to use multiple cards (but not too many cards) and control the balance on each card. Additionally, to accrue credit card debt, consumers may opt for an interest-free installment payment plan, chosen at the time of purchase.[6] Hence, we observe an individual's consumption decisions that is unaffected by borrowing costs.[7]

Our sample includes only store members that applied for the new card on spot on the first purchase of the membership expiration month. As individuals could apply for the new card any time, we construct the sample to avoid endogeneity concerns regarding the timing at which the individual applied for the card. Among these individuals, we focus on members with purchasing histories of at least one year with the card provider as to prior to the membership expiration. The idea is to mitigate unobserved influences related to the card characteristics or the issuer, and to gather enough data to demonstrate the budget categories management. Finally, we exclude members that have not started using the card close to its activation. In that way, we avoid endogeneity issues with regard to the starting point of using the new card.

We use three different estimation strategies to investigate the influence of receiving the new card on the consumer's budget categories and total expenditure 12 months forward. First, we perform a standard Differences-in-Differences analysis. The treated group includes individuals whose memberships expired during the first two years of the staggered

[6]Most of the credit cards are general-purpose deferred debit cards that have to be paid off every month. The only way in which they extend credit in any meaningful sense is via payment plans, whereby merchants allow cardholders to pay for their purchases (usually for transactions above 25$) through interest-free installments. When an individual makes a purchase, she can decide to how many interest-free installments to divide this specific purchase into (up to the number of installments that the merchant offers), subject to the available credit line on the card.

[7]Empirically, the cost of debt service is not necessarily the main factor that affects how individuals split consumption and repayments across cards (Prelec and Loewenstein, 1998; Amar, Ariely, Ayal, Cryder, and Rick, 2011; Gathergood, Mahoney, Stewart, and Weber, 2019; Keys and Wang, 2019; Ponce, Seira, and Zamarripa, 2017).

process, while the control group consists of those with membership expiration during the last year. Next, we examine a Differences-in-Differences analysis with staggered adoption (Athey and Imbens, 2021). In each month during the first two years, the treated group is classified as individuals whose memberships expired during the month, while the control group consists of individuals whose membership have not expired yet. Finally, we perform a regression discontinuity in time (RDiT) approach (Lee and Lemieux, 2010; Hausman and Rapson, 2018). The RDiT is a quasi-natural experimental econometric technique, a special case of the classical regression discontinuity design (RDD), where time is the running variable. We use the membership expiration as the running variable, analyzing expenditure changes in a narrow window of five months around it.

In all the specifications, we find that individuals change total consumption after receiving the new card only on the new card, while the spending pattern on the previously held card remains similar (most cardholders held one card prior to the membership expiration). Over 12 months after the receipt of the new card, total expenditure rises by 30% relative to the prior period. In a Diff-in-Diff analysis, there is an increase of 26.3% relative to the control group, which experiences a rise in spending of 3.6% over the same period. The elevated expenditure starts moderating six months after the receipt of the new card, and declines to the level of the control group after 11-12 months. Our results remain consistent in the other two estimation strategies and in varied robustness tests.

These findings provide first evidence that households use different payment cards to manage non-fungible budgets. The new card is perceived as a new budget category beyond the existing ones managed on the rest of the payment methods. Individuals increase expenditure only on the new card, without changing the spending pattern on the previously held card as they preserve the other categories. Associating and grouping expenses by cards is a helpful tool to mitigate the complexity of tracking various expenditures. It enables individuals to preserve the budget per card, as spending is traceable on the monthly statements and the credit line on each card serves as an observable binding limit.

We argue that income shocks or changes in liquidity constraints cannot explain our results in full. This is a central concern, as shocks to income or liquidity might correlate with the receipt of the new card and affect the decision to what extent to use it. In our setup, the timing of receiving the new card can barely coincide with the households' specific consumption or liquidity needs, as the sample includes only members who applied for the new card on spot on the first purchase in the membership expiration month. Those individuals represent the majority of the members, reducing the probability of selection bias of our results. Given that they could apply for the card any time but have not done it, suggests that they did not experience or anticipate significant monetary shocks.

We also address this concern more directly. First, we show that the total consumption response and the management at the card level are widely spread among individuals. Performing our standard Diff-in-Diff analysis using a quantile regression for the 25th, 50th and 75th percentiles response in consumption, we find an increase of 23%, 27% and 31%, respectively. On the previous card, a similar trend in expenditure relative to the control group is observed. These results are similar to the standard Diff-in-Diff analysis, indicating that managing mental accounts is not conducted only by a subset of individuals.

Additionally, the budget constraint that most influences behavior is the current income flow rather than the present value of lifetime wealth (Thaler, 1985). Therefore, the fact that after the initial spike in consumption, it decreases towards the consumption level of the control group suggests that income has not significantly changed over time and the budget constraint remains similar. Alternatively, individuals could fund the additional consumption by accruing debt. We show that this is not the case here. Separating between non-installment and installment spending, we find an increase in non-installment payments, while installment spending— the only way to accumulate debt beyond the next billing cycle (as individuals do not have the option to revolve credit)— remains similar to the control group. This indicates that individuals do not accrue debt to increase expenditure and the current individual's financial resources remain a binding constraint.

A natural increase in debt that occurs during the billing cycle could result a temporarily relief in potential liquidity needs. However, the whole billing amount is paid off at the end of the cycle, and the billing dates vary exogenously to the temporarily liquidity needs.

Another option is that consumers experience liquidity needs that leads to the heightened expenditure. However, we show that both liquidity constrained and non-constrained consumers—estimated by the utilization ratio before receiving the new card— increase expenditure on the new card, while maintaining similar spending pattern on the previously held card. The constrained consumers' increase in spending is higher, as their budgets are more binding and well defined (Thaler, 1999). Similarly, we separate between younger and older individuals and find an increase in consumption across all age groups only on the new card, while the magnitude among younger consumers is higher as they are more liquidity constrained and exhibit higher uncertainty in future income. However, spending on the previously held card remains similar to the control group in both age groups. Although liquidity and uncertainty in future income are important factors, they do not fully explain our results, especially not at the card level. In this context, it may be the case that the prior credit limit might serve as an ad-hoc binding constraint that motivated individuals to apply for the new card. Thus, we exclude periods when the individual increased spending above her limit prior to receiving the new card and find a consistent response on the new and the previously held card.

The fact that unconstrained individuals increase expenditure after receiving the new card may indicate that standard buffer stock consumption models (Carroll, 1997) are a plausible explanation of the results. The new card provides additional credit line, which may increase the spare borrowing capacity and loosen the individual's precautionary savings motives. This can ease perceived uncertainty of future unexpected needs and enable individuals to increase consumption. However, the observed response is not consistent with precautionary concerns being the dominant factor because non-constrained consumers reduce expenditure after a few months and do not increase installment payments.

Next, we show that differences in consumption preferences do not provide full explanation to our results. Consumers with hyperbolic discounting (Angeletos, Laibson, Repetto, Tobacman, and Weinberg, 2001) and high present bias might be more sensitive to the additional credit line on the new card and respectively increase their consumption. However, if this is the case, we would expect these individuals to apply for the new card earlier, especially when they were offered to do so during the transition period. Additionally, given the results of the quintile Diff-in-Diff regression, the effect is not concentrated only within a subset of consumers with specific consumption preferences.

Another concern might arise from individuals with less stable consumption over time or in models of inattentive consumers (Reis, 2006). Analyzing spending trends in the treated and the control groups before receiving the new card, we find parallel trends both in spending level and spending volatility. Further, the change in spending is concentrated on the new card, while spending on the previously held card remains similar— indicating some extent of self control— and consistent with preserving mental accounts. Furthermore, irresponsible or impatient consumers tend to have higher risk. Studying the individual's consumption response as a function of risk, we find no significant difference between high and low risk consumers.

Models of mental accounting are based on observations of behavior, thus their predictions are generally limited, which has led to limited empirical testing (Baugh, Ben-David, Park, and Parker, 2021). Households group expenditures into budgets and assigning money into different accounts (Heath and Soll, 1996). Our paper contributes to the existing theories on mental accounting and household consumption management by demonstrating that individuals manage different budget categories on different payment methods. Associating and grouping expenses by cards is a convenient tool of mental accounting that helps mitigating the complexity of tracking various expenditures (similarly to physically segregating funds into sealed envelopes to increase savings in poor countries (Soman and Cheema, 2011)).

