

Timing to the Statement: Understanding Fluctuations in Consumer Credit Use¹

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Abstract

We show that consumers spend 10% more per day in the first week following the receipt of a credit card statement than in the days prior to the statement. We control for account-level unobserved variables, credit card bill payment date as well as day of the month, week of the month, and month-year. The increased spending is in the retail product category, which is mostly discretionary, rather than in such non-discretionary categories as schooling. We test several mechanisms for this effect including mental accounting, optimization of the free float, and liquidity constraints. We show the spending response to the credit card statement date across heterogeneous consumer types. Our results support mental accounting theories along with present-biased time preference of consumers, but not optimization of the free float or liquidity constraint explanations. Falsification tests show spending does not respond to randomized statement dates.

JEL Classification: G2, D1, D3, D8, D12, D14

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1. Introduction

The Permanent Income Hypothesis (PIH) predicts that consumers smooth consumption over time, but there is growing empirical evidence which demonstrates lumpiness in consumption and spending, even when income shocks are highly predictable. Stephens (2003) uses daily expenditure data from the Consumer Expenditure Survey and finds that social security recipients spend significantly more in the days following the third of the month when they receive their social security checks. Shapiro (2005) uses daily caloric intake data on food stamp recipients in the US and finds that recipients choose a pattern of declining consumption between monthly food stamp payments (also see, Hastings and Washington, 2010). Huffman and Barenstein (2004) use the Family Expenditure Survey of U.K families to track daily expenditure following the most recent paycheck over fourteen days. The existing literature on the failure of the Permanent Income Hypothesis explains these declines in spending across time primarily through liquidity constraints and precautionary savings, but mental accounting may provide an additional mechanism through which consumers switch spending behavior across time (Hastings and Shapiro, 2012).

We analyze the role of mental accounting in the intra-month decision to spend on credit cards. Consumer credit and debit cards offer an ideal setting to study the role of mental accounting because high frequency purchasing behavior can be directly observed. Prior literature has documented behavioral biases in consumer credit markets (e.g. Agarwal and Mazumder, 2012; Ben-David, 2010), and understanding the mechanisms behind these biases can help in identifying the welfare implications of the quickly expanding market for consumer credit.

Consumer credit is of growing importance. Total credit card debt is over a trillion dollars in the US, over two-thirds of consumers have a credit card, and over half revolve debt. Consumer credit is growing even more quickly in developing countries where access to financial products

has traditionally been difficult but liberalization in the banking sector has recently allowed for an expansion in the availability of financial products. The ability of consumers to manage credit well has direct implications for the welfare impact of consumer credit proliferation. Existing literature suggests that consumer reaction to shocks to credit card terms cannot be fully explained by conventional models: consumers carry debt on credit cards while holding low-yielding assets and respond more in borrowing to changes in interest rates than would be expected (Gross and Souleles, 2002). Behavioral models may provide an additional explanation for these effects.

We test whether a credit cardholder's spending pattern is impacted by the credit card statement date and consider several possible explanations for this outcome. The statement date is highly predictable across months, but exogenously set by the bank. The bank from which we collected our data sets statement dates in order to optimize its own cash-flow considerations, and does not allow consumers to change statement dates. To the consumer, the statement date is a marker for the end of the previous credit cycle and the start of the next cycle. It also marks the beginning of the period at which new borrowing is at zero cost for a month (the "float").

Statement date offers several advantages over other sources of credit card-based shocks. Shocks in the form of changes in credit limits or APRs are seldom exogenous.² These are typically functions of cardholders' income, type of employment, pattern of past spending, and other consumer characteristics. In our setting, statement dates are completely exogenous to the consumer. The issuing bank has complete discretion in determining each cardholder's statement date, and assigns statement dates keeping in mind its own liquidity, cash flow and operational considerations, but typically does not use consumer information to determine the statement date. Figure 1 shows that the statement dates of the accounts in our sample are distributed across the

² Gross and Souleles (2002) are able to identify the effects of changes in credit terms through exogenous changes in APRs and credit limits.

month. In addition, statement dates are highly predictable to the consumer: we would not expect to see large changes in behavior around the statement date. Statement dates therefore provide us with variation with which to observe high frequency financial decisions among consumers.

We employ a unique transaction-level dataset from one of the largest financial institutions in India. We use detailed monthly statement data for the period January 2006 to May 2008 for 5797 credit card account holders of which 2882 hold a debit card as well. The dataset contains demographic information about the account holder, statement date, payment due date, date of actual payment for some account holders, credit limit, amount spent on the card, minimum payment due, actual amount paid, and information on the size of each transaction.

We run a distributed lag model with statement date as the exogenous event and observe the impulse response of credit card spending to the date of issuance of the credit card statement. We find that consumers increase the use of their credit card in the first days following the issuance of the credit card statement. Credit card spending is 11-13% higher per day in the first two days after the credit card statement is issued, and 10% higher per day in the first week after the credit card is issued. This is both economically and statistically significant. Because we have vendor information for the transaction level data, we can categorize spending types, and we find that in the discretionary retail sub-category, credit card spending increases following the statement date but not in other less discretionary expenditures such as school fees.

To better understand this increased spending effect, we also analyze debit card spending. We show that unlike the increase in consumer credit use following the issuance of the credit card statement, debit card use is uncorrelated with the credit card statement date. Our results are robust to controlling for credit card payment dates, and calendar dates (as proxy for salary

payday which tends to be clustered around the beginning of the month). Falsification tests show that there is no response to a randomly assigned statement date.

We consider a number of explanations for the spending increase in response to the statement date, and find the most support for mental accounting models. Mental accounting leads consumers to allocate and track expenses by category, and their purchases are guided by the money available for each category (Heath and Soll, 1996). Hence, future spending is inversely related to past spending within a category and period. Spending in the specific category increases only after the depleted category is replenished, thereby violating the assumption of fungibility of money across categories or accounts. In our context, consumers may dedicate a specific mental account to credit cards versus other forms of payment (e.g., debit cards). Treating each such payment form as a separate category, consumers use each payment form until the balance has reached their mental “limit” for the account.

The mental accounting model would suggest that the statement date marks the end of a spending cycle to the consumer, and the balance is reset to zero. Having “replenished” the account, the consumer starts to use the credit card account again. Such behavior would be observed through increased spending following the issuance of the credit card statement. We also find no response in debit card spending to credit card statement date which is consistent with mental accounting models. Expenditures with a debit card are a separate category, independent from credit card spending.

We also consider two other models consistent with the increased spending immediately following the statement date. A rational optimization model suggests that since credit cards offer a free float for up to a month, it is an attractive way to fund expenditure against future income. The float is most valuable in the initial days after the credit card statement is issued as the float

period is maximized, so it provides an alternative explanation for the increase in credit use following the release of the statement. To test this hypothesis, we create subsamples of consumers based on when they pay the credit card bill. Customers wanting to maximize the amount of time free credit is allocated to them would also pay their credit card bill later. So if optimization of the float is the key mechanism for the statement date effect, we expect it to be strongest among the consumers paying credit card bills toward the end of the grace period. We find evidence to the contrary.

We also test whether the statement date effect is a result of liquidity constraints. If consumers are liquidity constrained but carry enough cash to pay off their credit cards when the statement is issued, the ability to borrow again on the credit card following the statement date leads to a surge in spending. Contrary to the predictions of a liquidity constraint model, we find that customers close to their credit card limit at the statement date are less likely to respond to the issuance date of the credit card statement in their spending.

The spending behavior of transactors and revolvers provides added support for a mental accounting model over a liquidity constraint model. Transactors pay off their credit card balance each month while rotators pay less than the balance total amount, and incur an interest charge on the outstanding amount carried to the next credit cycle. Transactors are more likely to use mental accounting as they can reset their mental account to zero after every statement period as they expect to payoff their balance each month. A liquidity constraints model would suggest that rotators are more likely to exhibit strong responses to the credit card statement date as they are more likely to be liquidity constrained. Based on daily spending levels' data, we find that the spending response for transactors is much stronger than the spending response for revolvers. This suggests that liquidity constraints do not drive our results.

While mental accounting offers an explanation for credit cardholders' spending response even when there is no increase in income, the increased spending (of 10 percent per day) within the first week immediately following the statement date is also consistent with credit cardholders' taste for instant gratification, i.e., present-biased time preference (Shapiro (2005), Meier and Sprenger (2010)).³

This paper proceeds as follows. Section 2 provides an overview of strands of the economics and finance literature that relate to our work. Section 3 chronicles the vast expansion in credit card use in India in the past decade and discusses the institutional details and the characteristics of our unique transaction-level dataset from India. We provide summary statistics from the data and explain our event study empirical strategy. Section 4 discusses the main result documenting the effect of credit card statement date on spending. Section 5 considers tests for a number of alternative hypotheses and shows that the results are robust to a variety of falsification tests. Section 6 concludes and discusses the policy implications of our findings.

