



The Effect of Payment Transparency on Consumption: Quasi-Experiments from the Field

DILIP SOMAN

Dilip.Soman@rotman.utoronto.ca

The Rotman School of Management, University of Toronto, 105 St. George Street, Toronto, Canada

Abstract

Recent research suggests that the method of making a payment can influence the willingness to pay and consumption behavior. In this manuscript, we argue that payment mechanisms differ from each other along the dimensions of transparency, and that the degree of transparency correlates positively with the pain of paying using the mechanism, and negatively with consumption and spending. We replicate previous experimental results using quasi-experiments from the field, and find that the lower the payment transparency, the greater is the consumption. However, this effect is weak for products whose consumption rates are inflexible.

Keywords: payment mechanisms, transactions, money, spending, consumption

The main disadvantage to credit cards is that they don't always feel like "real money." Whipping out a piece of plastic is so easy it doesn't even feel like you're spending money.

Capital One web site

The last thing I want to do when I have spent a lot is to take out my checkbook and write out the amount. I use plastic, and then it doesn't feel like I'm paying a large amount of money.

Michelle, a department store shopper

1. Introduction

Literature in economics and business has treated a transaction as a dispassionate affair in which a consumer exchanges a sum of money for a product or service. However, common wisdom – and the examples quoted above – suggests that the parting of money is far from a mere economic activity, and that most consumers experience pain in parting with their hard-earned money. Indeed, Zellermyer coined the term "pain of paying" to refer to the emotion that consumers experience in parting with their money (Zellermyer, 1996, see also Prelec and Loewenstein, 1998).

The pain of making a payment obviously depends on the amount to be paid. However, recent research suggests that it might also depend on the method by which payment is made. For instance, Soman (2001) showed that consumers who paid by credit cards rather

than check seemed to experience less of a pain and hence were more willing to incur a given expense. Similarly, in an experimental auction setting, Prelec and Simester (2001) showed that subjects who were told that they would be paying by credit card bid a significantly larger amount for a pair of tickets to a sporting event than subjects who were instructed to pay by cash. Hirschman (1979) used actual consumer transactions data, and found that the spending of consumers who paid by credit cards was greater than those who used cash or checks controlling for other factors. Clearly, the manner in which consumers paid seemed to influence how much they would pay.

The goal of the present research is twofold. First, we argue that payment mechanisms differ from each other in the degree of the transparency of the payment, and that the perceived transparency of the payment correlates significantly with the perceived pain of payment associated with that payment mechanism. Second, we seek to demonstrate that the payment transparency influences spending and consumption behavior using a combination of field experiments and observational data, rather than controlled laboratory experiments.

The rest of this paper is organized in three sections. First, we discuss the concept of payment transparency. Second, we test for the effects of transparency on consumption using three field studies. Finally, we conclude with a general discussion and avenues for future research.

2. Payment Transparency

Unlike the simple economies of many years ago when cash was the predominant method of making payments, consumers today can choose from a vast array of payment options. While cash and checks are still prevalent in some parts of the world, plastic payment mechanisms (credit cards and debit cards) are very commonplace in most economies (Soman and Lam, 2002). In some countries, even these payments mechanisms are getting dated and are being replaced by more advanced mechanisms. For instance, in Hong Kong, a contactless and rechargeable smart card allows consumers to pay their bus and train fares, buy snacks at vending machines and cafes, pay parking fees and also pay for access to sporting facilities (Yoon, 2001). Also in Hong Kong, it is possible to pay for a vending machine snack by simply dialing a number on one's mobile phone and having the amount charged to one's phone bill. As technology presents increasingly convenient methods of making payments, it also results in payment mechanisms that are perceptually increasingly distant from conventional cash-and-carry transactions (Schneider, 2002, see also Gourville and Soman, 1998).