Previous papers show specific evidence of fungibility violation at the "micro" level in response to benefits[8] or price shocks (Hastings and Shapiro, 2013). Other studies show broader implications of non-fungible budget categories on savings and debt (Argyle, Nadauld, and Palmer, 2020; Bernstein and Koudijs, 2021; Medina and Pagel, 2021). Our paper extends these studies by establishing the non-fungible payment methods, which aggregate multiple specific spending categories into few larger groups.

The management of non-fungible mental accounts could also explain the mixed results of different stimulus programs around the world and the consumption response following tax refunds (Baker, Farrokhnia, Meyer, Pagel, and Yannelis, 2020; Johnson, Parker, and Souleles, 2006; Kan, Peng, and Wang, 2017; Parker, 2017). We show in a clean setting that a new payment card is enough to generate additional temporary spending. Hence, programs that provide income in a non-fungible way lead a change in consumption.

Finally, this study extends previous work on the impact of changes in credit limit (Gross and Souleles, 2002; Agarwal, Chomsisengphet, Mahoney, and Stroebel, 2018; Aydin, 2021) or an initiation of overdraft facilities (D'Acunto, Rauter, Scheuch, and Weber, 2020) on total spending. Our focus on the card level contributes to a better understanding of how explaining how individuals manage the increase in spending, as it is not conducted only on the new card. Further, we show that the increase in expenditure is temporary if it is not funded by accruing debt or additional income, as the total budget of the household does not change.

This paper proceeds as follows. Section I outlines the institutional background regarding the new credit card that the store's members received and regarding the Israeli credit card market. In Section II, we present the data and our sample of individuals. Section III demonstrates the budget categories management at the card level and the response

[8]For example, winter fuel payment is disproportionately spent on heating (Beatty, Blow, Crossley, and O'Dea, 2014); child clothing consumption out of child benefits is higher than out of other income (Kooreman, 2000); the SNAP-eligible food consumption out of SNAP benefits is also high among SNAP recipients(Hastings and Shapiro, 2018)

in expenditure following the receipt of the new card. Section IV deals with alternative explanations, in which we discuss Positive income shocks, changes in liquidity constraints, precautionary savings, heterogeneity in consumption preferences or models of inattention. In Section V we present robustness tests of our specifications, while Section VI presents our main conclusions.

I Institutional background

I.A The New Store Card

We use a unique setup where individuals received a new general purpose store credit card at a random time, without requesting it. A large retail chain in Israel signed an agreement with a card provider to start distributing a new store card. It notified members that, after a three-month transition period, they would be able to continue enjoying the store's special member discounts only if they pay for them with the new card. Membership enabled enjoying this specific store's special discounts, not transferable or redeemable in other stores. Members were not charged membership fees.

However, by the end of the transition period, 70% of the members did not apply for the card. After the end of the transition period, the retailer did not want to "force" customers to apply in order to avoid adverse impact on customer satisfaction. Instead, the retailer and the card provider decided to require those members to use the store card in order to take advantage of the store discounts starting from the expiration date of their previous membership card (which was not a payment method).

On the first purchase in the expiration month, each member was notified by the cashier that their membership had expired, and the only way continue enjoying the special discounts is by paying for them with the new store card. Members filled in the application forms on spot and the card was delivered to them by mail within 7-10 business days. By

the end of this staggered process, most of the members that had not previously applied for the new card nevertheless ultimately received it.

The process was not advertised and members were not notified in advance. The card provider and the retailer did not notify customers in advance since the notification during the transition period was not effective enough in the first place. Individuals did not receive any promotions or rewards for using the new card. The only incentive they had to use it was to continue enjoying this specific store's special discounts, not transferable or redeemable in other stores.

Memberships expired three years from previous renewal or issuing date. Members were not required to present their previous membership cards at the store, as the identification was conducted using the individual's state ID number. Thus, the probability that individuals remembered the membership expiration date and anticipated to get offered the new credit card is negligible, especially given that the previous membership benefits did not involve any payment methods. Indeed, analyzing spending patterns close to the membership expiration, we do not find evidence of anticipation, as presented in section III.

I.B The Israeli Credit Card Market

The Israeli credit card market is characterized by few distinctive features. First, debit cards are not common and the usage of checks accounted for 10% of total purchases (Israel Central Bureau of Statistics for 2013). It was only after recent regulations that financial institutions began distributing them in 2016, following the years of our sample. Therefore, most of the individual's daily private consumption is conducted by credit cards or cash. Credit cards serve as a major means of payment, held by the majority of the population with bank accounts and many use them on a daily basis.

Most of the credit cards are general-purpose deferred debit cards that have to be paid

off every month. To accrue credit card debt, consumers may opt for an interest-free installment payment plan, chosen at the time of purchase. The only way in which they extend credit in any meaningful sense is via payment plans, whereby merchants allow cardholders to pay for their purchases (usually for transactions above 25$) through interest-free installments. This type of credit is provided by the merchant, not the credit card company. When an individual makes a purchase, she can decide to how many interest-free installments to divide this specific purchase into up to the number of installments that the merchant offers, and subject to the available credit line on the card. Cardholders can also ask merchants to register specific transactions as "credit transactions," which carries interest, but this accounted for less than 4% of the total transactions. In this case, the credit is provided by the credit card issuer, but the cardholder needs to choose the number of installments when making the transaction, instead of deciding at the end of each month how much to revolve.

Moreover, during the years of the sample, no credit scoring was conducted by dedicated agencies. Regulators started to develop credit scores systems only in 2018. Thus, the decision upon receiving a new card was conducted mainly based on the internal model of the card issuer. The only external data source that existed was information on customers that do not meet their obligations. Banks, credit card companies, courts, government institutions, and some commercial companies (such as cellular companies) are required to share this information. In our sample, a small proportion of the members were not approved during the screening process for another regular credit card. Those individuals received a general-purpose prepaid card. We include those members in our sample, although our results do not change if we exclude them.

II Data

Our sample consists of 14,873 individuals that satisfy the following three conditions. We include only store members that applied for the new card on spot on the first purchase of the membership expiration month. As individuals could apply for the new card any time, we construct the sample to avoid endogeneity concerns regarding the timing at which the individual applied for the card. Among these individuals, we focus on members with purchasing histories of at least one year with the card provider as to prior to the membership expiration. The idea is to mitigate unobserved influences related to the card characteristics or the issuer, and to gather enough data to demonstrate the budget categories management. Finally, we include only members that started using the new card within one month from its activation. In that way, we avoid endogeneity issues with regard to the starting point of using the new card.

The unit of analysis in the data is an individual, not a credit card account that different individuals can use. We use monthly proprietary data for the years 2010-2013 from a leading financial institution in Israel. The payment system is concentrated and composed of few leading financial institutions, each with a substantial market share.

The data includes for each individual on a monthly basis the total and per card monthly expenditure, balance, credit line, installment and non-installment spending. Additionally we observe the gender, age, residence and an internal credit score of each individual. The card issuer uses a proprietary internal credit scoring model based on default risk and socio-economic indicators to decide whether to issue a new card and under which terms.

III Budget Categories and Expenditure after Receiving a New Payment Card

To study how receiving a new credit card influences the individual's budget management, our empirical methodology includes three different specifications. In Section III.A, we perform a standard Diff-in-Diff analysis, in Section III.B we show the results of the Diff-in-Diff analysis with staggered adoption, and in Section III.C, a regression discontinuity in time (RDiT) approach is presented.

III.A Standard Differences-in-Differences Analysis

We start the empirical analysis by performing a standard Diff-in-Diff specification. We are interested in analyzing the effects 12 months after receiving the new card. The treated group includes individuals whose memberships expired during the first two years of the staggered process, while the control group consists of those whose memberships expired during the last year. We perform the following Diff-in-Diff specification:

$$Y_{it} = \beta_1 \text{After}_t \times \text{Treat}_i + \alpha_i + \alpha_t + \varepsilon_{it}. \tag{1}$$

Here Y_{it} represents the total expenditure and the spending on the previously held card for individual i in year-month t. *After* is a dummy variable taking the value of one for the 12 months after the membership expiration and zero for the prior 12 months. *Treat* is an indicator taking the value of one for individuals in the treatment group as defined above and zero for the the control group. α_i is the consumer fixed effects, included to absorb time-invariant systematic differences in consumption spending across individuals, such as differences in occupation, gender, cultural background, or education. α_t is the time fixed effects that controls for any year-month specific effects on consumption. Standard errors are clustered by individual and time.

