

The Red and the Black: Mental Accounting of Savings and Debt

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Abstract

In the standard economic account of consumer behavior the cost of a purchase takes the form of a reduction in future utility when expenditures that otherwise could have been made are forgone. The reality of consumer hedonics is different. When people make purchases, they often experience an immediate *pain of paying*, which can undermine the pleasure derived from consumption. The ticking of the taxi meter, for example, reduces one's pleasure from the ride. We propose a "double-entry" mental accounting theory that describes the nature of these reciprocal interactions between the pleasure of consumption and the pain of paying and draws out their implications for consumer behavior and hedonics. A central assumption of the model, which we call *prospective accounting*, is that consumption that has already been paid for can be enjoyed as if it were free and that the pain associated with payments made prior to consumption (but not after) is buffered by thoughts of the benefits that the payments will finance. Another important concept is *coupling*, which refers to the degree to which consumption calls to mind thoughts of payment, and vice versa. Some financing methods, such as credit cards, tend to weaken coupling, whereas others, such as cash payment, produce tight coupling.

Our model makes a variety of predictions that are at variance with economic formulations. Contrary to the standard prediction that people will finance purchases to minimize the present value of payments, our model predicts strong *debt aversion*—that they should prefer to prepay for consumption or to get paid for work after it is performed. Such pay-before sequences confer hedonic benefits because consumption can be enjoyed without thinking about the need to pay for it in the future. Likewise, when paying beforehand, the pain of paying is mitigated by thoughts of future consumption bene-

fits. Contrary to the economic prediction that consumers should prefer to pay, at the margin, for what they consume, our model predicts that consumers will find it less painful to pay for, and hence will prefer, flat-rate pricing schemes such as unlimited Internet access at a fixed monthly price, even if it involves paying more for the same usage. Other predictions concern spending patterns with cash, charge, or credit cards, and preferences for the earmarking of purchases.

We test these predictions in a series of surveys and in a conjoint-like analysis that pitted our double-entry mental accounting model against a standard discounting formulation and another benchmark that did not incorporate hedonic interactions between consumption and payments. Our model provides a better fit of the data for 60% of the subjects; the discounting formulation provides a better fit for only 29% of the subjects (even when allowing for positive and negative discount rates).

The pain of paying, we argue, plays an important role in consumer self-regulation, but is hedonically costly. From a hedonic perspective the ideal situation is one in which payments are tightly coupled to consumption (so that paying evokes thoughts about the benefits being financed) but consumption is decoupled from payments (so that consumption does not evoke thoughts about payment). From an efficiency perspective, however, it is important for consumers to be aware of what they are paying for consumption. This creates a tension between hedonic efficiency and what we call *decision efficiency*. Various institutional arrangements, such as financing of public parks through taxes or usage fees, play into this tradeoff. A producer developing a pricing structure for their product or service should be aware of these two conflicting objectives, and should try to devise a structure that reconciles them.

(Mental Accounting; Framing; Consumer Choice)

"Now you can call your loved ones and not think about how
much it costs."

Billboard advertisement for long-distance telephone debit card

"Hotels are twice as good when you pay half as much."

Web advertisement for discount hotel rates

1. Introduction

We start with a brief story:

Last year, just after his 25th college reunion, Jones bought a slightly used red two-seater, financing the purchase with a standard car loan. Although the car performed well enough, he found that suitable driving occasions were less frequent than he had anticipated, and that the thrill of recreating the college years dissipated quickly. The monthly payments became regular reminders of what was in truth a rather expensive indulgence: It was hard to justify each bill with the pleasures of an occasional weekend drive. After a bout of worrying and procrastination, he decided to pay off the entire loan. Writing the check was painful but produced relief, and restored some of the pleasures of driving. Now that he owned the car, he was no longer concerned with driving a certain amount each month, and let suitable occasions arise spontaneously. He even began to enjoy how the thing looked in the driveway. . . .

In the traditional economic analysis of consumer choice, consumers are assumed to finance expenditures so as to minimize the present value of payments, perhaps making allowance for liquidity and convenience. The psychological reality of payment decisions is more complicated, as suggested by our story. The first and perhaps most obvious complication is that debt is unpleasant. It feels good to be rid of debt, and especially good to be rid of debt for a disappointing purchase such as the underused sports car. The rationale for such a feeling is somewhat unclear, since paying off the loan doesn't diminish the real opportunity cost of purchasing the car: However he pays for the car, Jones has less wealth, which will inevitably require some sacrifice in future consumption.

Second, according to the economic view, the costs and benefits of paying off the loan should be a purely financial matter, involving interest rates, liquidity concerns, and so on. In this example, however, a paper transaction—drawing down other accounts to clear a loan—changes Jones' enjoyment of the car, indicating that consumption utility has been affected by the composition of assets on the balance sheet.

Third, it is puzzling why Jones finds it painful to dispose of the entire loan with a single payment if that very action will bring relief. It is almost as if the discontent over the purchase is somehow collected and discharged through the brief but painful action of writing the check.

The feelings described in this example illustrate a systematic interference between the pleasures derived from consumption and the magnitude and timing of payments. Thinking about the cost of a purchase can undermine the pleasure one derives from it. Thinking about the benefits derived from a purchase can blunt the pain of making payments. These two-way hedonic interactions between payments and consumption fall outside the scope of traditional economic models. Nonetheless, they are important for understanding the financial behavior of consumers.