2. Literature Review

We contribute to the growing literature on consumption response to shocks. Income shocks have taken the form of end of mortgage payments (Coulibaly and Li, 2006), completion of vehicle loan payments (Stephens, 2008), social security checks (Stephens, 2003), food stamp receipts (Shapiro, 2005), and Alaska Permanent fund (Hsieh, 2003). Other papers have considered the role of various fiscal stimuli as shocks, such as the 2001 U.S. tax rebates (Agarwal, Liu and Souleles, 2007; Shapiro and Slemrod, 2003),⁴ the 2008 tax rebates on payday

³ Meier and Sprenger (2010) show that revolvers have a greater preference for instant gratification. Therefore, on grounds of both greater liquidity constraint and present-biased time preference arguments, one would have expected the statement response to be stronger for revolvers, and weaker for transactors. We find evidence to the contrary.

⁴ Other related studies include Wilcox (1989, 1990), Parker (1999), Souleles (2000, 2002), Browning and Collado (2001), and Hsieh (2003).

loans payments (Bertrand and Morse, 2009) the 2001 and 2008 tax rebates on bankruptcy filing (Gross, Notowidigdo, and Wang, 2012). While most of these papers have a direct income change, either through lower expenses (e.g., end of mortgage payments, food stamp receipts) or increase in income (e.g., tax rebate), our paper considers the spending implications of a shock which does not directly change income, but potentially affects consumers' perception of spending ability.

Many papers have identified mental accounting in a variety of contexts – from 401(k) contribution (Choi, Laibson and Madrian, 2009; Feldman, 2010) to addressing self control problem in saving for health expenses (Dupas and Robinson, 2012). Feldman (2010) considers IRA contributions in response to the 1992 U.S. tax withholding rule change while Hastings and Shapiro (2012) focus on consumer response in the gas market to price rises. We use a large database of credit transactions to identify mental accounting.

In the context of credit cards, Prelec and Loewenstein (1998) argue that by decoupling the purchase from payment allows consumers to put them into separate mental accounts, making credit cards appear more attractive. However, we find evidence of credit cards (and debit cards) themselves as a separate mental account or category in consumers' minds. Given that different cards are no longer considered fungible, we find evidence of increased spending when the specific account (credit card in our case) experiences a shock in the form of a new spending cycle as of the statement date. Analogously, we find no effect from the statement date on the use of debit card.

Our work contributes to the growing evidence of present-biased time preference among consumers. Shapiro (2005) finds evidence of such short-run impatience in consumers' caloric

intake following the receipt of monthly food stamps. In our paper, such impatience is evident even without any real increase in cardholders' purchasing power. More directly, several papers have considered the implication of present-biased time preference for consumer debt, and specifically credit card borrowings. In particular, Meier and Sprenger (2010) find evidence of greater preference for instant gratification being positive correlated with credit card borrowing. Our finding, that revolvers (who have larger borrowings) have a more muted spending response to the statement date than do transactors, may be reconciled with Meier and Sprenger (2010). Mental accounting leads cardholders to reset their mental limit on the credit card, but by a much larger amount for transactors compared with revolvers. Such a large reset leads to a significantly greater spending response among transactors than among revolvers, after accounting for their present-biased time preference. Therefore, the literature on present-biased preference further strengthens our result on the relevance and importance of mental accounting.

3. Institutional Details, Data and Methodology

Credit cards in India were introduced by public sector banks in the 1980s, but were little used until the entry of foreign banks in the 1990s. ANZ Grindlays introduced a credit card in 1989, Citibank in 1990 and HSBC in 1992. The credit card market was initially focused on the high-income consumer market, but it is now expanding across the salaried and professional worker categories.

Credit cards are an increasingly important category of consumer credit in India. Between 2005-06 and 2008-09, the growth in credit card receivables was the largest contributor to the growth in commercial banks' portfolio of total loans and advances (Reserve Bank of India (RBI), various issues). The use of credit cards is growing quickly: there is increased availability of the cards and improved acceptance at points of sale. The total value of all credit card transactions at

the point-of-sale (POS), as a proportion of GDP, has doubled between 2003-04 to 2008-09, rising from 0.6 percent in 2003-04 to 1.2 percent in 2008-2009. Over the period from 2006-07 to 2008-09, the number of outstanding credit cards issued in India grew at an average annual rate of 12.5 percent; the average annual growth in the number and value of credit card transactions at the POS were 18.5 percent and 24.5 percent, respectively. There has also been an increased use of debit cards, both in terms of number and value of transactions.⁵ As of 2011-12, the total number of outstanding credit and debit cards in India was 17.65 million and 278.28 million, respectively.

3.1 Data

We use a proprietary dataset of retail account holders in one of the five largest domestic private commercial banks in India which is also one of the biggest issuers of credit and debit cards. The dataset includes 10,000 savings account holders and all of their accounts at the bank during our sample period, January 2006 to May 2008. It includes information on the type of account, account holders' age, marital status, gender and city of residence. In addition, it provides data on the card(s) attached to an account for the duration of our sample period. The issuance of debit and credit cards is not automatic for most account holders, so the consumers in our data have specifically applied for these accounts. We have transaction-level data for credit and debit cards that come from the monthly statements of these accounts. These provide data on transaction dates as well as amount spent on each transaction. In most of our specifications, spending has been aggregated up to daily totals, although we also investigate timing of spending across categories of merchants. In addition to daily spending data, we also have data on credit

⁵ According to a U.S. Department of Commerce report, market penetration (credit and charge cards per capita) in 2005 was similar in China, India and Russia, at about 0.02. In comparison, it was 2.53 in the U.S. but with much slower growth than the emerging markets.

card statement date, payment due date for a sample of accounts, minimum amount to be paid, and credit limit.⁶ Finally, we do not assume that account holders remember their statement date. According to bank personnel we spoke with, emails have been used since the early 2000's and was certainly the mode used during our sample period (2006-2008) for sharing the credit card statement on the date the cycle ended (i.e., the statement date).⁷

We compare results across consumers who have both debit and credit cards as these cards are close substitutes and the decision to systematically use one over the other is therefore revealing.⁸ There are 2,882 account holders in our sample with both a credit card and a debit card and transactions occur over the two and a half year sample period. Table 1 provides summary statistics for these account holders prior to their receiving their credit card. While our sample is not representative of the general population, it is typical of financial services clients in India. Most account holders are married men and the average account holder age is 30. We separately provide demographic characteristics of account holders with credit cards (irrespective of whether or not they have a debit card) and those with only a debit card. A comparison of demographic characteristics of these classes of consumers shows that they are similar along observable characteristics, so our results are indicative of what we could expect to see following further expansion in the credit consumer base.

To motivate our analysis of daily spending patterns, Table 2 reports summary statistics on credit and debit card spending and frequency of use based on transactions-level data at the person-day level. Summary of credit card transactions is based on account holders with a credit

⁶ We are somewhat limited in our analysis in that we do not have data on APR, changes in customer credit limits over time, differences in features of cards across account holders in the sample, or the number of other credit or debit cards the account holder has from other banks.

⁷ Presently, most account holders receive both short message service (SMS on mobile phones) and email with information about the credit card statement on the date the cycle ends.

⁸ Zinman (2009) compares the consumer's choice of debit and credit card. We focus on credit card use but we use debit card spending response to credit card statement date both as a robustness test as well as to explore the implication for total spending.

card who may or may not have a debit card (about 2.73 million person-day observations) while the debit card transactions' summary includes account holders who may or may not have a credit card (about 1.02 million observations). Average daily spending on credit cards is Rs. 201 and average debit card daily spending is Rs. 35, and credit card transactions are twice as frequent as debit card transactions. There is substantial heterogeneity in use of the credit cards—many consumers have very few debit and credit transactions, but some consumers use both cards frequently. The mean credit limit is Rs. 55,981 suggesting that an average account holder only uses about 11 percent of the credit limit in a month. The average consumer has had a credit card for 1.7 years, but some consumers acquire their credit cards over the sample period.

3.2 Exogeneity of Credit Card Statement Dates

Our identification strategy relies on exogenous variation in statement dates across accounts. Managers at the bank explained that the bank does not allow its customers to choose their own statement dates. The bank chooses the statement dates based on its operational convenience and its need to optimize liquidity and cash flow. This reduces concerns about potential endogeneity of the statement date which would arise if customers chose their dates based on their own cash flow and spending needs or other customer preferences or characteristics. Figure 1 shows the distribution of statement dates over the course of a month across accounts in percentage terms.

Because the exogeneity of the statement date is crucial to our identification, we provide non-parametric evidence that the bank does not base its decision about statement dates for different consumers on the information that it has on the consumers. In Figure 2, we chart the

statement date frequency across sub-groups of consumers based on key demographic and account-level characteristics including gender, marital status, location (rural or urban), account holder age, age of the account, and different levels of credit limits. We observe no major differences across the distributions, suggesting that the bank is not basing statement dates on readily observable information about the customers.