Consider payment by cash as the benchmark transaction. In paying by cash, the payment is very salient in both physical form (i.e., it is easy to see that money is being spent) and in amount (i.e., since cash has to be counted and given, the amount is relatively memorable). In moving from cash to check payments, the salience of the physical form weakens somewhat, but the amount is reinforced (since it has to be written in words and numerals). With credit cards, the salience of both the physical form and the amount is weaker (i.e., cards don't have the physical properties of cash, and the opportunities to reinforce the price are

Table 1. Transparency Levels of Different Payment Mechanisms

Payment mechanism	Saliency of form	Saliency of amount	Relative timing of money outflow and purchase	Transparency
1. Cash	Very high	High	Concurrent	High
2. Check	Medium	High	Payment after purchase	Medium
3. Credit card	Medium	Medium	Payment significantly after purchase	Low
4. Debit card	Medium	Medium	Concurrent	Low
5. Stored value card	Low	Low	Payment before purchase	Very low
6. Autopay (direct debit from bank account)	Very low	Very low	Concurrent	Very low

low). And with electronic and mobile payments (like the Hong Kong examples discussed earlier), the saliency is even lower.

We define payment transparency of a payment mechanism as the relative saliency of the payment, both in terms of physical form and the amount, relative to paying by cash. In some sense, the payment transparency refers to the perceptual similarity between cash and a given payment mechanism. Cash is the most transparent form of payment – when one pays by cash, one sees exactly what they are paying. Other forms of payment may not be as transparent as cash. At the opposite extreme, a completely opaque (non-transparent) form of payment might be a payroll deduction that one is not even aware of. Based on a series of interviews, we were able to generate a list of several payment mechanisms in order of decreasing transparency (see Table 1).

We next present the results of three studies that examine the effects of payment transparency on consumption. In each of the studies, we use two or three different payment mechanisms with different levels of transparency (as determined by pretests), and study consumption as a function of their usage.

3. Study 1: Photocopy Cards

The goal of this first study was to demonstrate that differences in transparency influence consumption. In a simple two-condition experiment, we gave all subjects an identical task but randomly assigned them to one of two payment conditions.

3.1. Procedure, Data and Design

Twenty-four undergraduate students at a U.S. university were recruited, ostensibly to serve as research assistants for a marketing project. Each student was given the exact same library research project for which they were paid \$50, as well as photocopying expenses.

All participants read the following instructions:

A European company is planning to launch their new brand of toothpaste in the United States. Your task is to conduct library research on the market for toothpaste in the United

States. You should search and photocopy all articles that you think may be relevant for the company to know.

Participants were given a one-page summary listing the kind of information the company might like to have (e.g., market size, consumer perceptions, competitors, their strategies etc.). The list was long, but the expected level of detail was quite ambiguous. All participants were also given \$20 for photocopying articles. Since the copy machines in this university charged \$0.10 per copy at the time, this amount would let them copy up to 200 pages. Participants were told “While it is a safe strategy to copy everything that seems remotely related, please do keep in mind that we need to keep costs in control. Hence, please copy only the pages that you think are relevant. Of course, the degree of relevance is subjective and is up to your judgment. Given the time at your disposal, we expect that you will not be able to identify and copy more than 200 pages.” Participants were also asked to “make brief notes from articles that you did not photocopy but think may contain useful information.”

Photocopy machines throughout the campus accepted payment in two forms – dimes and copy cards. Therefore, after receiving instructions on the task, participants were randomly assigned to one of two experimental conditions. In one condition ($n = 12$), they were given a library photocopy card with \$20 credit on it. In the second (cash) condition ($n = 12$), they were given \$20 in the form of dimes that were rolled in four rolls of 50 dimes each. Participants were instructed to return the card with the residual value, or the remaining dimes along with the articles they had copies, and were also told to provide an account of the number of pages copied and hence the photocopying expense and residual value. Our dependent variable was simply the number of pages that had been photocopied.

3.2. *Results and Discussion*

None of the participants used up all the photocopies that they could make, and the number of pages copied ranged from 34 to 190. The mean number of pages copied in the photocopy card condition ($M = 114.5$) was significantly greater than the number of pages copied in the cash condition ($M = 77.25$, $t_{22} = 2.08$, $p < 0.05$). Participants seemed more generous with the photocopying allowance in the card condition, i.e., when it was low in transparency.