Our objective in this paper is to provide a theoretical account of these payment-consumption interactions that can both explain the observed patterns of behavior and give insights into designing payment mechanisms for products or services. Building on an idea first proposed by Richard Thaler (1980, 1985), we postulate that people establish mental accounts that create symbolic linkages between specific acts of consumption and specific payments. Acts of consumption and financial transactions call mental accounts to mind, which generates pleasure or pain depending on whether the accounts are in the red or in the black. For example, paying off the car in our story provides relief because it puts the "car account" in the black, thus ensuring that subsequent driving experiences are freed from thoughts about payment.

Our model makes a variety of predictions that are at variance with those of standard economic formulations. Contrary to the traditional notion that consumers prefer to consume now and spend later, our model predicts strong *debt aversion*, which supports (in some cases) a preference to pay for consumption in advance. Contrary to notions of economic efficiency, which dictate that consumers should pay for what they consume at the margin, our model predicts a preference for flat-rate pricing, such as unlimited Internet access at a fixed monthly price, even if it involves paying more for the same usage. Other predictions deal with differences in

spending patterns with cash, charge, or credit purchases, and with preferences for earmarking saving and debt accounts to specific purchases.

2. Preferences for Prepayment

What would economic analysis have to say about Jones' dilemmas? In a simple treatment of the purchase decision problem, the sports car purchase would be represented by a sequence of dated utilities (benefits) $\{u_b, b \geq 0\}$, and the loan by a sequence of dated payments (costs), $\{p_c, c \geq 0\}$.¹ The decision whether to purchase the car would rest on whether the discounted present value of the utility stream exceeded the discounted present value of loan payments,

$$\text{Buy if: } \sum_{b=0} \delta^b u_b - \lambda \sum_{c=0} \rho^c p_c > 0. \quad (1)$$

The parameter δ is the discount rate applicable to utility from consumption, ρ is the discount rate that applies to delayed monetary outlays ($0 < \delta, \rho \leq 1$), and λ is a Lagrange multiplier that, when the consumer optimizes, is equal to the marginal utility of money.

Interpreted as a descriptive model, Equation (1) makes a number of predictions about financing preferences. First, consumers should prefer to make payments later rather than sooner, as later payments have lower present value. Second, choice of financing (e.g., saving versus borrowing) should not be influenced by the type of product being purchased but only by the criterion of minimizing the second term in Equation (1). Both predictions have surface plausibility, but one can readily construct choice problems that reveal opposite intuitions. Consider Items 1A and 1B below. In each case, a decision needs to be made whether to finance an expenditure sooner or later, e.g.:

Item 1A

Imagine that you are planning a one-week vacation to the Caribbean, six months from now. The vacation will cost \$1,200. You have two options for financing the vacation:

A. Six monthly payments of \$200 each during the six months before the vacation.

B. Six monthly payments of \$200 each during the six months beginning after you return.

When this question was posed to 91 visitors to the Phipps Conservatory in Pittsburgh, 60% of respondents opted for the earlier payments, despite an implicit interest penalty of about \$50 (results summarized in Table 1).

The preference for prepaying does not hold for all types of expenditures, however:

Item 1B

Imagine that, six months from now, you are planning to purchase a clothes washer and dryer for your new residence. The two machines together will cost \$1,200. You have two options for financing the washer/dryer:

A. Six monthly payments of \$200 each during the six months before the washer and dryer arrive.

B. Six monthly payments of \$200 each during the six months beginning after the washer and dryer arrive.

Here, 84% of subjects prefer to postpone payments until the units arrive (Table 1). Such a reversal of preference in choosing between financing options is a robust

Table 1 Percentage of Subjects Who Prefer to Prepay (Item 1) or to Delay a Salary Payment (Item 2)

Item	Within subjects		Between subjects (first question only)	
	%	N	%	N
Prefer to prepay				
1A Vacation	63*	89	60*	31
1B Washer-dryer	24	89	16	30
1C Misc. expenses	70*	89	67*	30
Prefer to delay salary				
1D Work (brief)	60*	89	57*	45
1E Work (long)	66*	89	76*	46

Note: The order of questions was varied across subjects. The right side of Table 1 reports only the choices of first encounter of a payment question or a salary question (i.e., the data conform to a between-subjects design). The left panel includes all responses.

*Significantly different from the percentages in 1B, $p < .02$.

¹ For example, if Jones made two \$200 payments prior to acquiring the car, three payments of \$200 while driving the car, and paid off the car with a final payment of \$15,000, then $p = \{200, 200, 200, 200, 200, 15K, 0, 0, \dots\}$, and if he derives one unit of utility per month of car usage, then $u = \{0, 0, 1, 1, 1, 1, 1, 1, \dots\}$.

phenomenon, holding both between and within subjects.² It is also consistent with the findings of Hirst, Joyce, and Schadewald (1992), who describe several studies in which subjects show a preference for matching the duration of a loan with the life of the durable.

Table 1 reports two other variations on this question, designed to rule out two possible interpretations of debt aversion. In Item 1C, the six payments of \$200 were described as covering miscellaneous living expenses for a brief and fully anticipated period of unemployment. The fact that the majority of subjects still prefer prepayment shows that the debt aversion is not restricted to the category of luxury purchases, such as the vacation in 1A. In Items 1D and 1E, the six \$200 transactions were described as salary receipts for an "intensive weekend of work" (Item 1D) or "a few hours of work each weekend for the next six months" (Item 1E). The receipts could be collected before doing the work or afterwards. In both cases, the majority of subjects declined advance payment. This shows that the preferences in 1A and 1C are not caused by a simple desire to expedite financial transactions, whether payments or receipts.

Taken together, the majority choices in Table 1 reveal a form of debt aversion, where debt is construed as either consuming something before paying for it or getting advance payment for future work. Such preferences are consistent with our own earlier research (Loewenstein and Prelec 1993), which showed that people generally like sequences of events that improve over time and dislike sequences that deteriorate (see also Hsee and Abelson 1991; Kahneman et al. 1993; Loewenstein 1987).