Insert Table I here.

Table I presents the results of the standard Diff-in-Diff. In Columns 1-3 we find that total expenditure increases over the 12 months after receiving the new card by 29.7% relative to the prior period, while consumers that did not receive the new card experience a moderate rise of 3.6% in spending over the same period. Thus, the coefficient *TreatxAfter* is significantly positive with a magnitude of 26.3%.

In Figure 1 we show the changes in consumption on a monthly basis during a time-window of 24 months around the membership expiration. During the first 5-6 months after the receiving the new card, total expenditure rises relative to the period prior to its receipt. However, then, over the following 6 months it gradually declines to the level of the control group.

Insert Figure 1 here.

A key identifying assumption in the Diff-in-Diff estimation is that of parallel trends. The trends found in the outcome variable must be the same in both the treatment and the control groups. We provide supporting evidence for this assumption based on a visual inspection of Figure 1. Observing the expenditure of the treated and control individuals, we find no significant differences in trends prior to the expiration of the membership. Therefore, the parallel trends assumption appears to hold.

Insert Figure 2 here.

Separating between the new and the previously held card, we find in Columns 4-6 of Table I no significant difference in spending on the previous card between the groups. A similar increase of 3.5%-4% in both groups indicates that the consumption on the previously held card is not affected by the new card. Respectively, the coefficient *TreatxAfter* is insignificant. The similar expenditure pattern of both groups on the previously held card is also observed in Figure 2. Consistent with non-fungible budget categories, households treat the new card as a new budget category and use it for the new expenditure, without changing the spending pattern managed on the previously held card.

As a robustness test to the standard Diff-in-Diff analysis, we use an alternative definition of the treated and the control groups in Section V.B and find similar results. In Section V.A, we mirror our results above after excluding individuals with early or late expiration dates, as they may react differently to the requirement to use the new card due to specific potential unobserved influences. Additionally, to ensure that our estimates reflect individuals' response to the new card, we discuss placebo tests.

III.B Staggered Differences-in-Differences

Taking advantage of the fact that individuals started using the new card at different points in time and that our data is on a monthly basis, we supplement the analysis in the previous section by performing a Diff-in-Diff with staggered adoption (Athey and Imbens, 2021). In each month during the first two years, the treated group is classified as individuals whose memberships expired during the month, while the control group consists of individuals whose membership has not expired yet. We estimate the following specification:

$$Y_{it} = \sum_{k=-12}^{12} \beta_k \text{Treated}_{it+k} + \alpha_i + \alpha_t + \varepsilon_{it}. \tag{2}$$

Where Y_{it} represents the total spending and the consumption on the previously held card for individual i in year-month t. $Treated_{it+k}$ is an individual-level dummy that is equal to 1 at time $t+k$ and 0 otherwise, where $k = 0$ when individual i receives the new card at time t. We estimate the effect 12 months following the month in which the individual received the new card relative to the 12 preceding months. α_i is the consumer fixed effects, α_t is the time (year-month) fixed effects. Standard errors are clustered by individual and time.

Under the assumption of random assignment of adoption and no anticipation effects, the Diff-in-Diff estimator β_1 is a weighted average of the quarterly treatment effects. As

our setup offers a random timing of receiving the new card, we verify the assumption of no anticipation by analyzing whether expenditure exhibits parallel trends prior to receiving the new card.

As discussed in Section III.A, we find parallel trends in consumption between the treatment and the control groups during the 12 months before receiving the new card, and specifically in the last few months prior to the expiration of the membership. We do not observe changes in expenditure prior to receiving the new card among individuals that received it (see further discussion on Figure 3 in the next section). Additionally, previous renewals or issuing of the membership did not involve any payment requirement, thus members could not anticipate it to be part of the process this time. This enables us to rule out anticipation effects around the expiration date.

Insert Table II here.

Column 1 of Table II presents the results of the staggered Diff-in-Diff for the response in total expenditure and Column 2 presents the results for the spending on the previously held card. As in the standard Diff-in-Diff, we find similar magnitudes of the change in total expenditure and the previously held card. This shows that changes in total spending are managed only on the new card—which is perceived as a new budget category— while the spending pattern on the previously held card remains similar, as individuals preserve the rest of the budget categories.

III.C Regression Discontinuity in Time

Our last identification strategy—Regression Discontinuity in Time (Lee and Lemieux, 2010; Hausman and Rapson, 2018)– exploits the fact that most of the members in our sample applied for the new card. RDiT is a quasi-natural experimental econometric technique, a special case of the classical regression discontinuity design, where time is the running variable. We use the membership expiration as the running variable, studying

the total spending response and the behavior at the card level in a narrow window around the receipt of the new card. We estimate the following specification:

$$Y_{it} = \beta_k \text{Post}_{it} + \alpha_i + \alpha_t + \varepsilon_{it}. \tag{3}$$

Y_{it} represents the total spending and the expenditure on the previously held card for individual i in year-month t. $Post_{it}$ is an individual-level dummy that is equal to 1 after receiving the new card and 0 before. β represents the local average treatment effect (LATE), i.e., the relative difference in consumption after receiving the new card compared to the "normal" spending of those individuals before receiving the new card. Typically, smaller bandwidths are supposed to provide less biased estimates of the effect of interest. Thus, we use a narrow window of 5 months before and after receiving the new card. In the robustness tests, we show that changing the time window to 3 months does not change the results (Section V.B). α_i is the consumer fixed effects, α_t is the time (year-month) fixed effects. Standard errors are clustered by individual and time.

Insert Figure 3 here.

Figure 3 presents the total expenditure among individuals that received the new card in a short time window before and after the membership expiration. We observe an immediate increase in expenditure of 15% in the month of the membership expiration. We attribute the next month as the first full one for all the consumers, as the calendar months do not necessarily coincide with the billing cycles. Here we witness an additional increase of 9%. Over the next two months, expenditure remains stable and then increases by another 5% in the fifth month. However, we do not observe any changes in expenditure prior to receiving the new card, indicating the lack of any anticipation effect or earlier change in spending.

In Column 3 of Table II we find that this increase in expenditure is notable with a coefficient of 27.1% in the RDiT analysis. At the same time, the increase on the previously

held card is modest of 1.5%, but not statistically significant (Column 4). These results are in line with the results of the Diff-in-Diff specifications and serve as an evidence of managing budget categories by payment cards. The new card is perceived as a new category, thus used by individuals to increase consumption while keeping the expenditure on the other categories similarly.

IV Alternative Explanations

In this section we address directly alternative explanations to the results. In section IV.A we show that positive income shocks and changes in liquidity constraints cannot explain our results in full. Section IV.B deals with ease in precautionary savings, while section IV.C explains why differences in consumption preferences or models of inattentive consumers are not sufficient explanations in our case.

IV.A Income and Liquidity Shocks

We start the discussion of alternative explanations by analyzing income or liquidity shocks. This is a central concern, as shocks to income or liquidity might correlate with the timing of receiving the new card and affect the decision to what extent to use it. We address this concern in a few ways.

First, a central feature of the setup enables us to include in our analysis only members who applied for the new card on spot on their first purchase in the membership expiration month. Therefore, the timing of receiving the new card can barely coincide with the households' specific consumption or liquidity needs. Those individuals represent the majority of the members, reducing the probability of selection bias of our results. Given that they could apply for the card any time but have not done it, suggests that they did not experience or anticipate significant monetary shocks. We also find no evidence of anticipation by individuals prior to receiving the new card (see Section III.B).

Further, we show that the total consumption response and the management at the card level are widely spread among individuals. We perform our standard Diff-in-Diff analysis using a quintile regression for the 25th, 50th and 75th percentiles response in consumption. Table III presents the results.

Insert Table III here.

In Columns 1-3 of Table III, we find an increase of 23%, 27% and 31% in total expenditure, respectively. These results are similar to the standard Diff-in-Diff analysis, where the magnitude was 26%. In Columns 4-6, we find again similar results to the standard Diff-in-Diff analysis, as the differences in expenditure between the treated and the control groups on the previous held card are small. The results indicate that managing mental accounts is not conducted only by a subset of individuals.