Figure 3 further investigates spending across the month. We plot the frequency of credit card transactions on each day of the month, as a percentage of the total number of transactions across all accounts. We see that just over 3% of transactions occur on any given day of the month, and the level is extremely steady across the month (standard deviation is 0.27). The absence of large swings in credit card use across the month is further suggestive evidence that the bank's effort at smoothing cash flow and liquidity across the month is relatively successful.

3.3 Methodology

Our analysis exploits the disaggregated nature of our data. We use intra-month account-level data, focusing on the daily spending on credit cards and debit cards as it responds to the credit card statement date.

Let $S_{i,t}$ represent the amount of daily spending on credit or debit card by account holder i at the end of each day t , $I_{i(t)}$ be an indicator for i if the bank issued her credit card statement on day t , $I_{i(t-1)}$ be an indicator for i if the bank issued her credit card statement 1 day prior to day t , $I_{i(t-2)}$ be an indicator for i if the bank issued her credit card statement 2 days prior to day t , and so on. $I_{i(0)}$ is the excluded variable, so all coefficients are in comparison to the day the statement is issued. Our baseline estimation equation is given by:

$$S_{i,t} = \alpha_i + \sum_{d=1}^{31} \beta_{i(t-d)} I_{i(t-d)} + \gamma' X_t + \varepsilon_{it} \quad (1)$$

The *marginal* coefficients $\beta_1, \beta_2, \dots, \beta_{31}$ measure the *additional* spending each day after the issuance of the credit card statement (day 1 to day 31) relative to the day of the issuance of the statement (day 0).

While we have basic demographic information about the account holders, there are a variety of omitted variables that may potentially be correlated with the indicator variable, $I_{i(t)}$. We use a full set of account fixed effects, α_i , to control for potential omitted variables bias related to customer-specific spending. The account level fixed effects mean that the correct interpretation of the marginal coefficients for each day after the statement date is the spending relative to each customer's average spending. X_t is a vector of controls which include day of the week, day of the month and month-year fixed effects. These address potential omitted variable biases related to cyclical spending.

We also run the regressions by week, with four weeks per month, the first week beginning the day after the issuance of the statement, the second week beginning the 8th following the statement, the third week beginning on the 15th day following the statement, and the fourth week beginning on the 21st day following the statement; the remaining three-four days per statement month are the excluded group. We include the same set of controls as those in the daily-level regressions. For ease of exposition, we discuss results of week-based regressions and report them in the main tables. Since aggregating spending effect over weeks smoothes a large temporary effect across several days and reduces the overall magnitude of the impact that we observe, we compare the week-based results with the results based on daily-level regressions which we report in graphs.

4. Result on Statement Date Response

In this section, we provide evidence of credit card spending response to the timing of credit card statement. After seeing the univariate evidence, we estimate the average response of credit spending to the credit card statement date across the weeks in a month in a multivariate setting. We then examine the difference in account holders' response between credit card and debit card.

4.1 Univariate Result

To motivate our analysis, we plot credit card usage and spending over the days following the statement date in Figures 4 and 5, respectively. In contrast to the lack of variability in credit card usage by calendar date (Figure 3), we see a noticeable variation by statement date (standard deviation in usage is 0.37). Frequency of credit card use goes from 3.7% in the first days following the statement date to 2.7% close to the next expected statement. The percent of the monthly spending (which combines both the frequency of use and the size of the purchases) shows a similar, though somewhat more limited, decline from over 1.5% in the days following the statement, to 1.3-1.4% toward the end of the statement-month, though with greater variability through the course of the month. We move to a multivariate setting to control for other factors that may affect credit card use and spending.

4.2 Baseline Multivariate Specification

Table 3 presents the results for spending across weeks in a month following the credit card statement date. The results can be interpreted as an event study, with the omitted (comparison) variable being the day of the statement and the days immediately before the

statement. This is similar in structure to other papers that have studied the consumption response to income shocks (see, Agarwal, Liu and Souleles, 2007; Aaronson, Agarwal and French, 2012).

Specification 1 in Table 3 shows a statistically significant response of daily spending in the first week following the issuance of the credit card statement. Given the mean credit card spending of Rs. 201 (Table 2), it translates into an 11% increase in daily spending in the first week. The increase is statistically and economically significant.

In specification (2), we include controls for calendar-ordered week of the month in order to allow for the possibility that credit card use increases during certain periods of the month (particularly the beginning of the month following the paycheck date). Figure 6 shows the distribution of paycheck deposits into individual bank accounts by day of the month. Unlike statement dates (Figure 1) which are distributed through the month, paycheck deposit dates are clustered around month-end or beginning of the month.⁹ We find that credit card spending does not respond to the week of the month. And importantly, the coefficient on the first week following the statement date continues to be significant. In all subsequent specifications, we include calendar-ordered week of the month control in addition to day of the month, day of the week and month-year controls.

Specification (3) considers the frequency of daily credit card use (rather than the daily amount spent) and finds that account holders are .008 percentage points more likely to use their credit cards following the issuance of their statements. This translates to an average of 12% more transactions in the days of the first week following the statement relative to the number transactions in the days immediately prior to issuance of the credit card statement. So the statement issuance date has a significant effect both on the usage of and the amount spent on credit cards.

⁹ Unlike in the U.S., most firms in India pay salaries monthly rather than bi-monthly.

One could be concerned that while statement dates are distributed across the month by the bank, customers choose their own payment dates. So their spending response may be to the payment dates rather than the statement dates. Figure 7 shows the distribution of payment dates by calendar date. We see that payment dates are highest during the first 10 days of the month and drop off somewhat towards the end of the month. Besides, credit card bill payment dates are correlated with statement dates. Figure 8 shows the distribution of days between the credit card statement date and the bill payment date. The distribution peaks at 23 days, which matches the average grace period of about 25 days. So a large proportion of account holders wait to pay their credit card bills closer to the payment due date. Since payment dates could have an impact on spending responses, specification (4) in Table 3 additionally includes controls for each week following the payment date.¹⁰ Spending does appear to be affected by the payment of a credit card - in the week following credit card payment, spending increases by 23%. Importantly, controlling for payment date increases the magnitude of the impact on spending following the statement date. Daily spending in the week following the statement date increases by 19% after controlling for weeks after payment.

In summary, we find strong empirical evidence of increased credit card spending and usage following the issuance of credit card statement. The results hold even after we control for week of the month to account for possible paycheck receipts as well as for bill payment dates.

4.3 Credit Card versus Debit Card Response to Credit Card Statement

It is possible that even with an increase in credit card spending after the statement date, total spending remains unchanged. No change in spending would suggest that consumers merely

¹⁰ In our dataset, information about credit card bill payment date is only available for account holders who have both credit and debit cards. So the sample size is smaller.

substitute spending away from other methods to credit cards, with no effect on their overall wellbeing. While we lack information on account holders' total daily spending, we do have information on debit card spending. Table 4 examines the effect of credit card statement on credit and debit cards' spending based on the sample of account holders with *both* credit and debit cards. In any analysis including credit and debit cards, there would be concerns about a positive correlation between credit and debit spending within a month. Such a correlation will exist if consumers intensively use their credit card (relative to the debit card) after the statement date and intensively use their debit card (relative to the credit card) after the paycheck day. We include a full set of day of the month dummies in order to control for any relationship between spending across the month and statement date in consumers' accounts.

Specification (1) in Table 4 considers total spending on both cards. We find that daily total spending increases in the first week following the credit card statement date with the magnitude of the increase declining over subsequent weeks. A closer look at the daily-level regressions, in Figure 9(a), shows that the spending response is primarily on the first two days following the statement date, 10 percent on the first and 12 percent on the second day. This result provides suggestive evidence for important welfare effect of the statement date on account holders. To check whether the increase may be driven primarily by debit card spending, we separately estimate the response of credit and debit cards (in specifications (2) and (3), respectively). The results show that while issuance of the statement affects the consumer's credit spending, it does not have a similar impact on the consumer's debit spending. Credit spending goes up by approximately 18% in the week following issuance of the statement while debit spending is lower but statistically insignificant. Daily-level results are similar, with credit card

daily spending increasing on the first two days (by 11% and 13%) with no significant increase in debit card spending (Figures 9(b) and 9(c)).

Besides the statement date response, Table 4 also shows that credit spending is not affected by the calendar week of the month while debit spending increases in the first week of the month followed by significant drops in the third and fourth week of the month. Since paychecks are clustered around the end of the calendar month (Figure 6), our results suggest that while paycheck receipts do not increase credit card spending, customers respond by increasing spending on the debit card in the period immediately following receipt of their paychecks. These effects are also seen in the frequency of use of the credit and debit cards (in specifications (4) and (5)).