Two distinct motives might incline a person to prepay for a product. One might hope to enjoy it unencumbered by payment concerns, or, alternatively, one might want to avoid the unpleasant experience of paying for consumption that has already been enjoyed. When we probe our subjects' intuitions on this matter we find that both motives are recognized, but their force varies according to the nature of the product. In a different survey we asked 60 visitors to the botanical

² Forty-three percent of subjects preferred the early vacation and late washer/dryer payments; 3% displayed the opposite pattern.

gardens to consider two men who had financed a purchase (a one-week cruise in the Bahamas or a washer-dryer combination package) either with six monthly prepayments (Mr. A) or six payments beginning after the purchase (Mr. B). Subjects judged which of the two persons felt better when making the payments, and which felt better while consuming the good or service, in the case of each purchase. There was also an indifference option.

The evaluations in 2A (see Table 2) demonstrate that the attractiveness of vacation prepayment is derived from the consumption experience: People think that a prepaid vacation is more pleasurable than one that must be financed after returning. The washer-dryer unit (2B) yields no significant hedonic differentials, which means that the financial advantages of later payments can become decisive. Apparently, people are able to distinguish between the hedonic impact of payments on consumption and of consumption on payments, and these impacts are not exactly symmetric.³ The theory that we develop will therefore have to accommodate both the impact of payment on consumption and the reciprocal impact of consumption on payment.

Table 2 Hedonic Evaluation of Paying for Products Before or Afterward

	Payments	Consumption
2A Vacation	-.26 (.21)	-.79* (.12)
2B Washer-Dryer	.19 (.21)	-.19 (.19)

Note: The answers were encoded -1 (prepayment better), 0 (no difference), +1 (postpayment better). Hence, negative means indicate paying early is better. $n = 19-21$ in all cells.

*Significantly different from zero, $p < .05$

³ Leaving out the indifference option produces more pronounced preferences for prepayment and more symmetric attitudes toward payments and consumption. In a different survey of 60 visitors to the Phipps Conservatory, a large majority (92%) judged that they would enjoy a Caribbean vacation more if the vacation was prepaid, and an almost as large majority (82%) judged that making the payments would also be less unpleasant if done before leaving.

3. A “Double-Entry” Mental Accounting Theory

The purpose of these examples has been to reinforce the intuition that thoughts of payment can undermine the pleasures of consumption and, conversely, that the pain of making payments can be buffered by thoughts of the benefits that these payments finance. We will now introduce a “double-entry” mental accounting theory, in which one set of entries records the “net” utility derived from consumption after subtracting the disutility of associated payments, and the other set records the “net” disutility of payments after subtracting the utility of associated consumption.

Each time a consumer engages in an episode of consumption, we assume she asks herself: “How much is this pleasure costing me?” The answer to this question is the *imputed cost* of consumption. This imputed cost is “real” in the sense that it actually detracts from consumption pleasure. For some types of purchases, these costs may be highly salient, while for others they may only dimly impinge on consciousness.

Figure 1 illustrates the notion of imputed cost with the example of a consumer who finances a one-week vacation with six monthly payments, three before the vacation and three after. The six downward arrows represent the six payments and the upward facing bar represents the utility derived from the vacation. If the vacation were free, then the consumer’s enjoyment of the vacation would equal the full size of the bar. However, thinking about the costs reduces the quality of

the vacation experience. The top section of the bar represents the “utility lost” from the imputed vacation cost. The bottom section of the bar represents the utility that remains after subtracting imputed cost, which is the actual, or “experienced,” utility derived from the vacation (Kahneman and Varey 1991).

In formal terms, experienced utility is the utility of consumption when free (u_b) minus the imputed cost (\hat{p}_b) multiplied by a payment/utility conversion parameter, λ :

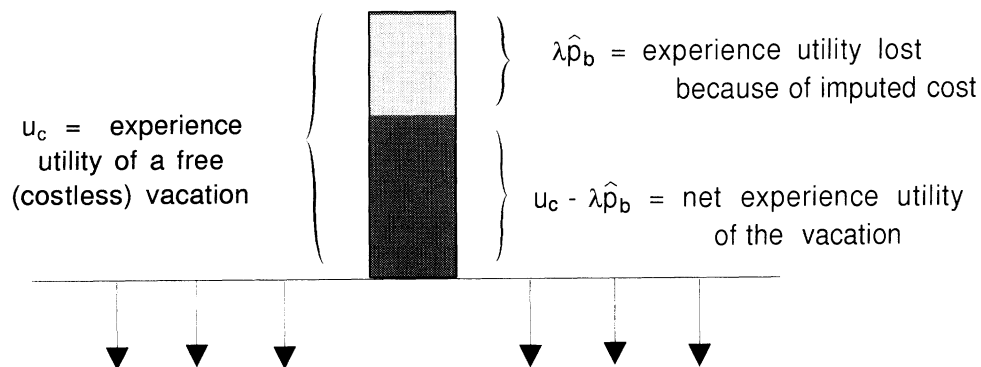
$$u_b - \lambda \hat{p}_b \quad (2a)$$

Like the Lagrange multiplier in the conventional formulation (Equation (1)), λ here reflects the marginal utility of money, which in turn depends on an individual’s financial situation. For example, a major economic loss would increase λ , which would diminish subsequent utility from consumption.

