Cashback Is Cash Forward: Delaying a Discount to Increase Future Spending

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Report Summary

Online cashback shopping is a relatively young but fast-growing phenomenon. Briefly, cashback companies advertise cashback offers—usually refunds equaling a percentage of money spent—on their websites on behalf of cooperating retailers. Registered users interested in a particular offer click through from the cashback company’s website to the retailer’s online store. For each referred purchase that takes place, the cashback company later receives a commission from the retailer and deposits the promised saving, or cashback payment, into the bank account indicated by the user.

Prasad Vana, Anja Lambrecht, and Marco Bertini study purchase behavior in this context. Specifically, they study the possibility that aside from the predictable positive impact of a cashback offer on initial demand, the cashback payment that follows a purchase with delay induces further spending. They find evidence of such a “repurchase effect” in panel data obtained from a large cashback company. In particular, they show that cashback payments increase not only the likelihood that a customer shops again through the cashback company’s website, but also the amount spent by that individual. They also demonstrate that, in line with theory, the effect is more pronounced for households with lower income than with higher income.

Marketing implications
The observation that cashback promotions stimulate demand at multiple points in time implies that managers need a broader perspective than is perhaps customary to assess the effectiveness of a campaign—either in absolute terms or relative to other activities intended to drive sales. According to the authors’ estimation, 9.6% of the money paid out in cashback payments is spent again through the cashback company, a figure accounting for up to 8.5% of the overall effectiveness of a cashback promotion. Yet, managers of cashback companies are currently not well aware of this effect. Second, the decision to delay paying a discount is often motivated by the hope that people will not bother to claim the money, rather than an intention to price-discriminate among individuals with different willingness to pay for a good. The authors suggest that when payments are automatically processed, as is the case for online cashback, a benefit of separating a discount payment from the purchase event may arise out of positive spillover effects on future purchases rather than from imperfect redemption behavior.

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As electronic commerce continues to grow in importance, retailers are testing novel means to reach people and entice them to purchase. Online cashback shopping is one example that is increasingly popular in the United States and other countries. Briefly, cashback companies advertise cashback offers—refunds mostly equaling a percentage of money spent—on their websites on behalf of cooperating retailers. From these websites, registered users interested in a particular offer click on the dedicated URL to reach the retailer’s online store. For each referred purchase that takes place, the cashback company later receives a commission from the retailer and deposits the promised saving, or cashback payment, into the bank account indicated by the individual.

By way of indication, in 2012 the leading cashback company in the United States generated sales in excess of $1.6 billion for 2,600 cooperating retailers. Since 1998, this company has processed cashback payments totaling $250 million. In 2013, the largest cashback company in the United Kingdom saved over $76 million for its four million users and produced $1.2 billion in sales for 4,000 retailers—a figure that represents 1% of all electronic commerce in the country for that year. Cashback shopping has similarly been spreading in other countries around the world.¹

At first glance, the economics of cashback shopping may appear no different to those of conventional sales promotion vehicles such as straight price cuts or coupons: A cashback offer is an incentive that, like any other incentive, the retailer hopes will stimulate enough incremental business to justify the margin sacrificed on all resulting sales. In fact, companies that in the past profited from the misjudgment, procrastination, or simple absent-mindedness that plague the redemption of mail-in rebates (Gilpatric 2009; Gourville and Soman 2011; Soman 1998), the offline precursor to cashback promotions, may even lament the fact that claims can now be settled automatically and effortlessly over the Internet. Yet the digital processing of cashback promotions also means that firms can now easily track a user’s purchases and access data to evaluate in detail how that user responds to the cashback payment.

In this research, we use such detailed data from a large cashback company to examine how cashback offers and payments affect purchases. We find that, aside from the predictable positive impact of a cashback offer on initial demand, the cashback payment that follows a purchase with delay surprisingly increases the likelihood and size of a further transaction—two related effects that we jointly term the “repurchase effect” of cashback shopping.

The fact that purchase behavior is affected not only by the promise of a saving, but also the later payment of that saving is in many ways striking because people are essentially rewarding a company for holding on to money. At the same time, researchers familiar with the psychology of mental accounting may reach a different conclusion. A recurring theme in this literature is that individuals perceive financial outcomes in terms of the value function of prospect theory (Kahneman and Tversky 1979), but integrate and segregate gains and losses opportunistically to portray decisions in whatever way makes them happiest (Thaler 1980, 1999; Thaler and Johnson 1990). Another important premise is that individuals distinguish between different types of wealth, each with a different propensity to spend (Arkes et al. 1994; Shefrin and Thaler 1988; Thaler 1999), and then look to match the source of income with the use to which it is put (Heath and Soll 1996; Kahneman and Tversky 1984). That is, people do not treat money as fungible.

In line with these basic principles, the temporal separation between a cashback offer and its payment suggests two outcomes. First, a person presented with a cashback offer is likely to integrate the promised saving into the purchase price, thereby making the product in question a more attractive proposition. This is of course the intended effect of any sales promotion effort. Second, in the event of a purchase, the same person is likely to segregate the cashback payment from the transaction and perceive it as a windfall gain—a possibility that Thaler (1985) and Soman (1998) already raised in the context of mail-in rebates. Because small windfalls are typically coded as spendable income (Shefrin and Thaler 1988), the prediction is that the cashback payment is spent quickly and disproportionately through the cashback company, which is what we observe empirically.

To link the repurchase effect to mental accounting, we perform a series of analyses that test the statistical significance of variables which the literature expects to play a moderating role. Shefrin and Thaler (1988) made the point that windfall gains are readily spent to the extent that they are perceived to be small, meaningless changes to one’s wealth (see also Feldman 2010). This perception is affected of course by the size of the gain, as larger cashback payments are presumably more “wealth like” and, therefore, saved. But it is
also affected by the purchasing power of the person receiving the payment: individuals with less disposable income are likely to respond more strongly to cashback payments than those with greater income. We test this argument using data on the size of cashback payments and average household income in the area of the customer’s residence. The results support the link of the repurchase effect to mental accounting.