The evidence points to an increase in daily spending on the credit card. We use the disaggregated nature of our data to examine the nature of spending. We separate transactions across broad vendor types, and focus on two extremes: retail spending and school. The retail category includes shops such as gift shops, luggage stores, piece goods stores, stationary stores, bicycle shops, sporting goods stores, etc. School includes expenditures associated with universities, vocational schools, child care services, and correspondence schools. The important distinction between the two is that retail could be considered “discretionary” and school “non-discretionary”.

Table 5 presents the results for spending response in each of these two product categories (Specification (1), for credit card spending in all categories, is the same as specification (2) in Table 3). Retail spending responds strongly in the first two weeks following the statement, but does not respond to the calendar week. A daily increase of Rs. 6.20 in the first week translates to an average impact of 15% per day (mean daily retail spending is Rs. 42). However, school

tuition which is the least discretionary category, shows no evidence of fluctuation in payments across the statement month. The spending increase is not driven by account holders setting up regular (i.e., non discretionary) payments to match the statement date. These intuitive results give us confidence in our empirical analysis.

Overall, these results appear to be consistent with mental accounting. The receipt of the statement clears the consumer's mental account for the month, at which point they increase their use of the credit card. Similarly, consumers increase their use of the debit card immediately following the beginning of the month when they have received their paychecks and decrease their use of the debit card toward the end of the month when the account may be getting lower. Consumers therefore treat credit cards differently from debit cards following the credit card statement. They appear to have different mental accounts for credit cards and for debit cards. With the issuance of the credit card statement, they reset their mental account only for credit cards, leaving their mental account for debit cards unchanged. These results control for omitted variables using account level fixed effects as well as for month-year, day of the month, and day of the week fixed effects. However, it is difficult to separate out mental accounting from present-biased preference as the underlying force driving the immediacy in spending.

5. Tests of Alternative Hypotheses

While mental accounting may be an explanation for the credit card response to the statement date, we explore alternative explanations for the spending response, including optimization of the free float allowed by the card and liquidity constraints.

The earlier a consumer spends in the credit card monthly cycle, the greater the free float advantage to the consumer. So, the consumer's increased spending following the statement period could be a rational response to the attractiveness of the float rather than mental

accounting. Another explanation for our results would be if the timing of spending were driven by liquidity constrained consumers who were unable to purchase on their credit cards in the previous cycle. We take advantage of heterogeneity in the types of account holders to test these alternative hypotheses. Finally, we discuss the results from several robustness tests.

5.1 Early versus Late Payers

We use the heterogeneity in consumers' bill payment decision to test alternative explanations for increased spending response to the credit card statement. Comparing the distribution of statement dates in Figure 1 and the bill payment dates in Figure 7, it is immediately obvious that consumers use their discretion in determining when they pay their credit card bill. For each credit card holder, we determine the days between the statement date and the bill payment date. We characterize those whose bill payment duration from the date of the statement was less than two weeks as "Early Payers," and the rest as "Late Payers." Those who care about the float (either because they are optimizers or because they are liquidity constrained) would prefer to pay their credit card bill as late as possible. So, if the impulse response in spending is coming from consumers who care about float, we should expect the late payers to exhibit a greater increase in spending after the statement date than the early payers.

Specifications (1) and (2) in Table 6 show the credit card spending response following the statement date for early and late payers, respectively.¹¹ While both groups experience an increase in spending in the first week after the statement date, the increase is significantly larger for early payers compared to that for late payers. This result offers suggestive evidence against the predictions of the float optimization and liquidity constraint hypotheses.

¹¹ In our dataset, information about credit card bill payment date is available, if at all, only for account holders who have both credit and debit cards. So the sample size is smaller.

5.2 Credit Limit as a Constraint

Instead of relying on an indirect measure of liquidity constraint based on timing of bill payment, we consider a more direct measure of liquidity constraint. We separate consumers into two groups: those who had statement balances worth 80% or more of their credit limit in their previous statement, and the remaining as unconstrained consumers.¹² There are fewer observations in the constrained category as most consumers do not hit the 80% threshold in many months. A new credit cycle by itself does not relax the credit constraint – that can only happen once the cardholder pays the bill. So it is only reasonable to consider the implication of the statement date on liquidity constraint if the threshold is less than 100%. Constrained consumers may be unwilling to purchase on their credit cards if they are close to their credit limit. So another potential explanation for our result, that spending increases in response to the credit card statement, would be that the start of a new statement cycle relaxes the consumer's liquidity constraint, allowing her to meet her pent up demand.

Specifications (3) and (4) in Table 6 present the results for constrained and unconstrained account holders, respectively. We see that credit constraints are not driving our results. The unconstrained consumers increase their spending following the statement date, similar to what we observe in the full sample. By contrast, the constrained consumers actually reduce spending in the first weeks of the month following their statement. This result would be more consistent with a model in which the statement provides information to the consumer about her spending behavior, and the constrained consumer reacts by reducing spending in the days following the statement.

¹² Alternatively, we could segment the credit cardholders into groups with low and high credit limit. However, this confounds credit constraint and individual wealth.

5.3 Transactors versus Revolvers

A transactor is a credit card customer who pays off the statement balance of his credit card from the preceding month each month. By paying off the total amount in each bill, a transactor resets their mental account each time they receive a statement. Revolvers carry at least a part of the total outstanding amount over to the next period. So revolvers do not necessarily reset the mental account to zero but to some larger non-zero number due to outstanding credit card balance. Mental accounting hypothesis would therefore suggest that one should see a greater spending response from transactors than from revolvers. But it is worth pointing out that revolvers tend to be liquidity constrained and is often the reason for not paying the entire credit card bill each time. According to the liquidity constraint hypothesis, we should expect that revolvers, more so than transactors, would increase their spending at the statement date. So the implication for revolvers and transactors are opposite under the two alternative hypotheses.

Specifications (5) and (6) in Table 6 show the regression results for revolvers and transactors, respectively. The coefficients are positive, statistically significant and of similar magnitude for both groups of consumers. Since this may be an outcome of smoothing in week-based regressions, we also look at the more disaggregated view with daily-level regressions, in Figure 10. Transactors increase their credit card spending on each of the first two days after the statement date, but there is no such statistically significant increase in spending for revolvers. While it does not support liquidity constraint as the possible driver of our results, it provides support for the mental accounting hypothesis.

5.4 Falsification Test: Spending response to a random date

Our identification relies on the fact that the statement date is exogenous and that the account holder is timing their spending to that and not some other factor which occurs within the month. We conduct a falsification test in order to check that our results are not driven by an artifact of our specification. We randomly assign the number of days that each day of the month is located from the statement date to each account in each month and estimate our distributed lag model. The estimated results (available on request) with the random assignment of the days from statement date show that there is no impact of a randomly assigned statement date across the month. We also randomly assign a day of the month to be the statement day, and calculate the number of days from that statement day. We find no impact of days from the random statement day.

6. Conclusion

We use a distributed lag model to estimate the daily response of credit card spending to credit card statement date both at the daily- and weekly-levels. We show that consumers have a strong response to receipt of their credit card statement. In particular, there is a sharp increase in total spending as well as spending on the credit card in the week following the credit card statement, with little or no substitution away from debit card spending. We offer evidence in support of mental accounting along with present-biased preference as the driver for increased spending in response to the statement date.

Financial literacy and the astuteness of financial decision making among the growing population being targeted by fast expanding financial services markets in developing countries is important in determining the necessity of increasing financial regulations in these new markets. While free access to new financial products cannot reduce the welfare of consumers

who understand the financial products and make informed decisions about their use, policy makers may be concerned about less knowledgeable consumers becoming trapped in debt after incorrectly using consumer credit. This paper provides evidence on the extent to which different types of consumers optimize their use of closely substitutable financial products.

There have been diverging trends in payment behavior around the world. Europe has experienced a significant increase in debit use at the expense of cash and checks but the market share of credit cards has remained flat and low. On the other hand, the US has experienced a significant increase in the use of credit cards at the expense of checks and cash and the market share of debit is flat and low. Rational models suggest that use of credit is optimal but behavioral models suggest that debit use promotes self-control. This paper provides evidence on the relative use of debit and credit by one of the largest new target consumer bases for consumer finance: consumers in developing country markets.