We also compared the number of points that participants made a note of in lieu of articles they did not photocopy. The mean number of points written down in the card condition ($M = 2.50$) was significantly smaller than the number of points written in the cash condition ($M = 5.92$, $t_{22} = 3.37$, $p < 0.005$). This suggests that the participants who used dimes copied less pages but compensated by writing more notes and expending effort in the process. Obviously, these participants seemed to value the money more than subjects who had a copy card.

We also note that this last result was inconsistent with the argument that consumption was greater in the card condition due to the lower transaction costs. If these subjects were averse to incurring costs, they should not have incurred the cost of writing additional notes.

Results from the first experiment showed that the transparency of the payment mechanism definitely influenced the level consumption.

4. Study 2: Prepaid Laundry Cards

We next conducted a “natural experiment” in which we observed people in the course a routine activity, but over time, such that the payment mechanism (and hence the transparency of the payment) had changed in the interim.

This study was conducted in the laundry rooms of two major apartment complexes in two major U.S. cities. Both these apartment complexes had laundry machines that previously accepted coins (4 quarters for each load in the washing machine), but had recently moved to a prepaid laundry card system. The laundry card could be purchased with a starting investment of \$20, and could subsequently be recharged in increments of \$10 using either cash or a credit card. When used to run a load of laundry, the card reader on the machine would automatically deduct \$1 per load from the card.

Note that the price of each load of laundry remained unchanged before and after the introduction of the card system. It could be argued that there was a difference in transaction cost to the extent that carrying a laundry card was easier than carrying coins. However, both the laundry facilities had a change machine that dispensed quarters, hence most residents did not have to actively save and organize quarters for their laundry. The major difference was the transparency of the payment – when using cash, the payments were highly transparent, but while using cards, the payment was not as transparent.

4.1. *Dependent Variable*

Good housekeeping books (e.g., Aslett, 2001) and mothers alike have incessantly advised laundry-doers to separate their clothes into whites and colored, and to run these as separate loads. In a pretest with 58 laundry-doers in two laundromats in an affluent U.S. town, most respondents (94.83%) said that they were aware of this advice. Of those that were aware, 36.36% said that they actually separated their laundry, while the rest (63.64%) suggested that they would do this, however it seemed wasteful and that they did not feel like paying for two loads if the volume of clothes was not large. These people seemed to suggest that if cost were not an issue, they would be happy to separate their whites from the colored clothes. In the context of the present study, we expected that the reduction in the transparency of the payment with the laundry cards would increase the likelihood that people separate their laundry. Therefore, our dependent variable was the percent of respondents who separated their laundry. In the rest of the discussion, we use the term “separate” as shorthand for separating whites from colored clothes while doing laundry.

4.2. Procedure, Data and Design

A research assistant was hired to collect data from the two laundry rooms over a period of 40 days. When the data collection started, the machines were operated by coins. Approximately midway during this period (after 16 days in one laundry, 18 days in the other), the machines were retooled to accept only laundry cards. Our unit of analysis was an individual who entered the laundry room with their basket(s). We eliminated groups of two or more people who came together, since it was impossible to determine (without being too intrusive) whether they were part of the same unit (i.e., family) or were acquaintances who had come together. We also did not collect data on weekends, or late in the evenings when the facility was close to being fully utilized, and the decision to not separate might be driven by capacity constraints.

When the individual entered the laundry room, the research assistant simply observed and noted whether they ran one load, or whether they ran separate loads. As the individual completed their laundry work, the assistant intercepted them and asked if they would participate in a simple survey about laundry practices. They were also asked whether they had been surveyed before; those that said yes were thanked and were not asked any further questions. All intercepted individuals agreed to participate, and was asked three questions. First, they were asked whether they believed that they should separate their laundry into whites and colored. Second, they were asked “Today, did you have a load that was large enough that – purely based on volume of clothes – you had to run more than one load?” Third, they were asked “Today, if you had clothes that could have gone into one load, did you actually separate them and run multiple loads?” The purpose of asking the questions was to corroborate the observation, and to ensure that we did not attribute multiple loads due to a large volume of clothes to a greater willingness to separate. Those that answered yes to the third question and were seen to run multiple loads were coded to have separated laundry. All participants were given a token gift in exchange for their time.