Our findings have implications for practice and theory. First, the observation that cashback promotions can stimulate demand at multiple points in time implies that managers need a broader perspective than perhaps customary to assess the effectiveness of a campaign—either in absolute terms or relative to other activities intended to drive sales. According to our estimation, 9.6% of the money paid out in cashback is then spent again through the cashback company. This figure represents a significant portion of the overall impact of a cashback promotion, yet it is not one that managers of cashback companies currently recognize. As the managing director of a major cashback company explained to us: “We spend a lot of time designing offers that are profitable for retailers and give our users maximum value. Of course, an essential part of our work is to ensure they receive the payments they are promised. But we have never really spent time looking at what the repercussions might be.” Similarly, the president of a second cashback company emphasized that all discussions with cooperating retailers focus on maximizing the likelihood of a first purchase: “Whenever we negotiate commissions with retailers, our argument is ‘The higher the percentage of commission you pay, the higher the cashback we can offer to users, and it is proven that they will be most motivated by as large a saving as possible’.”

A second reflection that we find interesting is that the decision of managers to delay paying a discount is often motivated more by the hope that people simply will not bother to claim the money than the original intention to price discriminate among individuals with different willingness to pay for a good. Aside from the fact that these two goals are not necessarily compatible (Gilpatric 2009), the active pursuit of low redemption rates has caused sufficient negative public sentiment to persuade many companies to revert to less controversial sales promotion tactics such as straight price cuts or coupons. Our study adds a positive perspective to this situation because it shows that the benefit of delayed discounts is not necessarily tied to high redemption costs or imperfect redemption behavior; it also

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suggests a positive spillover effect on future purchases when the payment of a saving is
separated from the purchase event.

Turning to academic research, our work is perhaps closest to articles in marketing that
examine the profitability of delayed discounts (Chen, Moorthy, and Zhang 2005; Gilpatric
2009; Lu and Moorthy 2007) or offer behavioral theories to explain the puzzle of poor
redemption (Gourville and Soman 2011; Soman 1998). The key distinction to this literature is
that the focus of our study is not on price discrimination or redemption failure, but on the
relationship between the act of temporally separating the purchase from its associated saving,
and both purchase likelihood and spending. To the best of our knowledge, we provide the
first empirical evidence of such a relationship.

A similar argument about focus can be made when contrasting the current research to
the handful of articles that demonstrate other aspects of mental accounting directly in the
field (Abeler and Marklein 2010; Feldman 2010; Hastings and Shapiro 2013; Kooreman
2000; Milkman and Beshears 2009; Stourm, Bradlow and Fader 2015). For example,
Kooreman (2000) showed that government payments labeled as child benefits directly
increased spending on children’s clothes, and Milkman and Beshears (2009) showed that the
redemption of a $10-off grocery coupon increased spending at the same store. The data at our
disposal allow us to add to this literature: We have information on a large number of
individuals (more than 76,000) making, on average, a large number of purchases (45) over a
long period of time (2.4 years). In addition, these individuals responded to multiple cashback
offers of varying size, and the cashback payments have no usage or time restrictions. These
characteristics help us separate the phenomenon of interest from simple heterogeneity in
spending patterns, and pinpoint the underlying psychology with more accuracy than
previously possible.

More broadly, it is our desire to stretch the study of sales promotion in digital
environments beyond the now familiar models of group buying (Wu, Shi, and Hu 2014) and
daily deals (Luo et al. 2014). There is already some interest among academics in cashback
shopping (Chen et al. 2008; Ho, Ho, and Tan 2013), but these analytical studies focus on
identifying conditions under which the phenomenon can be profitable for the cashback
company and the cooperating retailer, and they abstract from the repurchase effect we study.
Our empirical findings complement this work by documenting the purchase behavior spurred
by cashback promotions.

Lastly, it is our ambition to add to what marketing scholars know about the long-term
impact of sales promotion. The large literature that studies this question mostly paints a bleak picture: a campaign today tends to hurt sales tomorrow (for more detail, see Blattberg, Briesch, and Fox 1995). There are different reasons for this conclusion, among them the fact that price deals induce stockpiling (Bucklin and Gupta 1992; Bucklin and Lattin 1991; Neslin, Henderson, and Quelch 1985), accelerate purchases (Ailawadi and Neslin 1998; Bell, Chiang, and Padmanabhan 1999), and damage brand perceptions (Blattberg, Briesch, and Fox 1995). In comparison, the repurchase effect that is evident in our data provides respite because it points to a type of sales promotion that can bring both immediate and delayed returns.

**Empirical Setting**

**Data**

A nondisclosure agreement prevents us from revealing the name of the cashback company that shared its data, the country where this company operates, or the local currency. For ease of exposition, we convert all monetary values into United States Dollars.

The data comprise information on the amount of money spent by registered users, or “customers,” in response to cashback offers and the corresponding cashback payments. In total, we observe 3,433,476 referred purchases made between May 2005 and August 2013 at 5,337 cooperating retailers by 76,296 users. For each customer, the data we use starts with their initial purchase through the cashback company and runs until their last purchase in the time period our data cover. While the large majority of data relate to online purchases that required a customer to click from the website of the cashback company to that of the retailer, a small subsample of 4.8% of transactions result from in-store cashback offers. This option is available at the physical premises of only a small number of retailers and cashback is awarded when the customer pays using the credit card on record with the cashback company. While the majority of our analyses are based on the full data set we later check the robustness to excluding data relating to in-store cashback promotions.

Our data contain information on the total amount spent by a customer on a day at a given retailer, at a cashback offer of a particular size (e.g., 5% cashback on electronics). We do not observe finer details such as the items, their category or the quantity purchased, or purchases for which there is no active cashback offer on the day of the transaction. Only if, on a given day, the same retailer advertised different cashback offers (e.g., 5% cashback on
electronics and 3% cashback on wine) and the same customer acted on more than one of these offers, the resulting purchases appear separately in the data. The retailers offer products in services in several different categories including electronics, travel, insurance, clothing, music, fashion, and groceries. New users registered with the cashback company at various points during this time interval by entering details of their bank account.

Table 1 provides summary statistics. On average, a customer in our data has made 45.0 purchase transactions on, on average, 36.9 days. On such days, purchases are worth $339.70. The firm sometimes bundles multiple cashback payments and so we observe that on average every customer receives a cashback payment on 12.4 days, worth on average $51.44. Recall that cashback payments are deposited directly into customers’ bank accounts, which implies that the money is, at least in theory, fully fungible. A customer’s tenure with the cashback company, measured as the time between the first and last recorded purchase for that person, is on average 876.8 days. In the data, the mean time between successive purchase-days is 24.4 days, and on average it takes 123.9 days from the moment of purchase to the corresponding cashback payment. We refer to this last metric as “time-to-cashback.”