The critical difference between λp from Equation (1) and $\lambda \hat{p}$ is that the former is a decision criterion while the latter is the actual psychological burden of payment. In the standard formulation, the consumer should buy if $u - \lambda p > 0$. Provided he does buy, and barring any miscalculation about the quality of the product, his enjoyment of consumption will equal u . The cost—in utility terms—of the purchase is only realized in the future, when some other bit of consumption is canceled. In our model, however, the utility of consumption is actually reduced by its imputed cost, $\lambda \hat{p}$; “net experienced utility” is equal to $u - \lambda \hat{p}$.

The other half of the accounting system records the

Figure 1 Net Experience Utility Expressed as a Difference Between the Utility of a Costless (Free) Vacation and the Imputed Cost



disutility of making payments. Just as utility from consumption is undermined by the disutility of making payments, the disutility of making payments is buffered by the *imputed benefit* derived from each payment. In this case, the experienced disutility of making payment (p_c) equals the disutility of the payment if there were no associated benefits $-\lambda p_c$, compensated by the imputed benefits of this particular payment (\hat{u}_c):⁴

$$\hat{u}_c - \lambda p_c. \quad (2b)$$

The consumer's mental accounting rules determine how these imputed costs and benefits depend on the magnitude and timing of consumption.

3.1. The Purchase Criterion

The decision whether to purchase a product will depend on the anticipated sequence of net consumption and payment utilities, as defined by Equations (2a) and (2b). We assume that future net utilities are discounted according to some time discount function, which is possibly but not necessarily exponential. In the case of exponential (i.e., compound) discounting, the time discount factors would be given by: $\delta_b = \delta^b$, and $\rho_c = \rho^c$. We assume also that consumers are *loss averse* with respect to individual consumption and payment events, so that events that have negative net utility are given disproportionate weight at the moment of choice (Tversky and Kahneman 1992). Loss aversion is captured by a parameter, μ , $0 \leq \mu \leq 1$, which creates a gap between the decision weights of positive and negative experiences:⁵

⁴ The term ($\hat{u}_c - \lambda p_c$) may be compared to Thaler's (1985) "acquisition utility," which is a function of the difference between the "value equivalent" for the purchased product and the actual price paid (p_c). Because \hat{u}_c/λ is a sort of money equivalent of the benefits imputed to payment p_c , the term ($\hat{u}_c - \lambda p_c$) = $\lambda(\hat{u}_c/\lambda - p_c)$ resembles acquisition utility, at least in the special case when the purchase is made with a single payment and the benefits imputed to that payment equal the full utility of the product, $\hat{u} = u$. In Thaler's theory, acquisition utility is one of the two components of the utility of a purchase, the other component being "transactions utility," which is driven by a comparison of actual price paid with a fair or "reference" price.

⁵ The loss-averse weights in Equation (3) can be derived from a penalty function on absolute deviations from zero, $f(x) = x - \mu|x|$, applied to the terms $x = (u - \lambda\hat{p})$, and $x = (\hat{u} - \lambda p)$. The impact of

Loss-averse decision weights:

$$\begin{cases} (1 - \mu) & \text{if: } u_b - \lambda\hat{p}_b \geq 0, \text{ or: } \hat{u}_c - \lambda p_c \geq 0, \\ (1 + \mu) & \text{if: } u_b - \lambda\hat{p}_b < 0, \text{ or: } \hat{u}_c - \lambda p_c < 0. \end{cases} \quad (3)$$

These two assumptions, loss aversion and discounting, combine to give a decision criterion:

$$\begin{aligned} \text{Buy if: } & \sum_{b \geq 0} (1 \pm \mu)\delta_b(u_b - \lambda\hat{p}_b) \\ & + \sum_{c \geq 0} (1 \pm \mu)\rho_c(\hat{u}_c - \lambda p_c) > 0. \end{aligned} \quad (4)$$

To briefly review the model: Each term in the Summation (4) refers to an anticipated experience.⁶ The experience has a focal event, either consumption or payment, and a hedonic evaluation. Experiences that are further away from the decision point are discounted ($\delta, \rho < 1$), as are positive, relative to negative, experiences ($\mu > 0$). When there is no loss aversion ($\mu = 0$), no mental accounting ($\hat{p} = \hat{u} = 0$), and discounting is exponential, then we are left with the net present value purchase criterion, Equation (1).

3.2. Imputed Costs and Benefits

So far we have said nothing about the mental accounting terms, which are at the heart of the model. When both consumption and payment are brief and simultaneous—e.g., when we pay \$75 for a restaurant dinner—then consumption (i.e., of the dinner) is the only benefit that could be imputed to the payment, and the payment (i.e., the \$75) is the only cost that could be imputed to consumption. Few important purchases are this straightforward. What happens in more complex situations, when there are multiple payments and when the purchase benefits extend over time? In the car example, the imputed costs of a weekend drive may depend on any and all costs associated with car ownership: loan payments, operating costs, insurance,

loss aversion, holding all else equal, is to increase the attractiveness of consumption-payment schedules for which imputed costs match the utility stream, and for which the imputed benefits match the payment stream. Schedules where the temporal payments profile tracks the temporal consumption profile will generally exhibit this kind of matching.

⁶ In practice, actual experienced utility may deviate from anticipated (i.e., predicted) utility in systematic ways (Loewenstein and Schkade forthcoming).

and so forth. A general expression for the imputed cost, \hat{p}_b , would indicate what fraction, w_{bc}^p , of payment at time c (p_c) is “applied to” consumption at time b :

$$\hat{p}_b = \sum_c w_{bc}^p p_c \quad (5a)$$

A similar sum would indicate what fraction, w_{cb}^u , of consumption utility at b (u_b) is applied to payment at time c :

$$\hat{u}_c = \sum_b w_{cb}^u u_b \quad (5b)$$

The entire set of coefficients $\{w_{bc}^p, w_{cb}^u\}$ in (5ab) constitutes a person’s mental accounting system. It specifies how particular costs are matched with particular benefits, and how this in turn affects anticipated feelings (Equations (2ab)) and choices (Equation (4)).