As in our pretest, a very large percent of respondents (96%) said that they believed that they should separate their laundry. For the purpose of analysis, we only considered observations in which respondents said that their loads were not large enough for multiple loads (these were approximately 88% of the first group). We were left with a total of 126 (60 in one complex, 66 in the other) observations in the “cash” condition (i.e., when transparency was high) and 106 (51 in one complex, 55 in the other) observations in the “card” condition (i.e., when transparency was low). Hence, the study employed a 2 (Payment Mechanism: Cash vs. Card) \times 2 (Apartment Complex) design.

4.3. Results and Discussion

Table 2 shows the number of respondents separating their laundry in each of the conditions. The likelihood of separating laundry was analyzed using a logistic regression with Payment Mechanism and Apartment Complex as independent variables. Results indicate a significant simple effect of Payment Mechanism ($\chi^2(1) = 6.45, p < 0.02$). The simple effect of Apartment Complex and the interaction effect between the two factors did not

Table 2. Number of Respondents Separating Their Laundry: Study 2

Condition	<i>N</i> *	Number separating	Number not separating
Cash payment			
First apartment complex	60	25 (41.67%)	35 (58.33%)
Second apartment complex	66	30 (45.45%)	36 (54.55%)
Card payment			
First apartment complex	51	31 (60.78%)	20 (39.22%)
Second apartment complex	55	33 (60.00%)	22 (40.00%)

* *N* represents the total number of people surveyed who (a) believe in separating, and (b) did not have a load large enough to justify separating based on volume alone.

approach significance (p 's > 0.70). As the data in Table 2 shows, the percent of people separating their laundry in the cash condition was 43.65%, which was significantly lower than the 60.38% separating in the card condition. Consistent with our prediction, the willingness to separate laundry was greater when the payment mechanism hid the transparency of the cash outflows.

One possible explanation for this result was that the change in the payment mechanism caused some kind of a novelty effect that pushed residents to spend more on laundry. Perhaps such novelty effects are short lived and would die down after a period of time. We do not believe that this explanation accounts for our results – we ensured that we did not survey the same people twice, further, we believe that if anything, the tendency to spend more on laundry would increase over time rather than decrease. However, to ensure that novelty effects were not driving our results, we collected a smaller sample of data at one of the apartment complexes about 16 months after the first data collection exercise. Twenty six out of 40 people (65%) separated their laundry, a number that is statistically greater than the original 43.65% in the cash payment condition ($\chi^2(1) = 5.38$, $p = 0.02$). Hence, the effects of payment transparency were robust and apparently not a short term phenomenon.

5. Study 3: Credit Cards and Shopping Baskets

The goal of this study was to replicate these findings from the previous studies using real transaction data from a U.S. supermarket. We wanted to demonstrate that shoppers who use less transparent payment mechanisms tend to purchase more non-essential products on an average. Further, we also hoped to demonstrate that transparency does not have an effect on products that are essential in nature.

5.1. Procedure, Data and Design

Our data came from a collection of 275 grocery store receipts that shoppers volunteered to give us. Supermarket shoppers exiting a large U.S. store were intercepted by a researcher who identified himself as a member of a research team from a nearby, large state university and asked shoppers if they would be willing to give their grocery store receipt for analysis as part of a research project. Some shoppers who expressed reservation about privacy issues were explained that there was no identifying information on the receipt (for security reasons, the store did not print credit card numbers on the receipt). Out of 312 shoppers who were intercepted, 275 gave us their receipts, resulting in a response rate of 88.14%. Each shopper was also asked how he or she paid for their groceries. Of the 275 receipts we had, there were 92 cash transactions (33.45%), 55 check transactions (20%) and 128 credit card transactions (46.55%). The receipts served to corroborate this data since they carried a code for the payment method.