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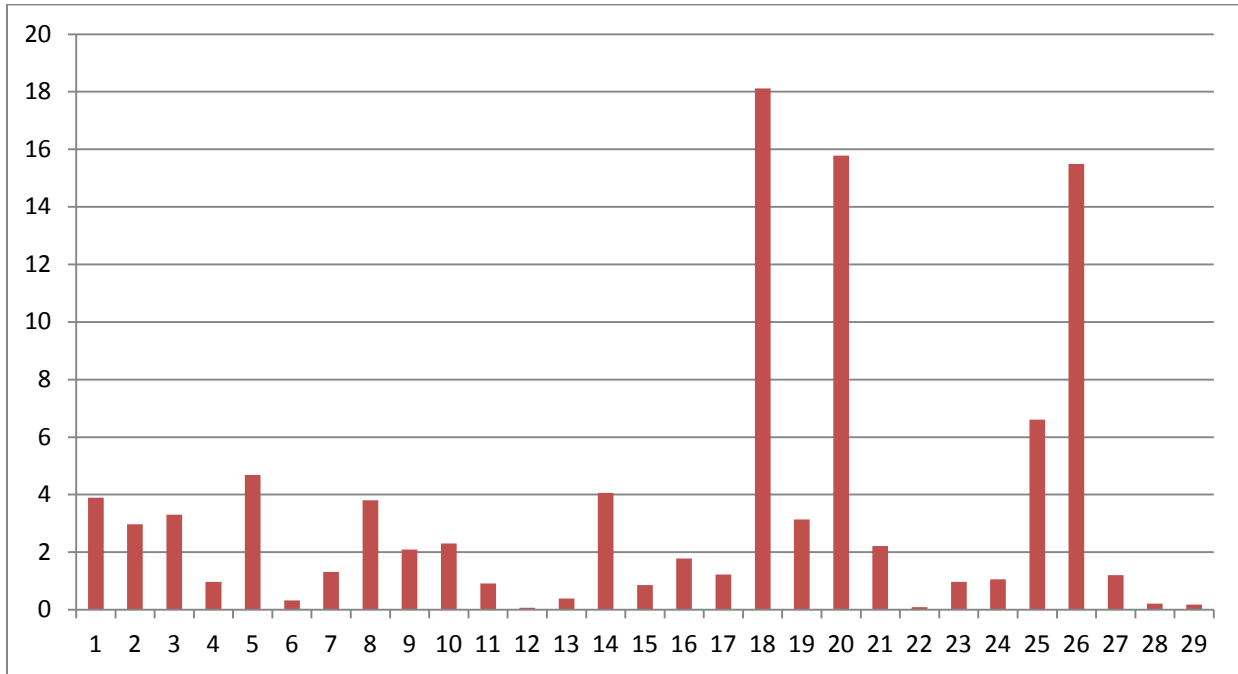
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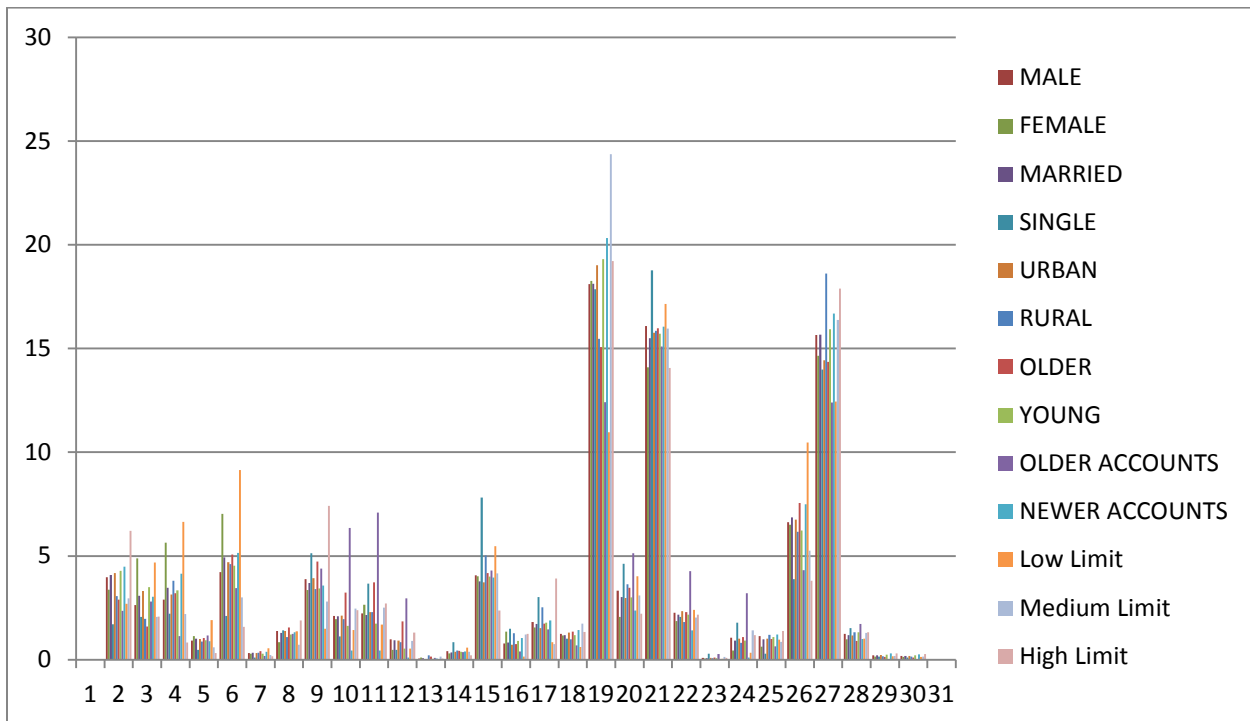
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Figure 1: Distribution of Statement Dates



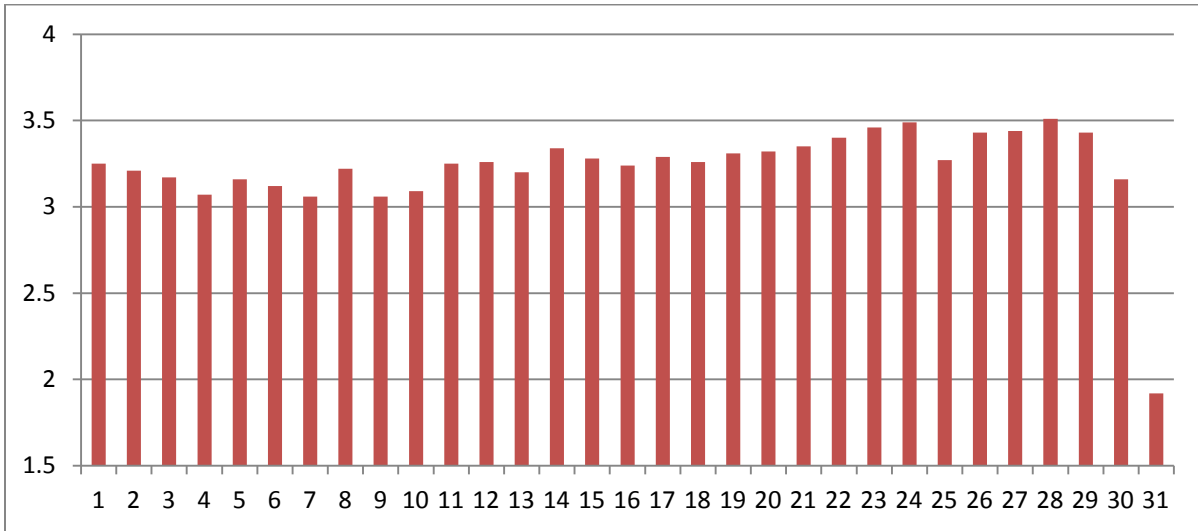
Notes: The figure plots the percentage of credit card statements that are issued on each day of the month.

Figure 2: Distribution of Statement Dates by Subgroups



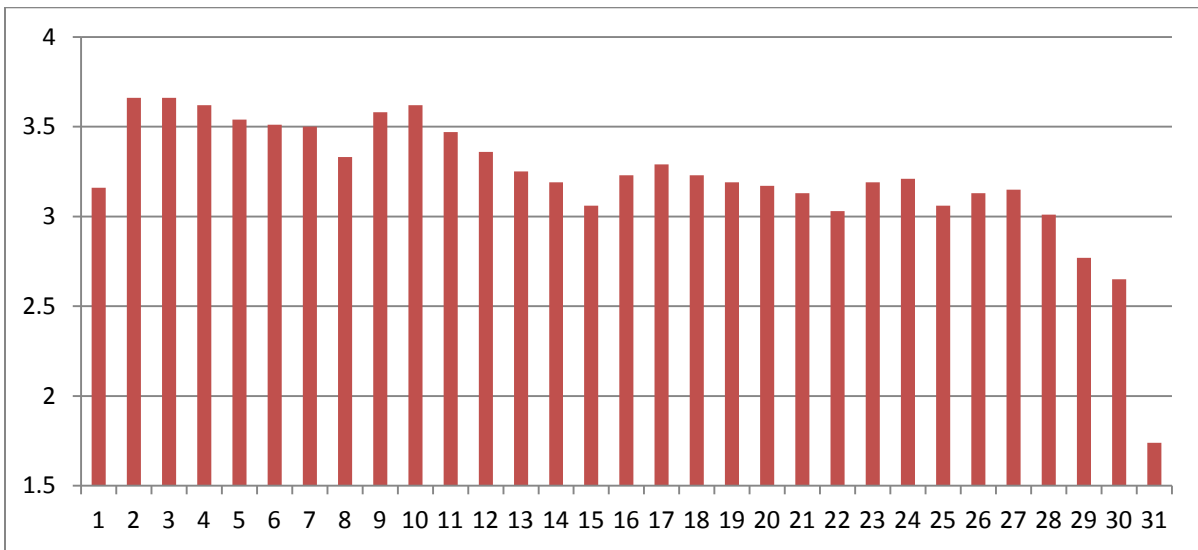
Notes: The figure plots, by account holder characteristics, the percentage of credit card statements that are issued on each day of the month.