The budget constraint that most influences behavior is the current income flow rather than the present value of lifetime wealth (Thaler, 1985). Hence, the fact that after the initial spike in consumption, it decreases towards the consumption level of the control group (see Figure 1) suggests that income has not significantly changed over time and the budget constraint remained similar. Yet, individuals could fund the additional consumption by accruing debt. The main way to accumulate debt beyond the next billing cycle is to make installment payments when purchasing products or services. To this end, we perform the standard Diff-in-Diff analysis in equation (1) separating between non-installment and installment spending. When an individual makes a purchase, she can decide to how many interest-free installments to divide this specific purchase (up to the number of installments that the merchant offers), subject to the available credit line on the card. Thus, our data includes the total monthly expenditure by installments vs. non-installments.

Insert Table IV here.

Panel A in Table VI presents the results for the total expenditure. We find that after receiving the new card, the increase in total consumption is performed only by non-

installment payments, while installment payments remain similar to the control group. In Panel B of Table IV we verify that individuals do not choose to increase installments on the previously held card. We find a similar result, i.e., individuals' change in non-installment payments is similar to the change in expenditure on the previously held card, while installment payments do not change, and even slightly decrease. This indicates that individuals do not accrue debt to increase expenditure and the current individual's financial resources remain a binding constraint. A natural increase in debt that occurs during the billing cycle could result a temporarily relief in potential liquidity needs. However, the whole billing amount is paid off at the end of the cycle, and the billing dates vary exogenously to the temporarily liquidity needs.

Moreover, we show that both liquidity constrained and non- constrained consumers before receiving the new card increase consumption with it. We perform the standard Diff-in-Diff analysis in equation (1), separating between those two groups. Table V presents the results of this specification. Columns 1-3 in each Panel present the results of constraint individuals, defined as those with an average utilization ratio above 75% prior to receiving the new card. Columns 4-6 present the the results of non-constraint individuals, those with utilization ratios lower than 50%.

Insert Table V here.

Liquidity constrained individuals increased consumption by 41.5% in the 12 months after receiving the new card relative to the prior 12 months (Column 2 in Panel A), and the less liquidity constrained individuals exhibited an increase in expenditure of 32.5% (Column 5 in Panel B). The changes in consumption are conducted only on the new card, while both groups have not changed spending on the previously held card relative to the control group, as the coefficients in Columns 1,4 in Panel B are statistically insignificant. These results are consistent with the mental accounting theory, by which the tighter the budget, the more explicit and stricter are the budgeting rules (Thaler, 1999). Therefore, among more financially constrained households, the budgets are more binding and well

defined.

To further address this issue, we compare between younger and older individuals. Table VI presents the results of the standard Diff-in-Diff analysis in equation (1), separating between younger (below the median age) and older consumers.

Insert Table VI here.

We find in Panel A an increase in consumption across all age groups only on the new card, while the magnitude among younger consumers is higher - 36% in Column 2 vs. 23% in Column 5. However, spending on the previously held card remains similar to the control group in both age groups. As younger individuals are on average more liquidity constrained (in general and in our sample) and exhibit higher uncertainty in future income, we observe a stronger impact among younger individuals. These results are consistent with the liquidity constrained results, and show that although liquidity and uncertainty in future income are important factors, they do not fully explain our results, especially not in regard to the expenditure management at the card level.

Finally, we verify that the results are not driven by temporary liquidity needs. To this end, we rerun our standard Diff-in-Diff analysis in equation (1), but this time exclude periods with increases in spending above the previous limit, which might be an ad-hoc binding constraint that motivated individuals to apply for the new card. Table VII presents the results of total spending (Panel A) and spending on the previously held card (Panel B) only among the treated individuals.

Insert Table VII here.

In Column 1 of each Panel in VII we include only months in which the consumer's expenditure is below the previous limit. We find that the effect remains significant at 25.6% (relative to 29% in the full sample) with no significant change in spending on the previously held card. In Columns 2-4 of each Panel we include months with expenditures below 90%, 80% and 60% of the previous limit, respectively. The increase in total spending after receiving the new card holds in all Columns, although the magnitudes slightly

decrease. However, spending on the previously held card remains stable, indicating that temporary liquidity needs are not the main driver of the results.

IV.B Ease in Precautionary Savings

We also show that the results are not driven solely by standard buffer stock consumption models (Carroll, 1997). The new card provides additional credit line, which may increase the spare borrowing capacity and loosen the individual's precautionary savings motives. This should ease perceived uncertainty of future unexpected needs and enable individuals to increase consumption and debt.

However, the observed response is not consistent with precautionary concerns being the dominant factor. It is different from other settings where this was the main driver following an increase in credit limit (Aydin, 2021) or an initiation of overdraft facilities(D'Acunto, Rauter, Scheuch, and Weber, 2020). As shown earlier in Figure 1, the increase in total expenditure is temporary. A few months following the receipt of the new card, consumers start reducing expenditure and eventually it decreases to the level of the control group. Not only that but as discussed in Section IV.A, they also do not increase installment payments, i.e., they choose not to accrue debt (beyond the current billing).

Additionally, if it was the dominant effect, non-liquidity constrained consumers would exhibit a larger effect. Nevertheless, as we showed in the previous section, constrained individuals' effect is larger.

IV.C Differences in Consumption Preferences and Inattention

Now we turn to show that differences in consumption preferences do not provide full explanation to our results. Consumers with hyperbolic discounting (Angeletos, Laibson, Repetto, Tobacman, and Weinberg, 2001) and high present bias might be more sensitive to the new card with its available new credit line. This can drive an increase in their

consumption. However, if this is the case, we would expect these individuals to apply for the new card earlier, especially when they were offered to do so during the transition period. Additionally, given the results of the quintile Diff-in-Diff regression presented in Section IV.A, the effect is not concentrated only among a subset of consumers with specific consumption preferences.

Another concern might arise from individuals with less stable consumption over time, who drive the jump that we observe in expenditure, rather than the new card. To address it, we rely on the analysis presented in section III.A of the spending trends in the treated and the control groups before receiving the new card. We find parallel trends both in spending level and spending volatility. Further, the change in expenditure is concentrated on the new card, while spending on the previously held card remains similar— indicating some extent of self control— and consistent with preserving mental accounts. Finally, all our specification include individual foxed effects, which supposed to capture to some extent long-term consumption patterns.

Irresponsible or impatient consumers tend to have higher risk. Table VIII presents the results of our standard Diff-in-Diff separating between high and low risk consumers. The individual's risk is estimated based on the card issuer's proprietary internal credit scoring model. We define high-risk consumers with the lowest 50% scores and low-risk consumers as those with the highest 50% scores. Studying the individual's consumption response as a function of risk, we find no significant difference between high and low risk consumers, as both groups respond with a similar magnitude on the new card, while keeping similar levels of expenditure on the previously held card.

Insert Table VIII here.

Finally, models of inattentive consumers (Reis, 2006) also cannot fully explain our results. Those consumers rationally choose to only sporadically update their information and re-compute their optimal consumption plans, while between updating dates they remain inattentive. Although this can be a plausible explanation why individuals have

not applied for the new card during the transition period, it cannot fully explain the changes in total expenditure after receiving the new card, while preserving the spending pattern on the previously held card.

V Robustness Tests

We conduct varied robustness tests. In Section V.A, we verify that members with early or late expiration dates respond similarly to the requirement to use the new card, and that they experience a similar change in total expenditure and at the card level. In Section V.B, we use an alternative definition of the treated and the control groups for the standard Diff-in-Diff analysis. Additionally, for the RDiT specification, we reduce the time window to 3 months before and after the membership expiration. To ensure that our estimates reflect individuals' response to the new card, we discuss placebo tests.

V.A Early and Late Expiration Dates

First, we test whether individuals that received the new card towards the end of the process respond differently to the requirement to use the new card, as they might have been influenced by the fact that they are the last. For example, the cashier might have mentioned this fact when explaining about the new policy to continue enjoying the store special discounts. Another option is that their friends or family members have already received the new card. Although we have not observed any anticipation patterns, those individuals might be less surprised to receive the card.

To this end, we compare members with expiration dates during the last two quarters of the staggered implementation process with the rest of the members. Analyzing the on spot application rates for the new card and the timing at which consumers started using the new card, we do not find differences in any of these factors.

Next, we consider members with early expiration dates. The proximity of the receipt

date of the new card to the transition period may be a concern. Although they did not apply for it during the transition period, the proximity between those occasions might influence their degree of surprise regarding the new card and their response differently from other members. To this end, we perform a similar set of tests as before for individuals whose expiration dates during the first two quarters of the staggered implementation process. We find no differences in on spot application rates for the new card or the timing at which the those members started using the new card compared to the rest of the members.