The total pretax amounts spent on the receipts ranged from \$2.05 to \$256.65. A series of descriptive statistics suggested that 80% of the amounts ranged between \$12 and \$90, and accounted for 219 receipts. An inspection of the shopping baskets represented by the receipts indicated that 27 purchases were obviously not routine shopping trips. Some of these 27 were purchases for special occasions (e.g., one receipt was for paper cups and plates, soda, charcoal, starter fluid and lighter; another was for party hats and banners, paper plates, cake, soda and chocolates), while others were institutional purchases (e.g., one receipt was for office items, another was for several gallons of bottled water). Since our interest was in studying the effect of payment mechanisms on routine shopping behaviors, we dropped these receipts. Of the remaining receipts, we dropped the top 5% and the bottom 5% as outliers. We also ran a second set of analysis in which we retained all the 275 receipts, but used geometric means rather than arithmetic means in the analysis. The pattern of results from this second set of analysis were identical to the ones reported here, and hence are not discussed in detail.

All the items from these 219 receipts were coded by a panel of three judges to be either Consumption Inflexible (staple grocery products) or Consumption Flexible (treats and luxuries). We coined these terms based on Ailawadi and Neslin's (1998) idea of flexibility in usage, and provided an explanation for them. Judges were told "Think of consumption inflexible products as staple grocery products or necessities, which you would need to buy irrespective of changes in price or other factors. For such products, the quantity that you would consume would also not vary greatly. For instance, you would not consume greater quantities of cooking oil or toilet paper just because it was cheap, or because you had plenty of supplies at home. Think of consumption flexible products as those where your purchase and expense may vary on a number of factors like price and quantity available." Examples of inflexible items included rice, cooking oil, toilet tissue and bread, while examples of flexible items included chocolate, gum, snacks and drinks, and magazines. The three judges first independently coded all items, and then resolved disagreements (11%) via discussion. At the end of this exercise, we were able to classify each item on each receipt as either Inflexible or Flexible, and hence were able to estimate dollar spends and percentages on each type. The objective of the analysis was simply to compare these num-

Table 3. Non-Discretionary and Discretionary Expenses as a Function of Payment Transparency: Study 3

	Payment mechanism (Transparency)		
	Cash (High Transparency)	Check (Medium Transparency)	Credit Card (Low Transparency)
Number of receipts	83 (37.91%)	43 (19.63%)	93 (42.46%)
Average total spend	\$32.96	\$35.74	\$43.49
Average inflexible item spend	\$23.88	\$24.02	\$24.77
Average flexible item spend	\$9.08	\$11.72	\$18.72
Percent spend on flexible expenses	27.56%	32.79%	43.04%
Average total spend – all receipts (geometric mean)	\$29.88	\$32.47	\$42.56
Average inflexible item spend – all receipts (geometric mean)	\$20.18	\$21.10	\$22.86
Average flexible item spend – all receipts (geometric mean)	\$7.52	\$8.36	\$15.81

bers across the three types of payments mechanisms – hence this study employed a simple one-factor design with 3 levels of payment mechanism: Cash (High Transparency), Check (Medium Transparency), Credit Card (Low Transparency).

5.2. Results and Discussion

The number of receipts in each condition as well as the mean of dollar spends is shown in Table 3. We first note that the attrition in the number of receipts as a result of dropping outliers was largely due to credit card purchases. Of the 56 receipts that were dropped, 17 receipts were dropped because the amounts were too low while 39 had amounts that were high. Of these 39, 35 receipts were credit card purchases (89.74%). Having already eliminated the high spending receipts, we expected the remaining data to serve as a conservative test of our predictions. The table also shows geometric means when all 275 receipts were included, and the numbers confirm that the pattern of results is unchanged.

We first compare the amount spent on inflexible expenses across the three conditions. In the cash condition, the average dollar spend was \$23.88; in the check condition, it was \$24.02; and in the credit card condition, it was \$24.77. While there was a small increase in spend on inflexible expenses as transparency went down, the differences were not significant (p 's > 0.35). Next, we consider differences in spending on flexible items. In the cash condition, this amount was \$9.08. In the check condition, it rose to a significantly greater \$11.72 ($t_{124} = 2.06$, $p < 0.03$). And in the credit card condition, the average spend was \$18.72, which was significantly greater than the check condition ($t_{134} = 4.07$, $p < 0.001$).