Figure 3: Credit Card Use by Date of the Month



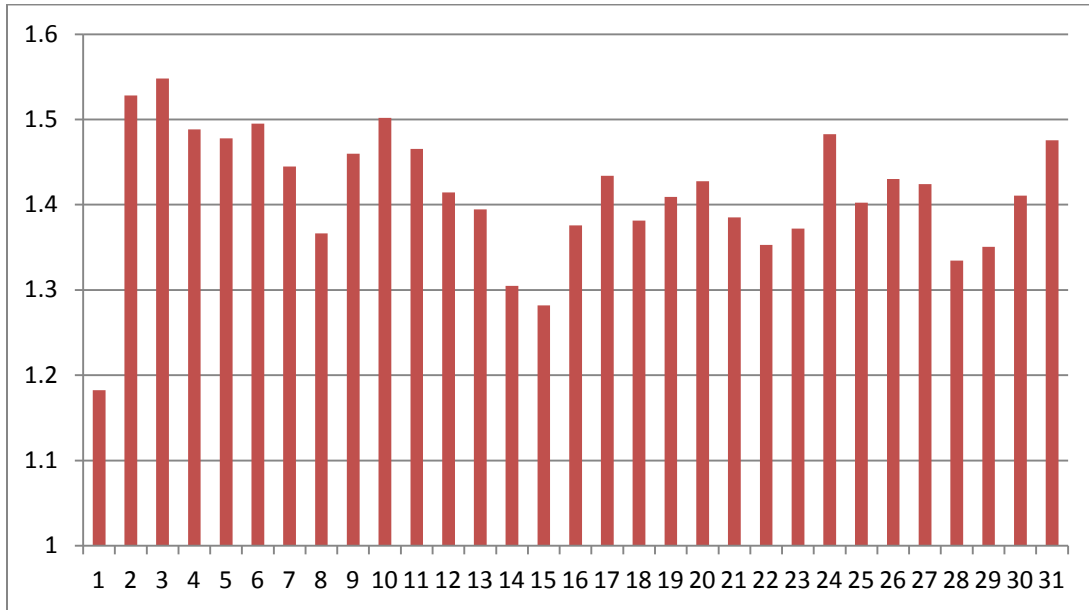
Notes: We aggregate the number of times (frequency) credit cards are used on each date of the month for all account holders with a credit card. The figure plots the percentage of credit card use by date of the month.

Figure 4: Credit Card Usage by Days from the Statement Date



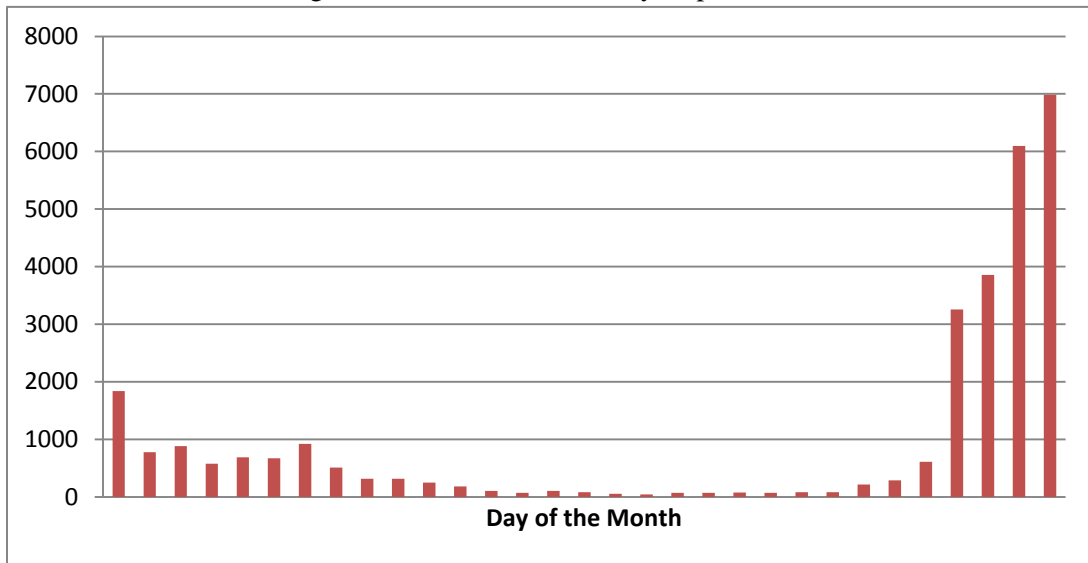
Notes: We aggregate the number of times (frequency) credit cards are used on each day following the date of the credit card statement for all account holders with a credit card. The figure plots the percentage of credit card use by days from the statement date.

Figure 5: Credit Card Spending by Days from the Statement Date



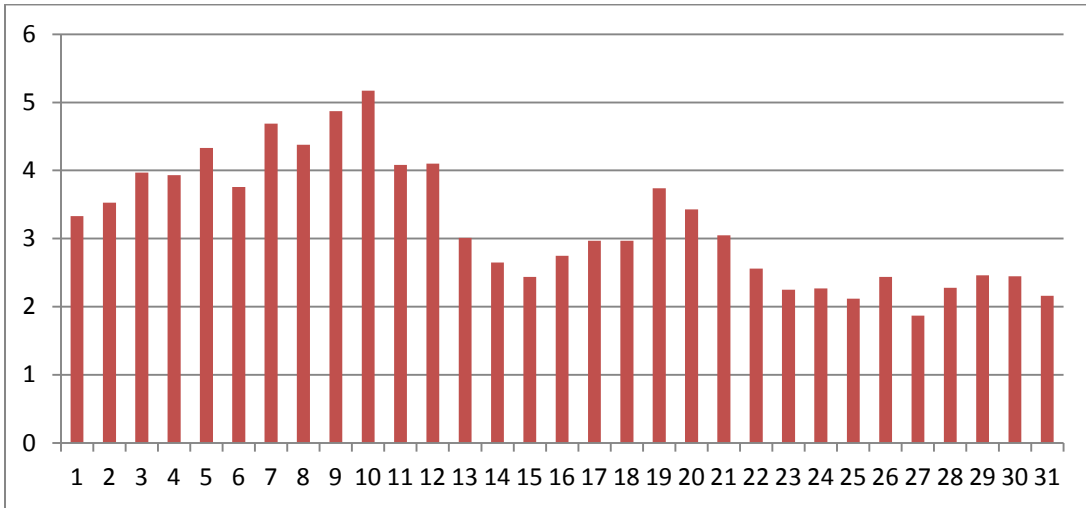
Notes: We aggregate the amount spent on credit cards on each day following the date of the credit card statement for all account holders with a credit card. The figure plots the percentage of credit card spending by days from the statement date.

Figure 6: Distribution of Salary Deposit Date



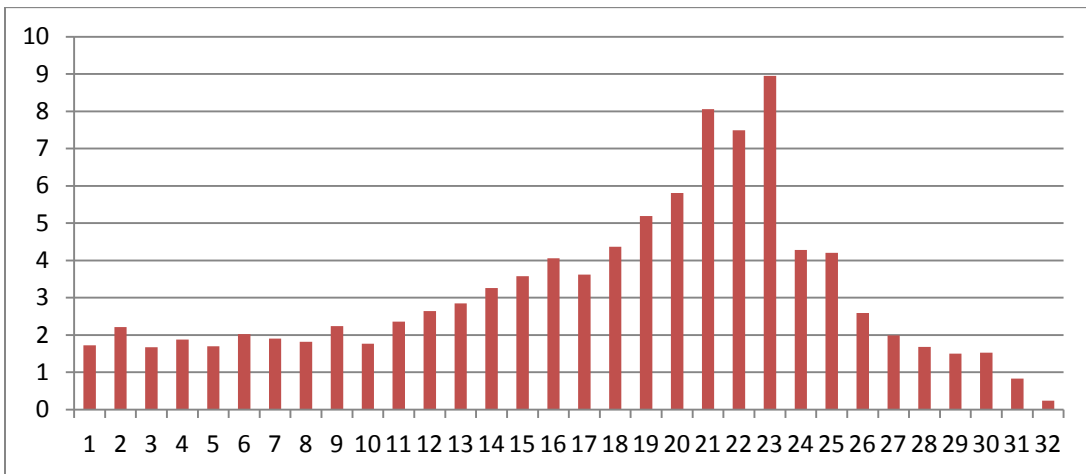
Notes: The figure plots the frequency of salary deposits made on each day of the month for our sample of credit card account holders.