We now describe three mental accounting assumptions that constrain the general form of (5ab). The first assumption, which we call *prospective accounting*, addresses the question of how imputed costs and benefits depend on the timing of consumption and payments. The second, *prorating* assumption, is a simple amortization rule for dividing up a single payment over multiple consumption events, or a single utility over multiple payments. The third, *coupling* assumption, allows for imperfect (i.e., less than 100%) imputation of costs and benefits.

3.3. Prospective Accounting

The survey results in Table 2, showing how the enjoyment of a vacation is affected by the timing of payments, would be consistent with a mental accounting rule that fully recognizes future payments ($c > b$) and largely “writes off” past ones ($c < b$). The vacation is enjoyed more if prepaid because it feels “free.” Likewise, payments would be particularly onerous if the vacation had already taken place, because it would feel as if one were paying for nothing. We believe that the relationship between imputed cost and the time of payment looks like the dotted line in Figure 2. If the vacation has been prepaid a long time in advance (point “A”), then the imputed cost is essentially zero and the vacation feels as if it were free. If the vacation has been recently prepaid (point “B”), then the imputed cost is no longer negligible though it is still relatively small (see Gourville and Soman 1997). The imputed cost is highest if payment is due right after the

vacation (point “C”), and then declines gradually as the payment is pushed off into the distant future (point “D”).

Although the conjectured relationship in Figure 2 is nonlinear and includes both future and past events, for analytical convenience we will approximate it by a step function, having value zero for past events and a constant value for all future ones (shaded line in the figure). This prospective accounting assumption combines two separate simplifications. First, the impact of past events is zero, as if past events were simply deleted from the mental accounting sheet. Second, the impact of future events is the same irrespective of their date. Consequently, all that matters from a given temporal vantage point is the total sum of residual (i.e., future) utilities and payments.

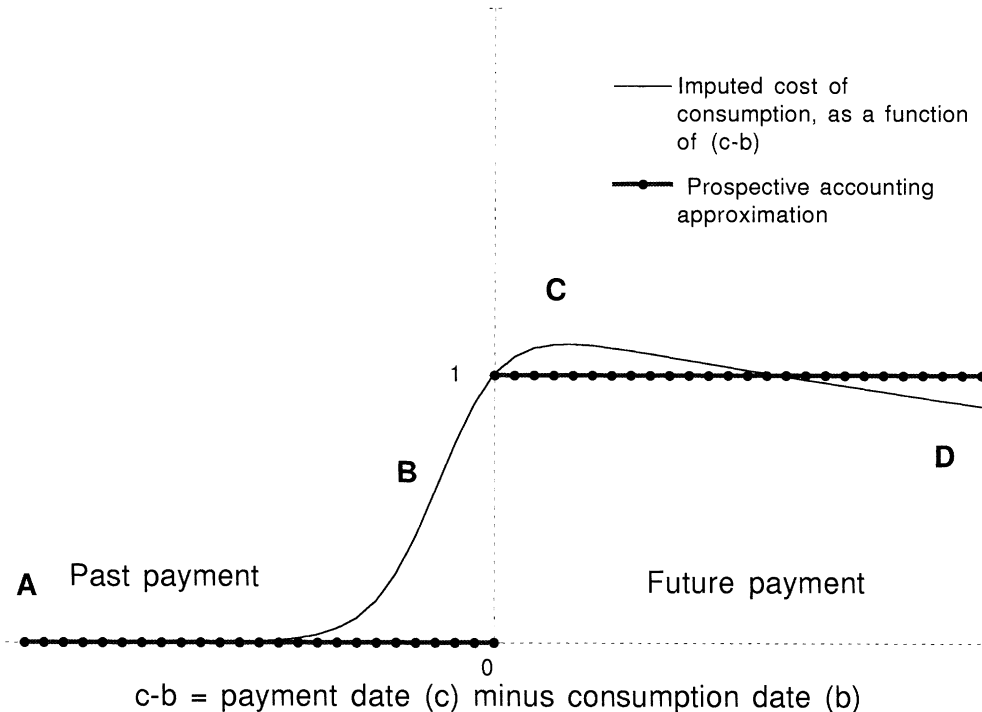
3.4. Prorating Over Multiple Events

In many cases the prospective mental account for a particular purchase—the sequence of payments and consumption yet to be realized—will include more than one payment or consumption episode. In such cases we need an accounting rule for assigning payments to consumption, and consumption to payments. While little is known about how consumers perform such assignments (but, see Heath and Soll 1998), a sensible default hypothesis is that they prorate residual payments to residual consumption, and vice versa. For example, if a prospective mental account includes two future payments of \$10 and \$20 and three consumption episodes, each conferring one unit of utility, then the prorated imputed cost of each consumption episode would be $(\$10 + \$20)/3 = \$10$, and the prorated imputed benefit of the smaller payment would be: $(1 + 1 + 1)*\$10/(\$10 + \$20) = 1$ util, and of the larger payment: $(1 + 1 + 1)*\$20/(\$10 + \$20) = 2$ utils. Over time, these imputations will change as specific payments and consumption episodes recede into the past and are dropped from the prospective mental account.