In addition, as the response in expenditure and the budget categories management can be affected differently by each of those two groups, we rerun our specifications in equations 1-3 excluding each group separately. Columns 1,2 in each Panel of Table IX present the results of each specification excluding individuals with late expiration dates, while in Columns 3,4 of each Panel we exclude individuals with early dates. Panel A show the results of the standard Diff-in-Diff analysis, Panel B for the staggered Diff-in-Diff specification and Panel C for the RDiT analysis.

Insert Table IX here.

In all the specifications, we find no change from our previous results in the effects on total spending and the expenditure on the previously held card. This indicates that our results are not driven by specific differences that arise from either of those two groups.

V.B Changing the Time Periods and Placebo Test

As a robustness test to the standard Diff-in-Diff analysis, we use an alternative definition of the treated and the control groups. We define the treated individuals as those whose memberships expired during the first 18 months of the staggered implementation process, while the control group consists of those with expiration dates in the last 18 months.

Insert Table X here.

Columns 1-2 in Table X present the Diff-in-Diff results for the total expenditure and the spending on the previously held card, respectively. We find similar results for both outcome variables to the ones reported in Table I.

As a robustness test to the RDiT specification, we zoom in from a time window of 5 months around the membership expiration to 3 months. Smaller bandwidths provide less biased estimates of the effect of interest. It also enables us to exclude the additional increase in spending that occurs on average 5 months following the membership expiration (see Figure 3).

Columns 3-4 in Table X present the results of this specification. We mirror the results of Table III with regard to total spending and the expenditure on the previously held card. As expected, the magnitudes are lower due to the shorter period.

Finally, to ensure that our estimates reflect individuals' response to the new card, we could perform a placebo test using an arbitrary date to show that only the real membership expiration date captures the effect of a new budget category. However, our Diff-in-Diff strategies already include in the control groups individuals that have not received the new card yet, as their membership expiration occur later. Analyzing the control groups (see Section III), we do not find a similar change in expenditure as in the treated group. We refer to these analyses as placebo tests in which the receipt date of the new card is conducted earlier from the real date.

VI Conclusions

In this paper we showed that individuals manage non-fungible budgets using different payment cards. Analyzing the spending response of households when they receive a new credit card, we established that it is perceived as a new budget category, beyond the existing categories managed on the rest of the payment methods. Changes in total expenditure are managed only on the new card, while individuals preserve the rest of the

budget categories. Thus, adding a new method of payment causes a temporary increase in total consumption expenditures, without a corresponding increase in indebtedness.

Our results can be applied beyond the daily budget management. The non-fungibility of mental accounts affects fiscal policies, such as programs aimed at temporarily increasing household consumption during economic downturns. We show in a clean setting that a new payment card is enough to generate additional temporary spending, as it serves as a budgeting tool and creates a new mental account. Hence, programs that provide income in an apparently non-fungible way might lead to a larger effect on consumption expenditure than, for example, a direct deposit of a stimulus payment into a household's bank account.

Additionally, the non-fungibility of mental accounts has important implications on monetary policy. Once launched, central bank digital money would become an additional mean of payment, and generate a new budget category. This might influence consumption patterns at the macroeconomic level, an aspect that has not been discussed yet.

References

Agarwal, Sumit, Souphala Chomsisengphet, Neale Mahoney, and Johannes Stroebel, 2018, Do banks pass through credit expansions to consumers who want to borrow?, *The Quarterly Journal of Economics* 133, 129–190.

Amar, Moty, Dan Ariely, Shahar Ayal, Cynthia E Cryder, and Scott I Rick, 2011, Winning the battle but losing the war: The psychology of debt management, *Journal of Marketing Research* 48, S38–S50.

Angeletos, George-Marios, David Laibson, Andrea Repetto, Jeremy Tobacman, and Stephen Weinberg, 2001, The hyperbolic consumption model: Calibration, simulation, and empirical evaluation, *Journal of Economic perspectives* 15, 47–68.

Argyle, Bronson S, Taylor D Nadauld, and Christopher J Palmer, 2020, Monthly payment targeting and the demand for maturity, *The Review of Financial Studies* 33, 5416–5462.

Athey, Susan, and Guido W Imbens, 2021, Design-based analysis in difference-in-differences settings with staggered adoption, *Journal of Econometrics*.

Aydin, Deniz, 2021, Consumption response to credit expansions: Evidence from experimental assignment of 45,307 credit lines, *Available at SSRN 3794759*.

Bachas, Pierre, Paul Gertler, Sean Higgins, and Enrique Seira, 2021, How Debit Cards Enable the Poor to Save More, *The Journal of Finance*.

Baker, Scott R, Robert A Farrokhnia, Steffen Meyer, Michaela Pagel, and Constantine Yannelis, 2020, Income, liquidity, and the consumption response to the 2020 economic stimulus payments, Working paper, National Bureau of Economic Research.

Baugh, Brian, Itzhak Ben-David, Hoonsuk Park, and Jonathan A Parker, 2021, Asymmetric Consumption Smoothing, *American Economic Review* 111, 192–230.

Beatty, Timothy KM, Laura Blow, Thomas F Crossley, and Cormac O'Dea, 2014, Cash by any other name? Evidence on labeling from the UK Winter Fuel Payment, *Journal of Public Economics* 118, 86–96.

Bernstein, Asaf, and Peter Koudijs, 2021, The Mortgage Piggy Bank: Building Wealth through Amortization, .

Carroll, Christopher D, 1997, Buffer-stock saving and the life cycle/permanent income hypothesis, *The Quarterly journal of economics* 112, 1–55.

D'Acunto, Francesco, Thomas Rauter, Christoph K Scheuch, and Michael Weber, 2020, Perceived precautionary savings motives: Evidence from fintech, Working paper, National Bureau of Economic Research.

Gathergood, John, Neale Mahoney, Neil Stewart, and Jörg Weber, 2019, How do individuals repay their debt? the balance-matching heuristic, *American Economic Review*

109, 844–75.

Gross, David B, and Nicholas S Souleles, 2002, Do liquidity constraints and interest rates matter for consumer behavior? Evidence from credit card data, *The Quarterly journal of economics* 117, 149–185.

Hastings, and Jesse M Shapiro, 2013, Fungibility and consumer choice: Evidence from commodity price shocks, *The quarterly journal of economics* 128, 1449–1498.

Hastings, and Jesse M Shapiro, 2018, How are SNAP benefits spent? Evidence from a retail panel, *American Economic Review* 108, 3493–3540.

Hausman, Catherine, and David S Rapson, 2018, Regression discontinuity in time: Considerations for empirical applications, *Annual Review of Resource Economics* 10, 533–552.

Heath, Chip, and Jack B Soll, 1996, Mental budgeting and consumer decisions, *Journal of consumer research* 23, 40–52.

Johnson, David S, Jonathan A Parker, and Nicholas S Souleles, 2006, Household expenditure and the income tax rebates of 2001, *American Economic Review* 96, 1589–1610.

Kan, Kamhon, Shin-Kun Peng, and Ping Wang, 2017, Understanding consumption behavior: Evidence from consumers' reaction to shopping vouchers, *American Economic Journal: Economic Policy* 9, 137–53.

Keys, Benjamin J, and Jialan Wang, 2019, Minimum payments and debt paydown in consumer credit cards, *Journal of Financial Economics* 131, 528–548.

Kim, Moon Jung, and Soohyung Lee, 2021, Can stimulus checks boost an economy under covid-19? evidence from south korea, *International Economic Journal* 35, 1–12.

Kooreman, Peter, 2000, The labeling effect of a child benefit system, *American Economic Review* 90, 571–583.

Lee, David S, and Thomas Lemieux, 2010, Regression discontinuity designs in economics, *Journal of economic literature* 48, 281–355.

Medina, Paolina, and Michaela Pagel, 2021, Does Saving Cause Borrowing?, Working paper, Working Paper.

Parker, Jonathan A, 2017, Why don't households smooth consumption? Evidence from a $25 million experiment, *American Economic Journal: Macroeconomics* 9, 153–83.

Ponce, Alejandro, Enrique Seira, and Guillermo Zamarripa, 2017, Borrowing on the wrong credit card? Evidence from Mexico, *American Economic Review* 107, 1335–61.

Prelec, Drazen, and George Loewenstein, 1998, The red and the black: Mental accounting of savings and debt, *Marketing science* 17, 4–28.