Figure 7: Distribution of Credit Card Payment Date



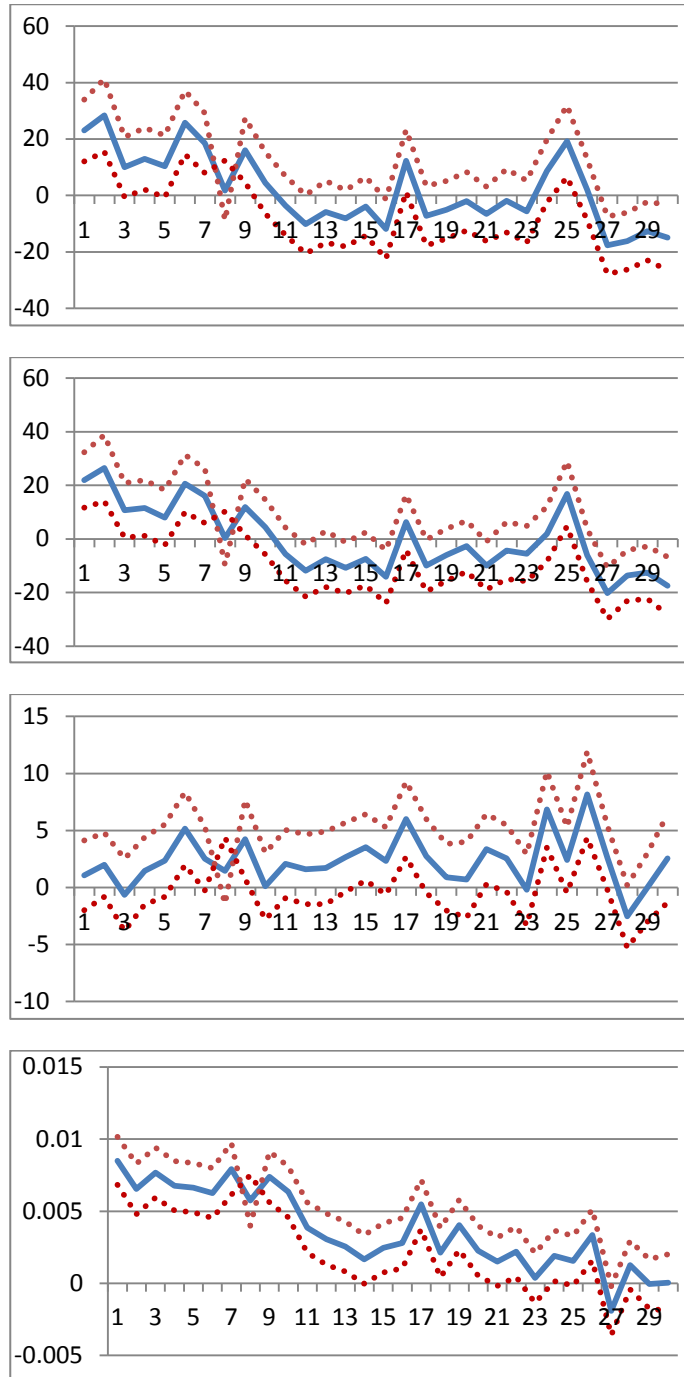
Notes: We aggregate the number of credit card payments made on each date of the month for all account holders with a credit card. The figure plots the percentage of credit card payments made by date of the month.

Figure 8: Credit Card Payment by Days from the Statement Date



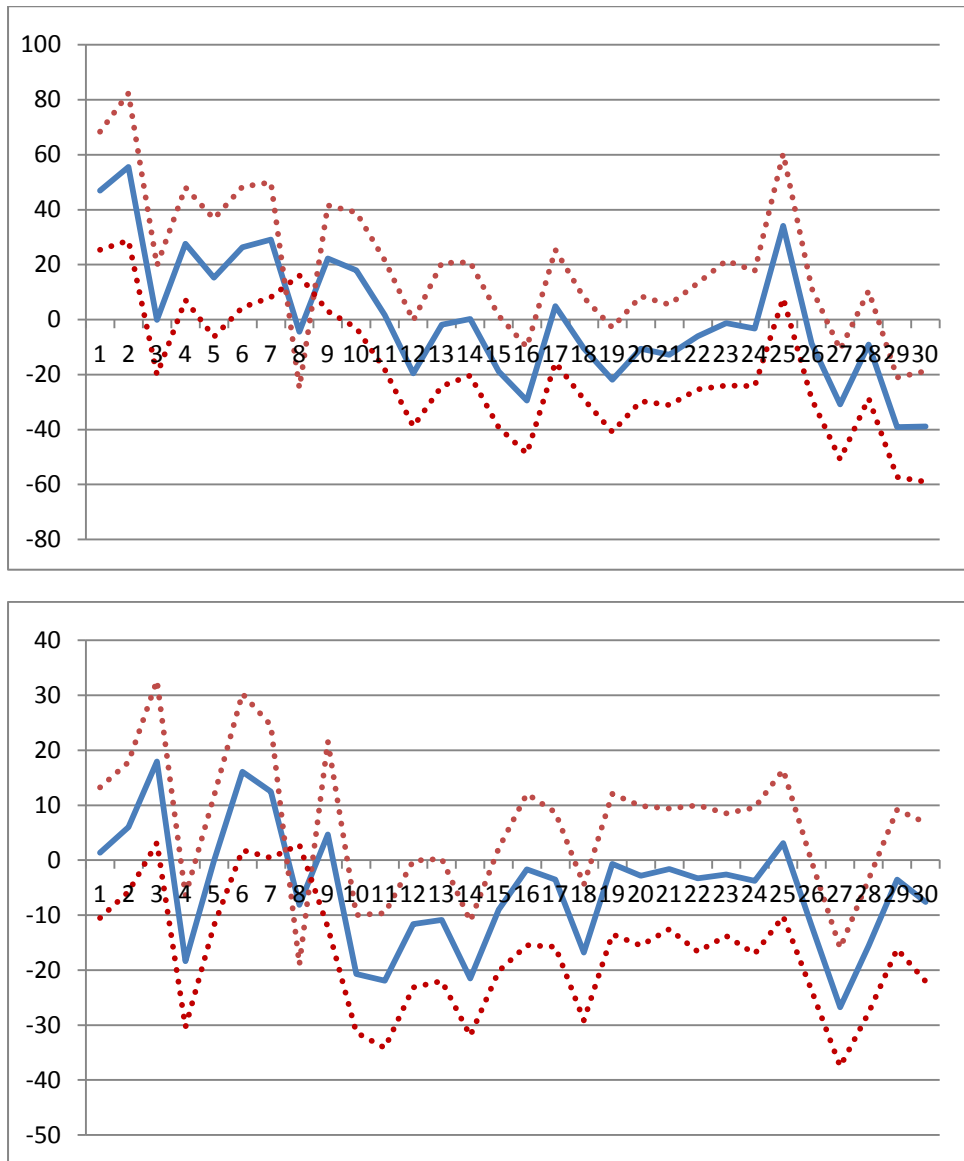
Notes: We aggregate the number of credit card payments made based on the number of days since the statement date for all account holders with a credit card. The figure plots the percentage of credit card payments made by days from the statement date.

Figure 9: Daily Level Regressions – Coefficients of (a) Total Spending, (b) Credit Card Spending, (c) Debit Card Spending, (d) Credit Card Usage



Notes: The figures plot the marginal coefficient (solid line) and the corresponding confidence interval (dotted lines) from a distributed lag model based on daily-level data. The sample has account holders who have both credit and debit cards. The level of observation is person-day. The regression specification includes fixed effects for each account holder, day of the week, day of the month and month-year. Figures (a) – (d) plot specifications where the dependent variable is total spending, credit card spending, debit spending and credit card usage.

Figure 10: Daily Level Regressions – Coefficients of (a) Credit Card Transactors and (b) Credit Card Revolvers



Notes: The figures plot the marginal coefficient (solid line) and the corresponding confidence interval (dotted lines) from a distributed lag model based on daily-level data. The sample has account holders who have both credit and debit cards. The level of observation is person-day. The data is split between those who pay their previous credit bill in full (transactors), and those who do not (revolvers). Figures (a) and (b) plot specifications where the dependent variable is credit card spending for transactors and revolvers, respectively. The regression specification includes fixed effects for each account holder, day of the week, day of the month and month-year.