One explanation for the long and variable time-to-cashback (see Figure 1) is that the retailer processes the commission only after the return period for the item(s) purchased has expired and the cashback company waits to receive the commission from the retailer before processing the cashback payment to the customer. Return periods of course can vary across retailers. A second explanation is that the time a retailer takes to process a commission may vary depending on internal policies and practices. Third, there may be a specific agreement in place between the cashback company and the retailer to delay cashback payments associated with certain types of purchases. For example, if a customer buys an insurance product, the issuer typically waits until the premium has been paid for several months before fulfilling its promise. For a travel-related expense such as a hotel accommodation or a cruise, the retailer typically waits until the end of the stay or vacation to process the cashback payment. Fourth, the processing of cashback payments at the cashback company is at times subject to delays.
Identification

To identify the causal effect of a cashback payment on purchase behavior, the former must be an exogenous shock to the customer’s wealth. That is, the customer cannot predict or influence whether a given cashback payment, or the amount of such a payment, will be made on a given day or week. If the opposite were true, then customers could integrate cashback payments in their overall spending plans and any observed association between cashback payments and purchase behavior could not be interpreted as causal.

We have at least three reasons to believe that, in our setting, cashback payments constitute exogenous shocks. First, customers have no discretion over time-to-cashback. Second, they are notified of a cashback payment only once it has reached their bank account. Third, as already mentioned, there is considerable irregularity in the time it takes retailers to pay commissions to the cashback company, and the time it takes the cashback company to deposit cashback payments. The data support that even at the level of a customer or a retailer there is indeed little regularity in the time-to-cashback, making it impossible for a customer to predict when cashback will be paid: Figure 2 illustrates that time-to-cashback fluctuates at the level of the user, which reinforces that the variation is not explained by individual-level differences. Figure 3 confirms that time-to-cashback varies within individual retailers. Last, Figure 4 illustrates variation in time-to-cashback at the level of individual customers for purchases at one specific retailer.

Figures 2, 3, and 4 follow References

One might be concerned that time-to-cashback could vary with the size of the purchase and, correspondingly, with the cashback payment related to that purchase, allowing a customer to predict the timing of the payment. This would be the case if, for instance, more expensive items enjoyed longer return periods. If retailers had such a policy and customers were aware of it, then they could estimate the timing of cashback payments and plan their spending accordingly. However, to our knowledge this is not standard practice—and even if it were, the estimate would not pinpoint the specific day or week of the cashback payment. Irrespective, we examine the data for any pattern that would substantiate such a concern and find only a very low correlation between the size of cashback payments and time-to-cashback ($R^2 = -0.016, p < 0.001$). The same holds when examining purchase amount and time-to-cashback ($R^2 = -0.015, p < 0.001$).
Finally, there exists a subset of transactions for which, given the nature of the purchase, people might have a better sense of when the cashback payment is going to take place. For example, if a customer reserves and pays in July for a cruise that takes place in December, the cashback payment for that purchase is deposited only after the vacation because some customers may cancel the reservation and demand a refund. Although in such cases it is still problematic to predict the precise timing of a cashback payment, we later check the robustness of our results by excluding observations with a long time-to-cashback, defined as the mean time-to-cashback plus one standard deviation, and find that the results hold.

**Analyses and Results**

**Model-free evidence**

We investigate here the possibility of a relationship between cashback payments and our two outcome variables: purchase likelihood and spending. To analyze purchase likelihood, we classify every user-day observation in the data as a non-purchase or purchase event depending on whether that person transacted at least once through the cashback company on that particular day. We then compute the average amount of cashback payment received in the seven days prior. The pattern illustrated by Figure 5 suggests that cashback payments relate to purchase likelihood: on average, customers receive $2.50 more in the seven days prior to a purchase event than to a non-purchase event (p < 0.001).

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**Figure 5 follows References**

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We examine the relationship between cashback payments and further spending through the cashback company by relating the amount of money returned to users in periods of seven days (from a given Saturday to Friday) to the amount of money spent by users in the seven days that follow this period.\(^3\) We compute the average weekly spend across all user-week observations for all amounts of cashback payments received in the preceding week.

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\(^3\) We choose a seven-day window starting on a Saturday and ending on a Friday because the cashback company processes 51.5\% of payments on a Thursday or Friday. The results are robust to alternative ways of specifying a weekly interval.
Figure 6 illustrates a positive relationship: as cashback payments increase, so does spending (overall, the correlation is 0.332; p < 0.001).

These preliminary results are consistent with the idea that cashback payments are framed as separate windfall gains and, as such, readily and disproportionately spent through the cashback company. From the perspective of mental accounting, the same label or category describes the source of (unexpected) income and the use to which it is put.

At the same time, this analysis does not control for individual-level heterogeneity. Individual-level heterogeneity matters because, for instance, frequent customers (those that make frequent purchases) are at any moment in time more likely to receive cashback payments than infrequent customers. Similarly, high-spending customers have spent more in the past than low-spending customers, and therefore at any moment in time they receive larger cashback payments. Figure 5 and Figure 6 may simply reflect this reality. We address this concern next.

**Cashback payments and purchase likelihood**

*Model setup.* We use a semi-parametric proportional hazard model to measure the effect of cashback payments on purchase likelihood (Cox 1972; Jain and Vilcassim 1991; Seetharaman and Chintagunta 2003). Specifically, we measure whether, on any given day, the cashback payments received by a customer during the seven days immediately prior increase the probability of a further purchase on that day—controlling for covariates and the time elapsed since the customer’s previous purchase.4

In a proportional hazard model, the dependent variable T represents the time in days between two consecutive purchase days, featuring at least one but possibly more transactions. We model the hazard of a purchase through the cashback company by customer i on any given day t, \( h_i(t | X_{it}) \), as

\[
h_i(t | X_{it}) = h_{0i}(t) \exp(X_{it} \beta)
\]  

(1)

4 Alternatively, a weekly decision model could examine whether cashback payments received in the past week affect this week’s purchase decision(s). Given that the median inter-purchase interval is eight days, studying the data in such a way would remove significant variation.
In this equation, \( h_0(t) \) is the baseline hazard function specific to customer \( i \). To account for individual-level differences in the average purchase likelihood, we follow the stratified baseline approach and let the baseline hazard function vary non-parametrically across individuals (Cleves, Gould, and Gutierrez 2004). The baseline hazard is proportionally shifted by the term \( \exp(\mathbf{X}_i \beta) \), where \( \mathbf{X}_i \) is a vector of time-varying covariates and \( \beta \) the set of parameters to be estimated.