The reduction in transparency of payments increased the dollars spend, but only on items whose consumption was flexible but not on items whose consumption rates were inflexible.

6. General Discussion and Conclusions

In this paper, we argued that a difference in the transparency of payments caused by different payment mechanisms changes the pain of making a payment, and consequently influences spending and consumption behavior. Using three quasi-experimental studies, we were able to document these effects using data from real consumers in real consumption situations. In particular, we examined the effects of prepaid cards vs. cash in two settings – making photocopies and doing laundry, and finally studied the effects of different payment mechanisms in a supermarket on the composition of the shopping basket. Our results consistently showed that reduced transparency results in increased consumption.

Since our goal was to look for field demonstrations of the effect of payment mechanisms on spending, one of the limitations of our studies was that we sacrificed some degree of control in our studies. For instance, in Study 1, we hired research assistants and then let them collect data and return to us with results. While we instructed them to not talk to others about their task, we had no means of ensuring that they did not exchange notes or collaborate with each other on the task. Note that even if they did collaborate, it would not explain our result. While we did try our best to maximize control, we were left with a degree of imprecision that is inherent in studies using “real” consumption behavior.

One interesting avenue for future research to pursue is the relationship between the characteristics of payment mechanisms and the perceived transparency and pain. The present research seems to suggest that the salience of form and amount seem to explain the perceived transparency – however, we did not measure our respondent’s perceptions of each payment mechanism along each of these dimensions, nor did we formally test for the relationships in any formal manner.

Admittedly, the present research can be enhanced in a number of ways. However, our goals were modest. We simply wanted to demonstrate the effects of payment transparency on consumption in three distinct, non-traditional settings using quasi-experiments. We feel that these findings nicely complement the experimental findings of Prelec and Simester (2001) and Soman (2001) and show that in addition to how much you pay, how you pay also matters in spending and consumption decisions.

Acknowledgement

This research was conducted when the author was at the University of Colorado, Boulder, and then at the Hong Kong University of Science and Technology, and the support of those universities is acknowledged. I thank Andrew Tan, Emily Chow, Kareen Kinzli, and

Michael Walker for excellent research assistance. I also thank Amar Cheema, Weiyin Hong and Rongrong Zhou for comments and suggestions on previous versions of this manuscript.

References

- Ailawadi, K. and S. Neslin. (1998). "The Effect of Promotion on Consumption: Buying More and Consuming it Faster," *Journal of Marketing Research*, 35(August), 390–398.
- Aslett, D. (2001). *The Cleaning Encyclopedia*. New York, NY: Dell Publishing Co.
- Gourville, J. and D. Soman (1998), "Payment Depreciation: The Behavioral Effects of Temporally Separating Payments from Consumption," *Journal of Consumer Research*, 25(2), 160–174.
- Hirschman, E. (1979). "Differences in Consumer Purchase Behavior by Credit Card Payment System," *Journal of Consumer Research*, 6, 58–66.
- Prelec, D. and G. Loewenstein. (1998). "The Red and the Black: Mental Accounting of Savings and Debt," *Marketing Science*, 17(1), 4–28.
- Prelec, D. and D. Simester. (2001). "Always Leave Home Without It: A Further Investigation of the Credit Card Effect on Willingness to Pay," *Marketing Letters*, 12(February), 5–12.
- Schneider, I. (2002). "Don't Leave Home Without IT," *Bank Systems and Technology*, 39(November), 30–34.
- Soman, D. (2001). "Effects of Payment Mechanism on Spending Behavior: The Role of Rehearsal and Immediacy of Payments," *Journal of Consumer Research*, 27(March), 460–474.
- Soman, D. and V. Lam. (2002). "The Effects of Prior Spending on Future Spending Decisions: The Role of Acquisition Liabilities and Payments," *Marketing Letters*, 13(November), 359–372.
- Yoon, S. K. (2001). "Tangled Octopus," *Far Eastern Economic Review*, 164(July 5), 40.
- Zellermayer, O. (1996). *The Pain of Paying*, Ph.D. Dissertation, Carnegie Mellon University.