Table 1: Demographic Summary Statistics

Debit and Credit Account Holders	Observations	Mean	Std. Dev.
Age	2882	30	6.499
Married	2882	0.899	0.301
Male	2882	0.851	0.356
Credit Card Accounts			
Age	5797	32.4	8.98
Married	5797	0.8165	0.387
Male	5797	0.8519	0.357
Debit Card Accounts only			
Age	862	30.162	6.676
Married	862	0.9095	0.287
Male	862	0.7865	0.410

Table 2: Summary Statistics of Financial Transactions

Daily Transactions	Obs	Mean	Std. Dev.
Daily Credit Transactions	2731203	0.0689	0.2534
Daily Credit Spending	2731203	201.0	4660
Daily Debit Transactions	1018359	0.030	0.2098
Daily Debit Spending	1018359	35.388	476.69
Credit Limit	2731203	55981	99016.08
Number of years credit account open	2731203	1.687	1.361

Table 3: Weekly Credit Card Spending and Usage Across a Month

	Credit Spending	Credit Spending	Credit Usage	Credit Spending
	(1)	(2)	(3)	(4)
Week 1 Following Statement	21.545*** (4.077)	20.283*** (3.730)	0.007*** (0.001)	38.493*** (5.395)
Week 2 Following Statement	30.194 (20.063)	29.510 (21.256)	0.004*** (0.001)	20.220*** (5.764)
Week 3 Following Statement	11.297* (6.470)	8.160* (4.846)	0.002*** (0.001)	15.123*** (5.536)
Week 4 Following Statement	11.651 (8.332)	11.656 (8.293)	0.001 (0.001)	16.366*** (5.443)
First Week of Month		34.829 (41.783)	-0.002*** (0.001)	
Second Week of Month		22.583 (28.599)	-0.001** (0.001)	-2.500 (5.822)
Third Week of Month		23.341 (28.500)	-0.000 (0.001)	-1.956 (5.955)
Fourth Week of Month		16.830 (22.897)	0.001 (0.001)	-4.392 (5.755)
First week following payment				46.007** (17.888)
Second week following payment				6.002 (5.967)
Third week following payment				4.211 (7.333)
Fourth week following payment				8.480 (11.339)
Observations	2,731,203	2,731,203	2,731,203	993,121
r2	.3564131	.3564167	.0696223	

Notes: The table reports OLS estimates of our baseline specification based on the sample of account holders with a credit card. The observations are at the person-day level. The dependent variable is the average daily credit card spending for every week following the credit card statement date, except in specification (3) where a dummy variable takes the value 1 if credit card was used. The indicator variable, *Week t Following Statement*, $t=1,..,4$, takes the value 1 if the observation lies in week t from the statement date, and 0 otherwise. In specifications (2) and (3), we control for each of the 4 weeks of the month. Specification (4) uses the sample of account holders with information on credit bill payment dates, and controls for every week following the payment date (dropping the first week of the month). We include fixed effects for account holder, day of the week, day of the month and month-year, which are not shown for brevity. Robust standard errors, clustered at the account holder level, are in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

Table 4: Weekly Spending and Usage Across a Month - Credit and Debit Cards

	Total Spending (1)	Credit (2)	Debit (3)	Credit Usage (4)	Debit Usage (5)
Week 1 Following Statement	34.518*** (5.220)	36.476*** (5.047)	-1.958 (1.553)	0.019*** (0.001)	-0.001** (0.001)
Week 2 Following Statement	16.352*** (5.078)	17.758*** (4.756)	-1.406 (1.792)	0.017*** (0.001)	-0.002** (0.001)
Week 3 Following Statement	8.738* (5.167)	9.983** (4.813)	-1.245 (1.755)	0.014*** (0.001)	-0.001* (0.001)
Week 4 Following Statement	13.011** (5.188)	13.728*** (5.078)	-0.717 (1.811)	0.012*** (0.001)	-0.002** (0.001)
First Week of Month	-0.068 (6.074)	-6.466 (5.726)	6.398*** (1.929)	-0.001 (0.001)	0.004*** (0.001)
Second Week of Month	-2.644 (6.194)	-2.735 (5.746)	0.091 (2.059)	-0.000 (0.001)	0.001* (0.001)
Third Week of Month	-7.608 (6.078)	-2.251 (5.861)	-5.357*** (1.856)	0.001 (0.001)	-0.002*** (0.001)
Fourth Week of Month	-11.163* (6.106)	-4.620 (5.689)	-6.543*** (1.821)	0.002** (0.001)	-0.003*** (0.001)
Observations	1247995	1247995	1247995	1247995	1247995

Notes: The table reports OLS estimates of our baseline specification based on the sample of account holders with both credit and debit cards. The observations are at the person-day level. The dependent variable is the average daily spending on both cards (specification (1)), spending only on credit or debit card (specifications (2) and (3)), indicator variable with value 1 for credit or debit card use (specifications (4) and (5)). The indicator variable, *Week t Following Statement*, $t=1,..,4$, takes the value 1 if the observation lies in week t from the statement date, and 0 otherwise. We control for each of the 4 weeks of the month. We also include fixed effects for account holder, day of the week, day of the month and month-year, which are not shown for brevity. Robust standard errors, clustered at the account holder level, are in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

Table 5: Weekly Credit Card Spending Across a Month - Product Categories

	All Categories (1)	Retail (2)	Schools (3)
Week 1 Following Statement	20.283*** (3.730)	6.053*** (1.414)	-0.032 (0.613)
Week 2 Following Statement	29.510 (21.256)	3.777*** (1.375)	-0.268 (0.609)
Week 3 Following Statement	8.160* (4.846)	0.122 (1.237)	-0.880 (0.577)
Week 4 Following Statement	11.656 (8.293)	0.586 (1.271)	-0.051 (0.599)
First Week of Month	34.829 (41.783)	2.095 (1.504)	0.222 (0.412)
Second Week of Month	22.583 (28.599)	1.767 (1.393)	0.622 (0.478)
Third Week of Month	23.341 (28.500)	1.241 (1.535)	-0.239 (0.410)
Fourth Week of Month	16.830 (22.897)	2.095 (1.584)	0.453 (0.481)
Observations	2,731,203	2,731,203	2,731,203

Notes: The table reports OLS estimates of our baseline specification based on the sample of account holders with a credit card. The observations are at the person-day level. The dependent variable is the average daily credit card spending for every week following the credit card statement date (specification (1)), and credit spending on retail and school product categories (specifications (2) and (3), respectively). The indicator variable, *Week t Following Statement*, $t=1,..,4$, takes the value 1 if the observation lies in week t from the statement date, and 0 otherwise. We control for each of the 4 weeks of the month. We include fixed effects for account holder, day of the week, day of the month and month-year, which are not shown for brevity. Robust standard errors, clustered at the account holder level, are in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

Table 6: Weekly Credit Card Spending Across a Month - Consumer Heterogeneity

	Early payer (1)	Late payer (2)	Credit constrained (3)	Credit not constrained (4)	Transactor (5)	Revolver (6)
Week 1 Following Statement	56.687*** (15.377)	23.195*** (8.826)	-50.289*** (11.077)	42.751*** (7.454)	19.056*** (4.666)	18.819*** (6.440)
Week 2 Following Statement	36.897** (16.901)	13.611 (9.424)	-42.385*** (14.397)	17.998** (7.302)	3.776 (4.439)	60.749 (47.730)
Week 3 Following Statement	45.349*** (16.792)	-6.754 (8.692)	-39.584*** (13.296)	7.163 (7.363)	1.488 (4.386)	15.206* (8.738)
Week 4 Following Statement	34.886** (15.389)	4.697 (8.967)	-27.131** (12.130)	10.956 (6.887)	2.569 (4.272)	21.343 (16.774)
First Week of Month	4.951 (16.570)	-3.286 (9.553)	15.822 (10.976)	-4.925 (7.742)	0.992 (4.342)	81.987 (96.628)
Second Week of Month	-8.139 (17.334)	5.281 (10.146)	22.200 (13.860)	-1.381 (7.850)	2.621 (4.715)	52.383 (67.142)
Third Week of Month	11.413 (17.629)	1.390 (9.839)	19.499** (9.614)	1.622 (7.931)	1.466 (4.554)	53.833 (65.636)
Fourth Week of Month	-5.836 (16.199)	-0.206 (9.466)	2.126 (9.120)	0.267 (7.475)	1.119 (4.436)	38.811 (52.480)
Observations	199858	385445	153129	776738	1538759	1193460

Notes: The table reports OLS estimates of our baseline specification, for different subsamples, based on the sample of account holders with both credit and debit cards. The observations are at the person-day level. Subsamples are based on early/late payers (those who pay their credit card bill within/after 2 weeks of the statement date), credit constrained or unconstrained credit cardholders (those who spend below/above 80% of their credit limit in the last statement cycle), and transactor/revolver (those who pay/do not pay their previous credit bill in full). The dependent variable is the average daily credit card spending for every week following the credit card statement date. The indicator variable, *Week t Following Statement*, $t=1,..,4$, takes the value 1 if the observation lies in week t from the statement date, and 0 otherwise. We control for each of the 4 weeks of the month. We include fixed effects for account holder, day of the week, day of the month and month-year, which are not shown for brevity. Robust standard errors, clustered at the account holder level, are in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.