We specify the vector of covariates as:
\[
\exp(X_{it} \beta) = \exp(\beta_1 CBPayment_{it} + \beta_2 AvgCBOffer_t + \beta_3 PreviousSpend_{it} + \beta_4 PurchaseInstance_{it} + \beta_5 DayOfWeek_t + \beta_6 Month_t)
\]

Here, the independent variable of interest is \( CBPayment_{it} \), the amount of cashback payment received by customer \( i \) in the seven days prior to day \( t \). We control for the size of the cashback offers posted by the cashback company on day \( t \) using the average cashback percentage of the 10 largest retailers in the data (based on the total number of transactions), \( AvgCBOffer_t \). The variable \( PreviousSpend_{it} \), which captures the amount spent by user \( i \) on the most recent purchase day, controls for individual-specific trends in purchase behavior. \( PurchaseInstance_{it} \) measures the number of transactions made by customer \( i \) until day \( t \). This variable reflects the customer’s experience with the cashback company and therefore controls for any pattern in purchase behavior attributable to expertise. \( DayOfWeek_t \) and \( Month_t \) control, respectively, for day-of-week and month fixed effects.

**Results.** Column 1 of Table 2 illustrates the predicted repurchase effect: a positive effect of cashback payments on purchase likelihood. The corresponding hazard rate of 1.0002 implies that, on any given day, a $1 increase in the cashback payment in the seven days prior increases the probability that a purchase takes place that day by 0.02%. The effect persists when instead of considering cashback payments in the seven days prior to day \( t \), the variable \( CBPayment_{it} \) measures instead cashback payments received in the 14 (Column 2) or 28 days (Columns 3) prior to day \( t \).
the size of the cashback offers posted by the cashback company. This result is comprehensible—it is well documented in the marketing literature and presumably intended by any manager implementing any type of sales promotion, including cashback promotions. Yet we stress that the repurchase effect observed in the data is after controlling for any impact that cashback offers have on initial demand.

**Cashback payments and spending**

*Model setup.* We estimate the effect of cashback payments on the weekly expenditure through the cashback company, $\text{Spend}_{iw}$, by specifying the following fixed-effects regression equation:

$$
\text{Spend}_{iw} = \alpha_i + \beta_1 \text{CBPayment}_{iw} + \beta_2 \text{AvgCBOffer}_w + \beta_3 \text{PreviousSpend}_{iw} \\
+ \beta_4 \text{PurchaseInstance}_{iw} + \beta_5 \text{Month}_w + \varepsilon_{iw}
$$

(3)

Notice that we take a similar perspective to the one underlying the model-free evidence presented above: we focus on the impact of cashback payments made in a given week (from a given Saturday to Friday) on spending at any time during the ensuing seven days.\(^5\) Since the dependent variable captures any change to the weekly amount spent, it implicitly accounts for the fact that cashback payments may lead a customer to make a purchase they would otherwise not have made.

The independent variable of interest in this case is $\text{CBPayment}_{iw}$, the amount of cashback payment received by customer $i$ in the week prior to week $w$. To control for the size of the cashback offers posted by the cashback company in week $w$, we again use the average cashback percentage of the 10 largest retailers in the data, $\text{AvgCBOffer}_w$. The variable $\text{PreviousSpend}_{iw}$ captures the amount spent by customer $i$ during the preceding week, and as such controls for individual-specific trends in purchase behavior. $\text{PurchaseInstance}_{iw}$ measures the number of transactions made by customer $i$ until week $w$. This variable reflects one’s experience with the cashback company. We also include a vector of customer fixed effects, $\alpha_i$, to control for different average levels of spending across individuals, thereby capturing user-specific unobserved heterogeneity. Similarly, $\text{Month}_w$ captures time-specific fixed effects. Finally, $\varepsilon_{iw}$ is an IID error term.

\(^5\) We conduct the analysis at the weekly rather than daily level because the latter would yield a large number of zero-spend observations for each user, which complicates estimation.
Results. Column 1 of Table 3 reports a different manifestation of the predicted repurchase effect: a positive effect of cashback payments on spending. In particular, during any given week, the amount spent by a user of the cashback company increases with the size of the cashback payments received in the seven days immediately prior. At the mean cashback payment, a $1 increase in the cashback payment in the prior week increases spending in the current week by $0.10. Again, Columns 2 and 3 indicate that the results hold when considering cashback payments in the 14 or 28 days prior to a week w.

Similarly to the analysis of purchase likelihood, spending likewise increases with the size of the cashback offers posted by the cashback company: if the top 10 retailers each increased the size of their cashback offers by one percentage point, spending would increase by an average of $1.71 (Column 1).

Robustness checks

We carry out a number of checks to ascertain that our findings are not a result of the model specification or assumptions. First, notice that we made the point that the identification of a causal effect of cashback payments on purchase behavior hinges on the assumption that the former are exogenous shocks to a customer’s wealth. While the descriptive analysis presented at the start of this section supports this idea, we remarked that there exists a subset of purchase events, with typically longer time-to-cashback, for which customers might have a better sense of approximately when a cashback payment is going to take place. For example, purchasing a ticket for a cruise vacation for December in July may lead to a particularly long time-to-cashback as cashback is only paid out after the end of the cruise. To check the robustness of our results against this contingency, we re-estimate our model removing all user-week observations in which time-to-cashback exceeds the mean plus one standard deviation. Column 1 of Table 4 demonstrates that even after excluding such observations, our findings hold.
A second check that we carry out is whether the effect of cashback payments on purchase behavior varies with the number of past purchases made by users. Column 2 indicates that the effect of cashback payment does not vary with the number of previous purchases—in other words, the phenomenon persists beyond the initial cashback payment(s).

Third, the repurchase effect might possibly be caused not by the amount of money actually deposited in the bank account of a customer, but by the difference between receiving zero cashback and some positive amount. For example, the emails sent by the cashback company to notify their customers of a cashback payment could be driving traffic to the website of the cashback company leading to the repurchase effect. To address this last issue, we test whether the main results hold when limiting the data to user-week observations in which cashback payments are greater than zero (Column 3). Again, the direction and significance of the results are consistent with the original outcome of the analysis.