Reis, Ricardo, 2006, Inattentive consumers, *Journal of monetary Economics* 53, 1761–1800.

Soman, Dilip, and Amar Cheema, 2011, Earmarking and partitioning: Increasing saving by low-income households, *Journal of Marketing Research* 48, S14–S22.

Thaler, 1985, Mental accounting and consumer choice, *Marketing science* 4, 199–214.

Thaler, 1999, Mental accounting matters, *Journal of Behavioral decision making* 12, 183–206.

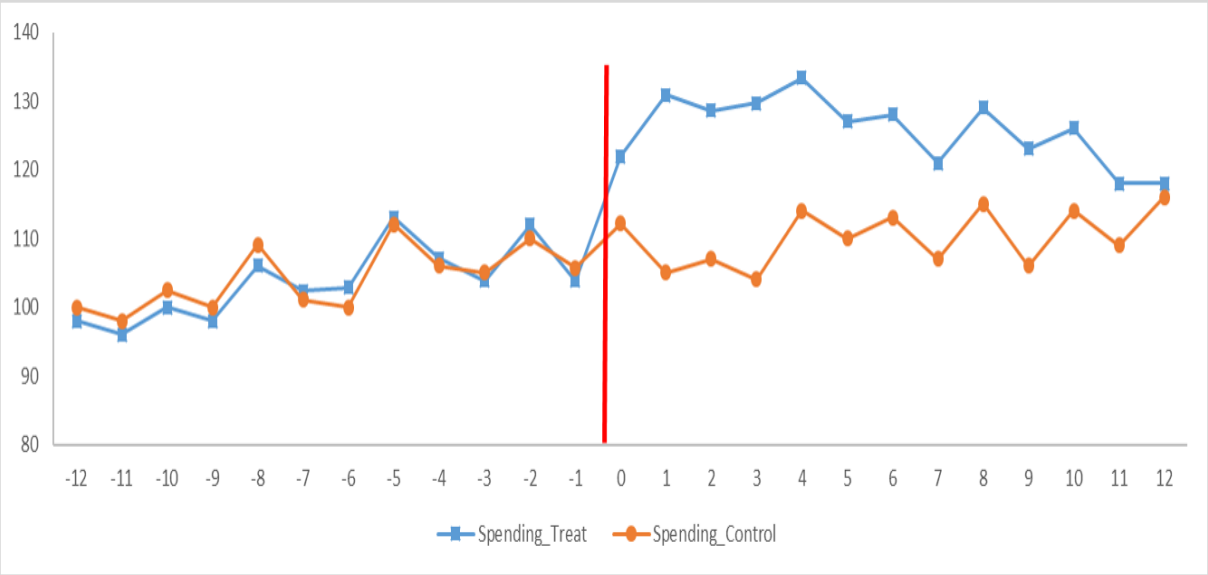

Figure 1: The figure plots the total expenditure of the treated vs. control individuals as defined in the standard Diff-in-Diff. We recode the spending levels of the control group as 100 at the beginning of the time window (12 months before receiving the new card). Time 0 is defined as the membership expiration month.

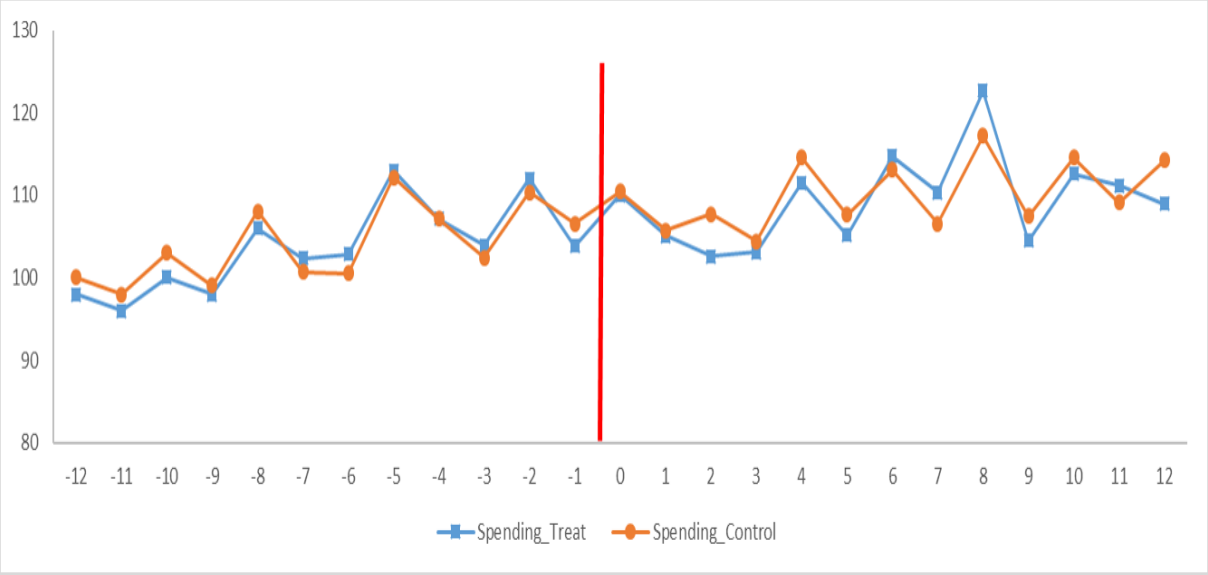

Figure 2: The figure plots the expenditure on the previously held card of the treated vs. control individuals as defined in the standard Diff-in-Diff. We recode the spending levels of the control group as 100 at the beginning of the time window (12 months before receiving the new card). Time 0 is defined as the membership expiration month.

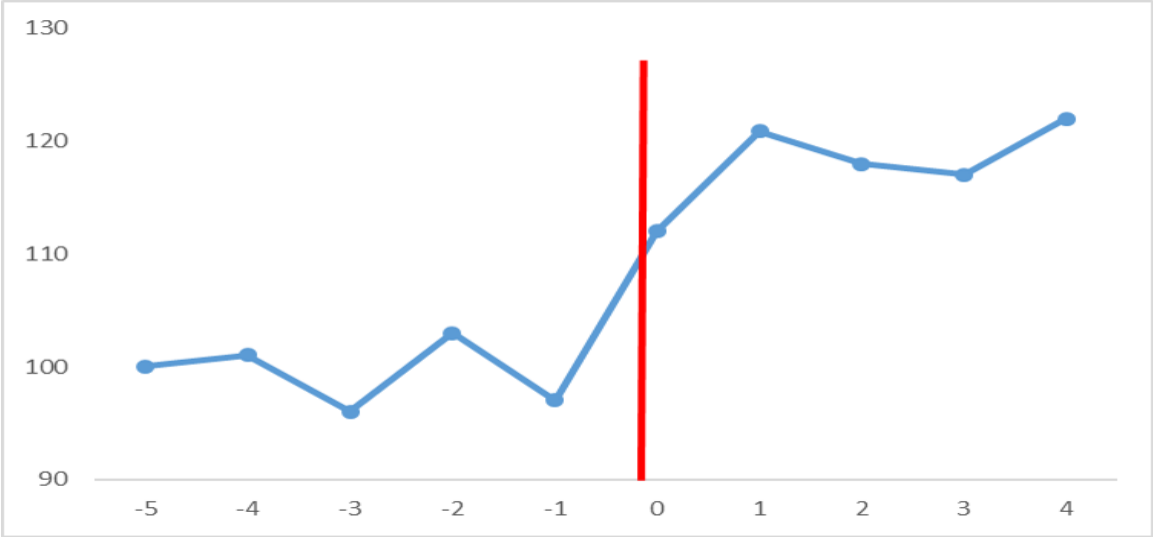

Figure 3: The figure plots the total expenditure of all the individuals in our sample that received the new card. We recode the spending levels of the control group as 100 at the beginning of the time window (5 months before receiving the new card). Time 0 is defined as the membership expiration month.

Table I: Standard Difference-in-Differences

The table presents the results of the Diff-in-Diff analysis according to Equation (1) for total spending (Columns 1-3) and spending on the previously held card/s (Columns 4-6). We present the results of the natural logarithm of each outcome variable. *After* is a dummy variable taking the value of one for the 12 months after receiving the new credit card and zero for the 12 months before. *Treat* is a dummy variable taking the value of one for individuals in the treatment group and zero for the individuals in the control group. Columns 2-3 and 5-6 present the results of the panel regression separately for the treatment and the control group with *After* as the explanatory variable and including individual fixed effects. In Columns 1,4 we include individual and year-month fixed effects. In Columns 2-3 and 5-6 we include individual fixed effects. Standard errors (in parentheses) are clustered by individual and time.