3.5. Coupling

So far, we have assumed a 100% conversion of payments into imputed costs and of consumption utilities into imputed benefits (except as this is qualified by prospective accounting and prorating). As a general

Figure 2 Showing How the Imputed Cost of Consumption Depends on the Time of Payment



hypothesis, this is clearly unrealistic. Consider the dinner example mentioned earlier. If the dinner is a break-even proposition: $u(\text{dinner}) = \lambda(\$75)$, then a full imputation of costs and benefits, $u = \hat{u}$, $p = \hat{p}$, would imply that the pleasure of the dinner is entirely erased by thoughts of payment: $u(\text{dinner}) - \lambda p(\text{dinner}) = 0$, and, likewise, that the pain of paying the \$75 is completely erased by thoughts of the dinner: $\hat{u}(\$75) - \lambda(\$75) = 0$. This seems counterintuitive. It is more plausible (in the break-even case) that the person would derive some pleasure from the dinner and some pain from the payment. To accommodate such partial linkages between payments and consumption we introduce two coupling coefficients, α (for "attenuation") and β (for "buffering"), which represent, respectively, the degree to which payments attenuate the pleasure of consumption and the degree to which consumption buffers the pain of payments. As we discuss later in the paper, coupling is likely to differ across situations and as a function of method of payment, e.g., credit card or cash purchase. It is also likely to vary across individuals. Some people tend to think very little about

the cost of purchases, which would be represented by a low baseline level of α . Others feel payments acutely because they are unable to derive much solace from the benefits that the payments provide. This would correspond to a low baseline level of β .

3.6. Imputations

The imputations that result from our three accounting assumptions are given in Equation (6). The first line in the equation, for example, expresses the imputed cost of consumption at time b as equal to the sum of payments still due at time b , $\sum_{t \geq b} p_t$, prorated over consumption remaining at time b , $(u_b / \sum_{t \geq b} u_t)$, and adjusted downwards for the degree of coupling, α :

$$\text{Imputations: } \begin{cases} \hat{p}_b = \alpha \left(\frac{u_b}{\sum_{t \geq b} u_t} \right) \sum_{t \geq b} p_t \\ \hat{u}_c = \beta \left(\frac{p_c}{\sum_{t \geq c} p_t} \right) \sum_{t \geq c} u_t \end{cases} \quad (6)$$

A prediction of how consumption and payment will actually be experienced is then obtained by substituting these imputed costs and benefits into (2ab):

Consumption experience:

$$u_b - \lambda \hat{p}_b = u_b - \lambda \alpha \left(\frac{u_b}{\sum_{t \geq b} u_t} \right) \sum_{t \geq b} p_t \quad (7a)$$

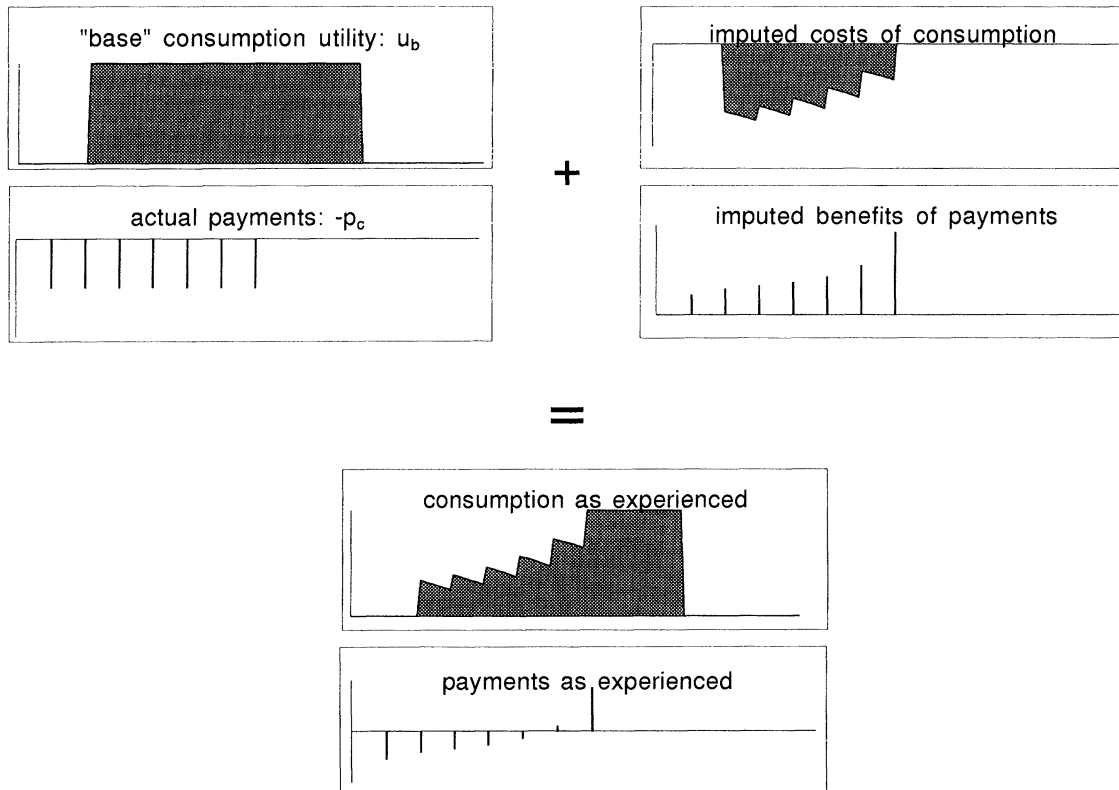
Payment experience:

$$\hat{u}_c - \lambda p_c = \beta \left(\frac{p_c}{\sum_{t \geq c} p_t} \right) \sum_{t \geq c} u_t - \lambda p_c \quad (7b)$$