Fourth, we check the robustness of our results to excluding any purchases and cashback payments related to in-store cashback promotions. Column 4 illustrates that the results hold when the data are limited to online cashback promotions.

Lastly, we conduct several additional robustness checks (available from the authors on request). To ensure that our results are not an artefact of specifying the controls $\text{AvgCBOffer}_t$ and $\text{AvgCBOffer}_w$, as the average percentage of cashback offered by specifically the 10 largest retailers, we re-estimate our models and let $\text{AvgCBOffer}_r$, respectively $\text{AvgCBOffer}_w$, capture the average percentage of cashback offered by all retailers, and subsequently by only the five largest retailers. The sign and magnitude of the coefficient on $\text{CBPayment}_t$ remain robust to these specifications. We also tested for a quadratic effect of cashback payments but found this to be insignificant.

**Further support for mental accounting**

The results of the analyses above confirm that cashback payments increase both the probability that a customer makes an additional purchase through the cashback company and the size of that eventual purchase. These effects, which we group together as the repurchase effect of cashback shopping, are hard to justify with standard economic thinking. Modigliani and Brumberg’s (1954) life-cycle theory of saving and Friedman’s (1957) permanent-income hypothesis presume that individuals optimize their spending decisions across the expected income over the course of a lifetime. In this normative context, windfall gains such as the weekly cashback payments of a cashback company represent trivial changes to one’s lifetime
wealth. Yet the purchase behavior that we observe in the data is excessively sensitive to these changes in income.

Instead, the repurchase effect makes sense if one presumes that the customer behaves in accordance with basic principles of mental accounting. First, the user treats cashback payments as separate windfall gains. This segregation is made possible by the temporal separation between the initial purchase and the payment of the discount. Second, the user does not treat this unexpected income as fungible: a windfall is readily spent (indeed, the literature has used the term “free money” to describe such gains; Gourville and Soman 1998) and, importantly, it is disproportionately spent in the same “account” it originated from.

But this is not the only possible explanation. First, it is plausible that cashback payments make the prospect of purchasing through the cashback company more salient (Obermiller 1985). This may occur, for instance, if the email notifying a customer of a cashback payment motivates that customer to visit the website of the cashback company. While the results in Column 3 of Table 4 suggest that this is not the case, it may still be that the size of the payment, rather than its mere presence, relates to salience. In similar fashion, it is plausible that cashback payments trigger positive incidental affect (i.e., elevate a customer’s mood) that increases the propensity to spend in general—including through the cashback company (Heilman, Nakamoto, and Rao 2002).

To make a strong case that the repurchase effect indeed relates to mental accounting theory, we test the significance of variables that only mental accounting predicts to play a moderating or intervening role. Shefrin and Thaler (1988) reasoned that windfall gains are readily spent to the extent that they represent meaningless changes to one’s wealth. This perception is affected of course by the size of the gain: it seems reasonable that increasingly larger cashback payments are increasingly viewed as “wealth like” and, therefore, saved. Another variable that is expected to influence the perception of a cashback payment as a windfall gain is the purchasing power of the individual who receives it. It seems reasonable that less wealthy customers would respond more profoundly to differences in cashback payments than more wealthy customers.

To test these predictions, we focus on the 17,351 customers for whom we have information on their postal code and complement our data with information on the average household income in the geographic unit (on average about 1,000 households) where a customer lives. Overall, the income data for this subset of customers, proxied by the household income in their geographic unit, are representative of the national averages: the
national weekly household income is $1,080.21 with a standard deviation of $290.85, compared to a mean of $1,124.87 and standard deviation of $293.21 for those in our data. Empirically, we expect that spending varies with the size of cashback payments and the income in the geographic unit in which the household resides.

We first examine the effect of different sizes of cashback payments. We estimate again the effect of cashback payments on spending, but this time include coefficients that separately capture the effect of cashback payments above $42.26, the average amount across customer-weeks in our data, and the effect of cashback payments below this threshold. Since we are interested in the differential impact of small versus large cashback payments, we exclude user-week observations when no cashback was paid. The result in Column 1 of Table 5 shows a stronger effect of small cashback payments than large cashback payments. The inverse relationship between cashback payment and spending suggests a pattern that is consistent with mental accounting but not with the aforementioned alternative accounts. In fact, a salience or incidental affect story predicts the opposite result or, at best, no real relationship between cashback payment and spending.

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Table 5 follows References
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One explanation for the marginal significance of the effect of small cashback payments on spending, as reported in Column 1 is that customers with different purchasing power respond differently to cashback payments of any given size. As noted, we expect that customers with less wealth respond more strongly to differences in cashback payments than customers with more wealth. Column 2 of Table 5 presents the estimates of the effect of cashback payments on spending by household income level and amount of cashback payment. For customers in geographic units with low household income, the effect of cashback payments below $42.26 (the average amount in a week) on spending is significantly more pronounced than the effect of cashback payments above that amount (the estimates differ significantly with p = 0.010). This result makes sense if we accept that these customers view large cashback payments as more wealth like, and therefore save them, than small cashback payments.

Column 2 of Table 5 further illustrates that, for customers in geographic units with high household income, small cashback payments do not affect spending but large cashback
payments do—presumably because the former appear insignificant. Notice that the effect on spending of small versus large cashback payments do not differ significantly (p=0.220).

The result of this additional analysis constitutes direct evidence in support of a mental accounting view of consumer response to cashback payments. In our mind this evidence is compelling because it derives from situational and dispositional intervening variables: the size of the cashback payment is at the discretion of the cashback company, while household income—here proxied for by the average income in a geographic unit—is inherent to users.

**Implications for Practice**

The objective of cashback promotions, same as the goal of any other online promotional campaign, is to generate and convert leads for a retailer. A cashback company is one of probably many intermediaries that the retailer pays a commission to in order to achieve, in different ways, this purpose. As such, it is not surprising that the mind of both retailers and cashback companies is fixed on making that initial sale happen. The quotes presented at the start of the paper exemplify this understanding, and our analysis suggests that cashback offers are capable of driving sales.