	Total Spending			Spending on Previous Card		
(lr)2-4(lr)5-7	(1)	(2)	(3)	(4)	(5)	(6)
	All	Treated	Control	All	Treated	Control
TreatxAfter	0.263***			0.00581		
	(0.0384)			(0.0332)		
After		0.297***	0.0362**		0.0392	0.0350*
		(0.0233)	(0.0135)		(0.0251)	(0.0145)
Individual Fixed Effects	YES	YES	YES	YES	YES	YES
Year-month Fixed Effects	YES			YES		
Observations	587700	290775	296925	580500	284025	296475
Adjusted R^2	0.581	0.512	0.644	0.585	0.536	0.633

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table II: Additional Specifications

Column 1-2 in the table present the results of the staggered Diff-in-Diff analysis according to Equation (2). Columns 3-4 present the results of the regression Discontinuity in time analysis according to Equation (3). In Columns 1,3 the outcome variable is total expenditure, and in Columns 2,4 the expenditure on the previously held card. We present the results of the natural logarithm of each outcome variable. *Treated* is a dummy variable taking the value of one for individuals whose memberships expire each month during the first two years, and zero for individuals whose memberships have not expired yet. *Post* is a dummy variable taking the value of one during the first 5 months after receiving the new card and zero for the prior 5 months. We include individual and year-month fixed effects. Standard errors (in parentheses) are clustered by individual and time.

	Staggerred Diff-in-Diff		RDiT	
(lr)2-3(lr)4-5	(1)	(2)	(3)	(4)
	Total Spending	Previous Card	Total Spending	Previous Card
Treated	0.291***	0.0484		
	(0.0449)	(0.0546)		
Post			0.275***	0.0193
			(0.0652)	(0.0552)
Individual Fixed Effects	YES	YES	YES	YES
Year-month Fixed Effects	YES	YES	YES	YES
Observations	156469	152454	55145	53890
Adjusted R^2	0.489	0.517	0.591	0.617

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table III: Difference-in-Differences with Quintile regression

The table presents the results of the Diff-in-Diff analysis according to Equation (1) using a Quintile regression for the 25th, 50th and 75th percentiles response in total spending (Columns 1-3) and spending on the previously held card (Columns 4-6). We present the results of the natural logarithm of each outcome variable. *Treat* is a dummy variable taking the value of one for individuals in the treatment group and zero for the individuals in the control group. *After* is a dummy variable taking the value of one for the 12 months after receiving the new credit card and zero for the 12 months before. We include individual fixed effects.

	Total Spending			Spending on Previous Card		
(lr)2-4(lr)5-7	(1)	(2)	(3)	(4)	(5)	(6)
	p(25%)	p(50%)	p(75%)	p(25%)	p(50%)	p(75%)
TreatxAfter	0.233***	0.269***	0.311***	0.000930	0.0101***	0.0180***
	(0.00324)	(0.00263)	(0.00366)	(0.00407)	(0.00290)	(0.00356)
Individual Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	733125	733125	733125	722025	722025	722025

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table IV: Spending by Installments

The table presents the results of the Diff-in-Diff analysis according to Equation (1) for total spending (Panel A) and spending on the previously held card (Panel B). We present the results of the natural logarithm of each outcome variable. Columns 1-3 in each Panel present the results of non-installment payments, while Columns 4-6 present the installment payments. *After* is a dummy variable taking the value of one for the 12 months after receiving the new credit card and zero for the 12 months before. *Treat* is a dummy variable taking the value of one for individuals in the treatment group and zero for the individuals in the control group. Columns 2-3 and 5-6 of each Panel present the results of the regression separately for the treatment and the control groups with *After* as the explanatory variable. In Columns 1,4 we include individual and year-month fixed effects. In Columns 2,3,5,6 we include individual fixed effects. Standard errors (in parentheses) are clustered by individual and time.

Panel A: Total Spending

	Non Installment Spending			Installment Spending		
(lr)2-4(lr)5-7	(1)	(2)	(3)	(4)	(5)	(6)
	All	Treated	Control	All	Treated	Control
TreatxAfter	0.263***			0.00537		
	(0.0402)			(0.107)		
After		0.314***	0.0520		-0.0166	-0.0141
		(0.0341)	(0.0433)		(0.0504)	(0.0463)
Individual Fixed Effects	YES	YES	YES	YES	YES	YES
Year-month Fixed Effects	YES			YES		
Observations	587700	290775	296925	507000	239550	267450
Adjusted R^2	0.626	0.552	0.700	0.361	0.302	0.389

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Panel B: Spending on the Previously Held Card

	Non Installment Spending			Installment Spending		
(lr)2-4(lr)5-7	(1)	(2)	(3)	(4)	(5)	(6)
	All	Treated	Control	All	Treated	Control
TreatxAfter	-0.0150			0.0315		
	(0.0250)			(0.0596)		
After		0.0448	0.0614		-0.0226	-0.0448
		(0.0445)	(0.0400)		(0.0229)	(0.0479)
Individual Fixed Effects	YES	YES	YES	YES	YES	YES
Year-month Fixed Effects	YES			YES		
Observations	580425	284025	296400	491475	220425	271050
Adjusted R^2	0.626	0.566	0.688	0.391	0.316	0.406

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table V: Liquidity Constraint

The table presents the results of the Diff-in-Diff analysis according to Equation (1) for total spending (Panel A) and spending on the previously held card (Panel B). We present the results of the natural logarithm of each outcome variable. Columns 1-3 in each Panel present the results of constraint individuals, defined as those with an average utilization ratio bigger than 75% prior to receiving the new card. Columns 4-6 present the the results of constraint individuals, those with utilization ratios below 50%. *After* is a dummy variable taking the value of one for the 12 months after receiving the new credit card and zero for the 12 months before. *Treat* is a dummy variable taking the value of one for individuals in the treatment group and zero for the individuals in the control group. Columns 2-3 and 5-6 of each Panel present the results of the panel regression separately for the treatment and the control group with *After* as the explanatory variable. In Columns 1,4 we include individual and year-month fixed effects. In Columns 2,3,5,6 we include individual fixed effects. Standard errors (in parentheses) are clustered by individual and time.

Panel A: Total Spending

	Constraint Individuals			Non-constraint Individuals		
(lr)2-4(lr)5-7	(1)	(2)	(3)	(4)	(5)	(6)
	All	Treated	Control	All	Treated	Control
TreatxAfter	0.318**			0.322***		
	(0.101)			(0.0464)		
After		0.415***	0.112		0.325***	0.0235
		(0.0868)	(0.0596)		(0.0404)	(0.0272)
Individual Fixed Effects	YES	YES	YES	YES	YES	YES
Year-month Fixed Effects	YES			YES		
Observations	85716	35787	40182	527316	271158	203016
Adjusted R^2	0.595	0.599	0.615	0.601	0.533	0.685

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Panel B: Spending on the Previously Held Card

	Constraint Individuals			Non-constraint Individuals		
(lr)2-4(lr)5-7	(1)	(2)	(3)	(4)	(5)	(6)
	All	Treated	Control	All	Treated	Control
TreatxAfter	-0.0573			0.0566		
	(0.0952)			(0.0352)		
After		0.0577	0.109		0.0758	0.0234
		(0.110)	(0.0668)		(0.0498)	(0.0524)
Individual Fixed Effects	YES	YES	YES	YES	YES	YES
Year-month Fixed Effects	YES			YES		
Observations	70983	30801	40182	412188	209622	202566
Adjusted R^2	0.620	0.585	0.616	0.613	0.564	0.665

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table VI: Consumer's Age

The table presents the results of the Diff-in-Diff analysis according to Equation (1) for total spending (Panel A) and spending on the previously held card (Panel B). We present the results of the natural logarithm of each outcome variable. Columns 1-3 in each Panel present the results of individuals younger than the median age. Columns 4-6 present the the results of older individuals. *After* is a dummy variable taking the value of one for the 12 months after receiving the new credit card and zero for the 12 months before. *Treat* is a dummy variable taking the value of one for individuals in the treatment group and zero for the individuals in the control group. Columns 2-3 and 5-6 of each Panel present the results of the panel regression separately for the treatment and the control group with *After* as the explanatory variable. In Columns 1,4 we include individual and year-month fixed effects. In Columns 2,3,5,6 we include individual fixed effects. Standard errors (in parentheses) are clustered by individual and time.