When these equations are plotted over time, we obtain a set of predictions about the temporal hedonics of falling into debt, paying off a loan, or saving up for a future good. Figure 3 displays a simple, but representative example—the purchase of a durable product,

e.g., a car. The top-left panel in the figure displays the constant utility stream that the car would provide over its lifespan if it was entirely free (e.g., a gift). The car is not free, however, but is instead paid off in seven equal installments, indicated by the seven solid lines in the panel just below. The two panels to the right then show the imputed costs and benefits, calculated according to Equation (6), for $\alpha = \beta = .75$. The bottom two panels, which present the sequences produced by summing the top left and right panels, show how the car and the payments would be experienced according to the model (2ab). The patterns displayed here highlight certain generic predictions of the model: First, debt financing takes some of the glow off consumption, as we can see from the loss in experienced utility in the initial phase of ownership; full consumption pleasure is gradually restored as the car is paid off. Second, on the payment side, the loan payments become progressively less onerous as the debt balance is

Figure 3 Transformation of Utility and Payment Streams into the Experienced Streams (Explanation in Text)



reduced, with especially sharp improvements observed near the end of the payment series. For example, the next-to-the-last payment in the bottom panel of Figure 3 has a slightly positive hedonic level, because it receives credit for 50% of car utility remaining at that point, and the very last payment is a cause for a celebration because it captures 100% of remaining utility.

3.7. Debt Aversion

Under prospective accounting, the experience of consumption and payment is unequivocally enhanced by prepayment. From the vantage point of a consumption event, prepayment diminishes the sum of residual payments and so increases net enjoyment (Equation (7a)). From the vantage point of a payment transaction, prepayment increases the sum of residual utilities and so diminishes the pain of payment (Equation (7b)).

Although prepayment always provides hedonic benefits, the magnitude of these benefits is not constant for different types of consumption. Figure 4 illustrates the interaction between the magnitude of hedonic benefits and the duration of the utility flow. The top two panels represent prepayment for an item, either a brief, high-utility episode ("vacation," left panels) or longer, lower-utility pattern ("durable," right panels). The bottom two panels maintain the same pair of underlying utility profiles but shift the payment schedule toward the future so that the payments now either follow the "vacation" or coincide with usage of the "durable." As in Figure 3, the shaded area is experienced utility as computed by applying Equation (2a), and the bars are the experienced disutility of the payments, as computed by applying Equation (2b).

The important comparison is between the top and bottom panels. Let's look at the vacation first. In the top left panel the vacation is prepaid, while in the bottom panel it is taken on credit. In the latter case, the model predicts that the start of the vacation will be enjoyable, but as the vacation progresses the residual payments will be no longer covered by residual vacation time and the balance will move into the red. A big hedonic plunge is predicted at the very end of the trip, when one has only the payments to look forward to. This is not the case with the durable, however. There

is little cost to delaying payment, because there is always enough residual utility to keep one "out of debt," in terms of Equations (7ab).

The patterns in Figure 4 are consistent with the hedonic intuitions reported in Table 2. According to the judgments in the table, prepayment strongly improves the quality of the vacation experience, but has a negligible impact on the hedonics of payment. This is what happens in the left panels of Figure 4, where the impact on feelings about payment is small. Likewise, Table 2 shows that prepaying for a durable (washer-dryer) may improve the feelings about payment and consumption, but the impact is small relative to the impact on the vacation. This, too, is consistent with the profiles shown in the right panels of Figure 4.

In general, the attractiveness of prepayment will depend on whether a particular account is in the red or in the black. Given the desire to keep accounts in the black, there should be a strong tendency to accelerate payments for items whose utility declines over time.⁷ Jones in the story would be more likely to pay off the car loan when a friend whose judgment he respects makes disparaging remarks about the image such a car projects.⁸ We would expect to see an increase in mortgage prepayments in areas where property values fall, or when new developments such as an airport extension decrease people's liking of their own homes.⁹

3.8. Impact of Time Discounting

Does debt aversion imply that consumers will necessarily choose to prepay for consumption? No. Although prepayment always provides future experiential benefits, these benefits may not be large enough to

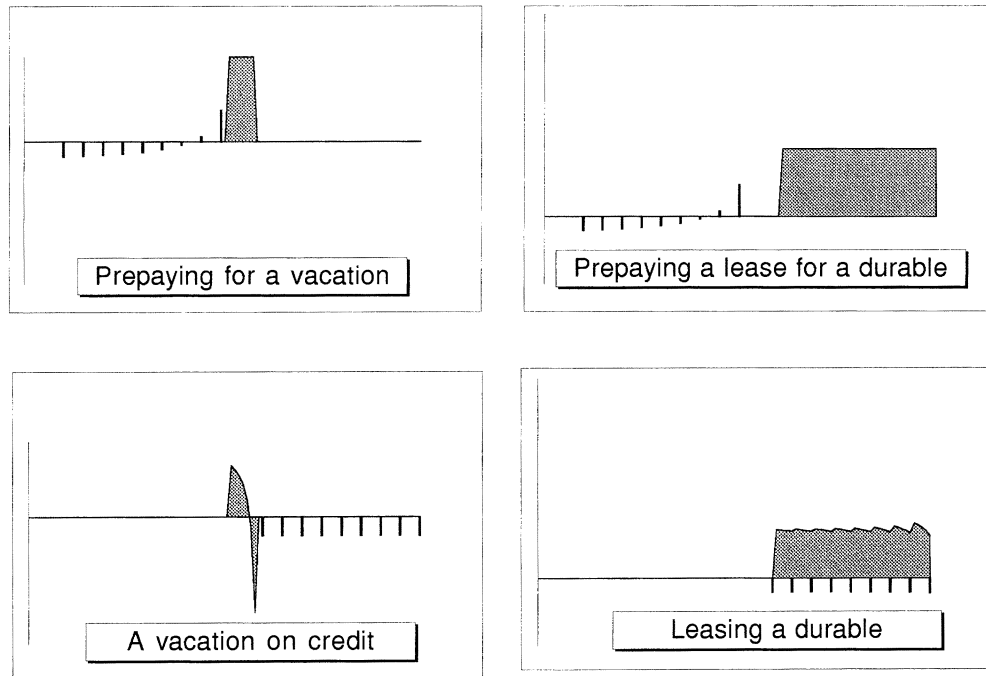
⁷ Contrary to the general desirability of prepayment, there are some situations in which deferred payment is desirable even apart from discounting considerations. Recently we were told a (true) anecdote about an Israeli academic who has seen inflation reduce his home mortgage to a trivial sum. Although he could have easily disposed of the mortgage with a single payment, he nevertheless did not do so. The reason? It was a pleasure to write those tiny checks each month. Prolonging payments will be advantageous when the payment account is in the black, because the payments themselves are pleasurable.