However, since our results demonstrate that cashback payments increase the probability and size of a further purchase through the cashback company, it is natural to wonder what the importance of this repurchase effect is relative to the intended immediate impact. For the purpose of quantifying the repurchase effect, assume that the 10 largest retailers collaborating with the cashback company each increased the size of their cashback offers by one percentage point, from the current average of 5.8% to 6.8%. According to Column 1 of Table 3, this decision increases the average amount spent in a week by any given user by $1.71—that is, the average user now spends $70.46 instead of $68.75. In turn, improving the cashback offer also increases the corresponding cashback payment by $0.80. Note that this sum comprises the additional 1% cashback offered on the original average spend of $68.75, and the full 6.8% offered on the increase in spending by $1.71.

Alongside this result, the repurchase effect of cashback payments implies that, on average, a customer spends 9.6% of the cashback payment received (see the estimate in Column 1 of Table 3). Here, this is equivalent to $0.08. Therefore, the decision to increase a cashback offer by 1% boosts the initial spending of the customer by $1.71, and future spending by $0.08. Independent of possible knock-on effects, the total increase of $1.79
comes at the expense of an additional promotional cost of $0.80 (the change in cashback payment).

The relevant metric to evaluate the effectiveness of a cashback promotion is the ratio of net revenue increase (i.e., the increase in spending minus the increase in promotional cost) to promotional cost. A simple calculation reveals that this ratio is 112.6% when considering only the effect of the cashback offer, but 122.2% when considering also the repurchase effect caused by the cashback payment. According to our data, therefore, the repurchase effect accounts for approximately 8.5% of the overall effectiveness of a cashback promotion. Importantly, managers of cashback companies who are not aware of this are likely to underestimate the true impact of the promotional tool they offer on purchase behavior and, in turn, make suboptimal decisions at the time of negotiating with retailers and designing campaigns.

The obvious suggestion that comes from this discussion is that these managers need to think more comprehensively about the effect of cashback promotions on individuals than perhaps customary. The first step is to examine the data in a similar fashion to what we show here to identify the repurchase effect. The second step is to consider ways of designing cashback promotions so that cashback offers and payments together maximize the effectiveness of the promotion, or at least intensify the repurchase effect. One dimension to pay attention to is the type of retailer the cashback company collaborates with, as the likelihood and size of any purchase—and repurchase—by customers depends to some extent on which partners advertise their offers on the website.

To shed some light on the differences across these partners, we examine the data separately for the three largest categories of retailers: general retailers (selling many different product categories, including department stores and supermarkets), travel retailers (offering hotel, flight, car rental bookings, and other related services), and service retailers (products such as utilities or insurance where a purchase constitutes signing a yearly contract). Interestingly, we find that general retailers account for a major part of the overall repurchase effect in the data. This seems plausible because these retailers offer a wide range of products that satisfy a variety of different needs for a wide range of prices. In contrast, purchases related to travel or services tend to be infrequent, which, together with the significant cost and time commitment that is associated, makes it unlikely that a cashback payment has a sufficiently strong effect to spur an additional purchase. For the manager of a cashback company, this result suggests that, while a range of retail partners is probably important in
order to attract and retain a large number of users, it is also true that different profiles of retailers impact the repurchase effect to different extents. This suggests that they should carefully pay attention to including the types of retailers where customers are more likely to spend cashback payments.

Thinking further afield, the results of our analyses have implications outside the context of cashback shopping. Any company that implements some form of delayed discount in principle stands to benefit from the repurchase effect. The example that comes readily to mind is the use of mail-in rebates by traditional bricks-and-mortar retailers. While we acknowledge that the repurchase effect is probably harder to track in a non-digital setting, the benefit might be significant enough—at least as long as the firm can reduce associated effort and hassle cost of redemption for customers—to warrant exerting the necessary effort. Similarly, commercial banks or other financial institutions that offer cashback payments on transaction made with their credit cards may want to verify whether the tactic increases future usage and spending, as indicated by our data.

Finally, our study demonstrates that even if an online sales promotion (e.g., cashback shopping) is set up to mirror an offline promotion (e.g., mail-in rebates), the difference in the environment means that it may play out in very different ways. In the case we study, the automated tracking reduces the effort for the customer—and so eliminates slippage, but the 24/7 accessibility of retailers and promotions may reduce the transaction costs related to a purchase for customers—and so, potentially, boost the repurchase effect. The implication for managers who may be tempted to apply their knowledge about promotions at bricks-and-mortar retailers to ecommerce is that such a translation may not be straightforward.

Conclusion

Online cashback shopping is an increasingly popular form of sales promotion. We studied purchase behavior in response to cashback offers and payments with panel data from a large cashback company that span 3,433,476 transactions from 76,296 customers over eight years. A critical feature of these data is that the timing of cashback payments is unknown to customers, and as a consequence cashback payments are exogenous shocks to one’s wealth.

We have two key findings. First, we find that receiving a cashback payment shortens the time it takes to a user’s next purchase through the cashback company. Second, we find that cashback payments increase the average amount of that future expenditure. These effects,
which we label the repurchase effect of cashback shopping, are striking because people are essentially rewarding the cashback company for holding on to money. The repurchase effect also cannot be reasoned with the standard economic arguments of Modigliani and Brumberg (1954) or Friedman (1957) and, importantly, it comes in addition to the positive impact of cashback offers on initial demand that managers seem to exclusively worry about.

Instead, we argue that the repurchase effect can be traced to basic principles of mental accounting. People use the value function of prospect theory to interpret financial outcomes, but do so opportunistically in search of whatever framing yields the greatest satisfaction (Kahneman and Tversky 1979; Thaler 1999)—a phenomenon known as “hedonic editing” in the literature (Thaler and Johnson 1990). The specific case we studied was foretold by Thaler (1985) and Soman (1998), who argued in the context of mail-in rebates that the temporal separation between purchase and refund allows individuals to segregate the latter and perceive it as a windfall gain. In addition, because small windfalls are typically coded as spendable income (Shefrin and Thaler 1988), and people care to match the source of income with the use to which it is put (Kahneman and Tversky 1984), cashback payments are likely to be spent quickly and disproportionately through the cashback company—as if users do not treat money that is deposited in their bank accounts as fungible.