Panel A: Total Spending

	Yonger Consumers			Older Consumers		
(lr)2-4(lr)5-7	(1)	(2)	(3)	(4)	(5)	(6)
	All	Treated	Control	All	Treated	Control
TreatxAfter	0.307***			0.215***		
	(0.0511)			(0.0485)		
After		0.361***	0.0575		0.229***	0.0146
		(0.0489)	(0.0341)		(0.0450)	(0.0225)
Individual Fixed Effects	YES	YES	YES	YES	YES	YES
Year-month Fixed Effects	YES			YES		
Observations	300825	150975	149850	286875	139800	147075
Adjusted R^2	0.565	0.498	0.610	0.596	0.526	0.669

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Panel B: Spending on the Previously Held Card

	Yonger Consumers			Older Consumers		
(lr)2-4(lr)5-7	(1)	(2)	(3)	(4)	(5)	(6)
	All	Treated	Control	All	Treated	Control
TreatxAfter	-0.0252			0.0376		
	(0.0501)			(0.0468)		
After		0.0138	0.0537		0.0657	0.0285
		(0.0444)	(0.0359)		(0.0434)	(0.0255)
Individual Fixed Effects	YES	YES	YES	YES	YES	YES
Year-month Fixed Effects	YES			YES		
Observations	297075	147225	149850	283425	136800	146625
Adjusted R^2	0.567	0.537	0.594	0.597	0.531	0.664

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table VII: Expenditure Below Previous Limit

The table presents the results of the standard Diff-in-Diff analysis according to Equation (1) for the natural logarithm of total spending (Panel A) and spending on the previously held card (Panel B) only among the treated individuals. In Column 1 we present the results only for months when the individual's expenditure is lower than the limit prior to receiving the new card. In Columns 2-4 we present the results for months when the expenditure is lower than 90%, 80% and 60% respectively. *After* is a dummy variable taking the value of one for the 12 months after receiving the new credit card and zero for the 12 months before. We include individual fixed effects. Standard errors (in parentheses) are clustered by individual and time.

Panel A: Total Spending

	(1) Up to 100%	(2) Up to 90%	(3) Up to 80%	(4) Up to 60%
After	0.256***	0.251***	0.244***	0.227***
	(0.0351)	(0.0346)	(0.0344)	(0.0338)
Individual Fixed Effects	YES	YES	YES	YES
Observations				
Adjusted R^2	262246	256780	250393	234949
r2_a	0.531	0.537	0.548	0.569

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Panel B: Spending on the Previously Held Card

	(1) Up to 100%	(2) Up to 90%	(3) Up to 80%	(4) Up to 60%
After	0.0104	0.00720	0.000975	-0.00852
	(0.0321)	(0.0326)	(0.0335)	(0.0317)
Individual Fixed Effects	YES	YES	YES	YES
Observations				
Adjusted R^2	255822	250535	244217	229254
r2_a	0.553	0.558	0.566	0.581

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table VIII: Consumer's Risk

The table presents the results of the Diff-in-Diff analysis according to Equation (1) for the natural logarithm of total spending (Panel A) and spending on the previously held card (Panel B). Columns 1-3 in each Panel present the results for the top 50% of individuals by risk (as evaluated based on an internal scoring model of the card issuer). Columns 4-6 present the the results of less risky individuals. *After* is a dummy variable taking the value of one for the 12 months after receiving the new credit card and zero for the 12 months before. *Treat* is a dummy variable taking the value of one for individuals in the treatment group and zero for the individuals in the control group. Columns 2-3 and 5-6 of each Panel present the results of the panel regression separately for the treatment and the control group with *After* as the explanatory variable and including individual fixed effects. In Columns 1,4 we include individual and year-month fixed effects. Standard errors (in parentheses) are clustered by individual and time.

Panel A: Total Spending

	Higher Risk Consumers			Lower Risk Consumers		
(lr)2-4(lr)5-7	(1)	(2)	(3)	(4)	(5)	(6)
	All	Treated	Control	All	Treated	Control
TreatxAfter	0.250***			0.281***		
	(0.0539)			(0.0534)		
After		0.339***	0.0528		0.296***	0.0133
		(0.0439)	(0.0388)		(0.0505)	(0.0303)
Individual Fixed Effects	YES	YES	YES	YES	YES	YES
Year-month Fixed Effects	YES			YES		
Observations	301650	142350	159300	273825	143400	130425
Adjusted R^2	0.586	0.485	0.650	0.580	0.529	0.641

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Panel B: Spending on the Previously Held Card

	Higher Risk Consumers			Lower Risk Consumers		
(lr)2-4(lr)5-7	(1)	(2)	(3)	(4)	(5)	(6)
	All	Treated	Control	All	Treated	Control
TreatxAfter	0.0192			0.00774		
	(0.0499)			(0.0530)		
After		0.0617	0.0476		0.0215	0.0118
		(0.0413)	(0.0385)		(0.0494)	(0.0334)
Individual Fixed Effects	YES	YES	YES	YES	YES	YES
Year-month Fixed Effects	YES			YES		
Observations	297900	138450	159450	270150	140325	129825
Adjusted R^2	0.572	0.488	0.629	0.608	0.578	0.646

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table IX: Robustness Tests (1)

Panel A presents the results of the standard Diff-in-Diff analysis in Equation (1), Panel B presents the results of the staggered Diff-in-Diff analysis in Equation (2), and Panel C for the RDiT analysis in Equation (3). In Columns 1-2 of each Panel we exclude members with expiration dates during the last 2 quarters of the staggered implementation process, and in Columns 3-4 we exclude members whose membership expired during the first 2 quarters.

Panel A: Standard Diff-in-Diff

	Excl. Late Dates		Excl. Early Dates	
(lr)2-3(lr)4-5	(1)	(2)	(3)	(4)
	Total Spending	Previous Card	Total Spending	Previous Card
TreatxAfter	0.263***	0.00610	0.263***	0.00515
	(0.0315)	(0.0233)	(0.0418)	(0.0378)
Individual Fixed Effects	YES	YES	YES	YES
Year-month Fixed Effects	YES	YES	YES	YES
Observations	243827	240851	463704	458034
Adjusted R^2	0.576	0.579	0.583	0.587

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Panel B: Staggered Diff-in-Diff

	Excl. Late Dates		Excl. Early Dates	
(lr)2-3(lr)4-5	(1)	(2)	(3)	(4)
	Total Spending	Previous Card	Total Spending	Previous Card
Treated	0.290***	0.0476	0.293***	0.0490
	(0.0457)	(0.0560)	(0.0448)	(0.0545)
Individual Fixed Effects	YES	YES	YES	YES
Year-month Fixed Effects	YES	YES	YES	YES
Observations	130441	127081	133649	130223
Adjusted R^2	0.487	0.515	0.491	0.519

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Panel C: RDiT

	Excl. Late Dates		Excl. Early Dates	
(lr)2-3(lr)4-5	(1)	(2)	(3)	(4)
	Total Spending	Previous Card	Total Spending	Previous Card
Post	0.272***	0.0173	0.275***	0.0193
	(0.0657)	(0.0552)	(0.0652)	(0.0552)
Individual Fixed Effects	YES	YES	YES	YES
Year-month Fixed Effects	YES	YES	YES	YES
Observations	53838	52605	55145	53890
Adjusted R^2	0.588	0.615	0.591	0.617

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table X: Robustness Tests (2)

Columns 1,2 present the results of the standard Diff-in-Diff analysis in Equation (1), changing Treated group to individuals with expiration dates in the first 18 months of the staggered implementation process, while the control group includes those with expiration dates during the last 18 months. Columns 3,4 present the RDiT specification in Equation (3) changing the period around the expiration months from 5 to 3 months.

	Standard Diff-in-Diff		RDiT	
(lr)2-3(lr)4-5	(1)	(2)	(3)	(4)
	Total Spending	Previous Card	Total Spending	Previous Card
Alt_TreatxAfter	0.254***	-0.00235		
	(0.0454)	(0.0424)		
Alt_Post			0.246**	0.0114
			(0.0785)	(0.0194)
Individual Fixed Effects	YES	YES	YES	YES
Year-month Fixed Effects	YES	YES	YES	YES
Observations	586500	577620	39332	38428
Adjusted R^2	0.558	0.553	0.637	0.641

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$