To provide process evidence for this interpretation, we examined factors that the literature expects to play a significant moderating role. In particular, we focused on one situational variable, the size of a cashback payment, and one dispositional variable, the approximate household income of a customer, that determine whether cashback payments are perceived as income to be spent or saved. We find that for customers residing in low-income geographic units, the size of the cashback payment processed by the cashback company influences the effect on spending: small payments have a greater impact on spending than large payments, a result that is consistent with the prediction that small payments are viewed as windfall gains and coded as spendable income but larger payments as increasingly wealth-like and so more likely to be saved. However, for customers from high-income households, we find that small cashback payments do not affect spending, presumably because they appear insignificant.

We see at least four contributions to marketing research. First, we add to the literature on delayed discounts; of which some articles focus on the profitability of the practice, especially in comparison to couponing (Chen et al. 2005; Lu and Moorthy 2007), while the remainder focus instead on the psychological underpinnings of redemption failure (Gilpatric
The key insights from the first group of studies is that the temporal separation between purchase and saving opens up a second opportunity for price discrimination, as long as redemption costs are set properly by the manager. Yet it appears that many companies have pursued low redemption rates to excess, causing great customer dissatisfaction and, in recent years, stronger legislative efforts to curb malpractice (for a review, see Pechmann and Silk 2013). Against this backdrop, our work makes the point that there is benefit in delaying a discount beyond the hope that customers simply will not bother to claim the money. A cashback payment is processed automatically and effortlessly, and our data show that this event can improve the likelihood and amount of a future purchase.

The second contribution is to research on mental accounting, in the sense that we provide large-scale field evidence of the core ideas that, when it comes to interpreting financial outcomes, individuals exercise hedonic editing and fail to treat money as fungible—ideas that for the most part have been documented only in the controlled confines of a laboratory (Thaler 1980, 1999). To the best of our knowledge, this is the first study that documents the positive relationship between delaying a discount and purchase behavior. Moreover, it is noteworthy that this positive relationship persists over an extended period of time, over repeated interactions between users and the cashback company, and despite the fact that cashback payments come with no strings attached—that is, there are no restrictions on how or when the money deposited into a user’s bank account can be spend.

Third, while many businesspeople are keen on understanding purchase behavior and, in particular, a person’s response to marketing stimuli in digital environments, academic studies on sales promotion tactics have to date largely focused on the original models of group buying and daily deals (Aydinli, Bertini, and Lambrecht 2014; Luo et al. 2014; Wu, Shi, and Hu 2014). Cashback shopping is gaining ground, and will probably continue to do so as companies in this space make their business model more transparent in order to resolve the understandable “Getting paid to shop? There must be some catch” suspicions of many onlookers. Indeed, we noted that the leading cashback company in the United Kingdom alone already accounts for 1% of all electronic commerce in that country. With this in mind,

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our research not only adds empirical evidence to the pair of analytical studies that exist on the topic (Chen et al. 2008; Ho, Ho, and Tan 2013), but also shifts the focus from the business relationship between cashback company and cooperating retailer to the surprising purchase behavior of those that come to the website in search of attractive prices.

Fourth, the repurchase effect that we report complements a rich literature in marketing on the long(er)-term impact of sales promotion efforts. The bulk of articles studying this question come to the conclusion that a business can easily and quickly increase sales today by offering some price concession, but does so at the expense of sales in the future (Blattberg et al. 1995). Therefore, the finding that the mere act of delaying a discount can motivate further, larger purchases should be welcome news. At least in our experience, the management team of the cashback company that shared their data with us found the results compelling and is studying ways to improve their practices.

These contributions of course need to be judged in the context of certain limitations. The data at our disposal allow us to study purchase behavior at times when the cashback payment is either present or absent. The data also allow us to examine the response of customers to cashback payments of different sizes. What is not possible, however, is to draw conclusions about the effectiveness of cashback promotions relative to a setting where the company opts for other types of sales promotion, other marketing activities aimed at driving sales, or indeed no intervention of any kind.

In addition, while our data confirm that delayed discounts trigger the repurchase effect, we cannot ascertain the boundaries of this relationship with respect to key factors such as time-to-cashback. We single out this variable because, from the perspective of mental accounting, some temporal separation between purchase and saving is necessary in order for the user to segregate the cashback payment and therefore treat it as a windfall gain. However, an excessive delay may also frustrate the customer, prompting doubts about the merit of cashback shopping. In our view, it seems clear that future research should investigate the optimal delay of a delayed discount. Future research could similarly explore whether a cashback company has other means at its disposal to intensify the repurchase effect.
References


Table 1: SUMMARY OF DATA ACROSS CUSTOMERS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td><strong>Across customers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of transactions</td>
<td>45.000</td>
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</tr>
<tr>
<td>Number of transactions days</td>
<td>36.843</td>
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</tr>
<tr>
<td>Number of transaction weeks</td>
<td>27.009</td>
<td>34.574</td>
</tr>
<tr>
<td>Amount spent per transaction ($)</td>
<td>305.660</td>
<td>396.203</td>
</tr>
<tr>
<td>Amount spent per day ($), days with at least 1 transaction</td>
<td>339.696</td>
<td>428.269</td>
</tr>
<tr>
<td>Amount spent per week ($), weeks with at least 1 transaction</td>
<td>389.047</td>
<td>480.349</td>
</tr>
<tr>
<td>Number of cashback payments</td>
<td>29.514</td>
<td>60.644</td>
</tr>
<tr>
<td>Number of days with at least one cashback payment</td>
<td>12.413</td>
<td>14.128</td>
</tr>
<tr>
<td>Number of weeks with at least one cashback payment</td>
<td>11.097</td>
<td>15.507</td>
</tr>
<tr>
<td>Cashback payment per deposit ($)</td>
<td>25.392</td>
<td>29.426</td>
</tr>
<tr>
<td>Cashback payment per day with deposit &gt;0 ($)</td>
<td>51.440</td>
<td>54.031</td>
</tr>
<tr>
<td>Cashback payment per week with deposit &gt;0 ($)</td>
<td>52.127</td>
<td>54.423</td>
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<tr>
<td>Tenure with cashback company (days)</td>
<td>876.839</td>
<td>717.819</td>
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<td><strong>Across Purchases</strong></td>
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<td></td>
</tr>
<tr>
<td>Inter-purchase time (days)</td>
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<tr>
<td><strong>Across cashbacks</strong></td>
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<td>Time-to-cashback (days)</td>
<td>123.862</td>
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<td>Cashback payment per week ($)</td>
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<td>74.329</td>
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<tr>
<td>Dependent variable</td>
<td>(1) 7 Days</td>
<td>(2) 14 Days</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>Time to next purchase (in days)</td>
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<td></td>
</tr>
<tr>
<td>Independent variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cashback payment ($) (1e-4)</td>
<td>1.858</td>
<td>0.117</td>
</tr>
<tr>
<td>Average cashback offer (%) of top 10 retailers in the current week</td>
<td>0.034</td>
<td>0.002</td>
</tr>
<tr>
<td>Amount spent past week ($) (1e-4)</td>
<td>0.156</td>
<td>0.007</td>
</tr>
<tr>
<td>Shopping instance (1e-4)</td>
<td>-1.48</td>
<td>0.057</td>
</tr>
<tr>
<td>Day of week fixed effect</td>
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<td></td>
</tr>
<tr>
<td>Month fixed effect</td>
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<tr>
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All results reported are from Cox Proportional Hazards estimation with stratified baseline hazards (stratified by customer).
* p < 0.10, ** p < 0.05, *** p 0.01.
Table 3: CASHBACK PAYMENTS AND SPENDING

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>(1) 7 Days</th>
<th>(2) 14 Days</th>
<th>(3) 28 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spend in a week ($)</td>
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<td>SE</td>
<td>Estimate</td>
</tr>
<tr>
<td><strong>Independent variables</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cashback payment ($)</td>
<td>0.096</td>
<td>0.031 ***</td>
<td>0.098</td>
</tr>
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<td>Average cashback offer (%) of top 10 retailers in the current week</td>
<td>1.709</td>
<td>0.366 ***</td>
<td>1.709</td>
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<tr>
<td>Amount spent past week ($)</td>
<td>0.215</td>
<td>0.112 *</td>
<td>0.215</td>
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<tr>
<td>Shopping instance</td>
<td>0.008</td>
<td>0.036</td>
<td>0.007</td>
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<td>Customer FE</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Month FE</td>
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<td>76,296</td>
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</table>

All results reported are from fixed-effects OLS estimation with robust standard errors.

* p < 0.10, ** p < 0.05, *** p < 0.01.
Table 4: ROBUSTNESS CHECKS FOR SPEND MODEL

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>(1) Excluding long times to cashback</th>
<th>(2) Cashback effect and customer tenure</th>
<th>(3) Only observations with cashback payments &gt; 0 in the current week</th>
<th>(4) Excluding purchases and cashback payments related to in-store cashback promotions</th>
</tr>
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<tbody>
<tr>
<td>Spend in a week ($)</td>
<td>Estimate 0.113 SE 0.035 ***</td>
<td>Estimate 0.082 SE 0.027 ***</td>
<td>Estimate 0.138 SE 0.037 ***</td>
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<td>Independent variables</td>
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<td></td>
</tr>
<tr>
<td>Cashback payment ($)</td>
<td>0.113 0.035 ***</td>
<td>0.082 0.027 ***</td>
<td>0.138 0.037 ***</td>
<td>0.097 0.031 ***</td>
</tr>
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<td>Average cashback offer (%) of top 10 retailers in the current week</td>
<td>1.672 0.368 ***</td>
<td>1.704 0.367 ***</td>
<td>9.401 1.721 ***</td>
<td>1.690 0.369 ***</td>
</tr>
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<td>Amount spent past week ($)</td>
<td>0.216 0.113 *</td>
<td>0.215 0.112 *</td>
<td>0.094 0.011 ***</td>
<td>0.216 0.112 *</td>
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<tr>
<td>Shopping instance</td>
<td>0.007 0.036</td>
<td>0.006 0.035</td>
<td>-0.034 0.046</td>
<td>-0.022 0.013</td>
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<td>Cashback amount * Shopping instance (1e-4)</td>
<td></td>
<td>0.72 1.034</td>
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<tr>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Month FE</td>
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<td>Yes</td>
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All results reported are from fixed-effects OLS estimation with robust standard errors.

* p < 0.10, ** p < 0.05, *** p < 0.01.
Table 5: EVIDENCE FOR MENTAL ACCOUNTING

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>(1) By size of cashback payment, only customers with income data</th>
<th>(2) By size of cashback payment and income level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spend in a week</td>
<td>Estimate</td>
<td>SE</td>
</tr>
<tr>
<td>Independent variables</td>
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<td>Cashback payment less than $42.26</td>
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<td>0.160</td>
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<tr>
<td>Cashback payment greater than $42.26</td>
<td>0.169</td>
<td>0.062</td>
</tr>
<tr>
<td>Cashback payment less than $42.26, low income households</td>
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</tr>
<tr>
<td>Cashback payment greater than $42.26, low income households</td>
<td>0.202</td>
<td>0.095</td>
</tr>
<tr>
<td>Cashback payment less than $42.26, high income households</td>
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<td>0.174</td>
</tr>
<tr>
<td>Cashback payment greater than $42.26, high income households</td>
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<td>0.062</td>
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<tr>
<td>Average cashback offer (%) of top 10 retailers in the current week</td>
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<td>3.145</td>
</tr>
<tr>
<td>Amount spent past week ($)</td>
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<tr>
<td>Shopping instance</td>
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<td>0.029</td>
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<tr>
<td>Month FE</td>
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<td>213,324</td>
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</table>

All results reported are from fixed-effects OLS estimation with robust standard errors.

* p < 0.10, ** p < 0.05, *** p < 0.01
Figure 1: DISTRIBUTION OF TIME-TO-CASHBACK
Figure 2: DISTRIBUTION OF TIME-TO-CASHBACK FOR FOUR RANDOMLY-SELECTED CUSTOMERS
Figure 3: DISTRIBUTION OF TIME-TO-CASHBACK FOR FOUR RANDOMLY-SELECTED RETAILERS

![Distribution of Time-to-Cashback for Four Randomly-Selected Retailers](image-url)
Figure 4: DISTRIBUTION OF TIME-TO-CASHBACK FOR FOUR RANDOMLY-SELECTED CUSTOMERS AT A SPECIFIC RETAILER
Figure 5: MODEL-FREE EVIDENCE FOR PURCHASE LIKELIHOOD

- Non-purchase day
- Purchase day

Average cashback payment received in the past 7 days ($): 0, 3, 7
Figure 6: MODEL-FREE EVIDENCE FOR SPENDING