⁸ This was suggested to us by Brian Gibbs.

⁹ Also consistent with this are the results of Hirst, Joyce, and Schadewald (1992) who find that people prefer to first pay off debt for an item that is stolen.

Figure 4 Impact of Prepayment on the Hedonics of Consumption and Payment for a Vacation (Left Panels) and a Durable (Right Panels)

Notes: The shaded area is experienced utility as computed by applying Equation (2a) and the bars are the experienced disutility of the payments as computed by applying Equation (2b). The underlying model parameters are the same in all four panels ($\alpha = \beta = .35$, $\lambda = 1$, $\mu = 0$) as is the total utility integral for the vacation and for the durable (the vacation and the durable are an equally good deal). The utility scale for the durable is larger by a factor of 3 to facilitate comparisons of the utility profiles.



overcome the opposing influence of time discounting, which favors the delay of payments.

Consider, for example, the decision whether to prepay or postpay for a single consumption episode. To keep things simple, assume equal coupling of consumption and payment, $\alpha = \beta$, and no loss aversion ($\mu = 0$). The experiences of consumption and payment under the two scenarios (prepay and postpay) are given in Table 3. Comparing the left and right columns, we see that both consumption and payment will feel better under the prepayment option. Such debt aversion is a general implication of prospective accounting, even with more complex sequences of consumption and payment (viz. Equations (7ab)).

To determine whether a consumer would actually prefer prepayment according to the model, one has to compare the present value of the two options, using

Table 3 Consumption and Payment Experiences, Given Prepayment and Postpayment

	Postpayment Consume at time 0, pay at time 1	Prepayment Pay at time 0, consume at time 1
Consumption experience	$u - \lambda\alpha p$	u
Payment experience	$-\lambda p$	$\alpha u - \lambda p$

Equation (4) with the one-period discount factor δ (we assume here a common discount factor for payments and utility, $\delta = \rho$). The present value of the postpayment option equals $(u - \lambda\alpha p) + \delta(-\lambda p)$, while the present value of the prepayment option equals $(\alpha u - \lambda p) + \delta(u)$. Prepayment will therefore be more attractive if $(\alpha u - \lambda p) + \delta(u) > (u - \lambda\alpha p) + \delta(-\lambda p)$,

which is to say, if $(1 - \alpha - \delta)(u + \lambda p) > 0$. Because $(u + \lambda p)$ is positive, prepayment is preferred whenever the sum of the discount factor (δ) and the coupling coefficient (α) exceeds one. When impatience is high ($\delta \ll 1$) and/or coupling is low ($\alpha \ll 1$), the consumer will choose to consume first and pay later, as predicted by the standard discounting model.

3.9. Planned Versus Unplanned Debt

In assessing the realism of the debt-aversion prediction, it is also important to distinguish between planned and unplanned debt. Our purchase criterion in Equation (4) predicts a dislike of fully planned borrowing from future income for present consumption. Indeed, there is evidence that young persons with temporarily low incomes, such as those who are educating themselves for lucrative careers, fail to borrow sufficiently against future earnings (Carroll and Summers 1991). This failure to borrow is a well-recognized paradox for the influential "life-cycle" model of spending and saving, which posits that consumers borrow and save so as to maintain a constant consumption profile over their lifetime.

With credit card debt, however, a large share of the debt may be unplanned, in that consumers underestimate their ability or willingness to pay off the monthly balance (Ausubel 1991). Such underestimation is thought to be behind high credit card interest rates, as consumers who expect to pay off their balances regularly will ignore the rate and choose credit cards on other attributes.¹⁰

What could motivate debt-averse but financially liquid individuals to delay paying off old debts? In our model, this behavior can be explained by nonexponential (e.g., hyperbolic) discounting, which creates an incentive to perpetually keep postponing any painful event, like debt clearing. To take a simple example, suppose that maintaining a debt account of size D requires an interest payment of d per time period, and

¹⁰ Ausubel (1994, p. 18) cites a *New York Times* report on the new "Prime Option" MasterCard, issued by Dean Witter, Discover & Co., and Nationsbank: "Under the card's terms, customers pay 9.9% interest for the first two months after a purchase, but then the rate rises to the prime rate plus 9.9%. This structure is meant to take advantage of the gap between the intentions of consumers to pay off their credit card bills quickly, and the reality that most run balances for long periods."

that there are no imputed benefits, $\hat{u} = 0$ (i.e., this is old debt for past consumption). Consider three options, (a) to pay off the debt immediately, (b) to pay the debt in the next period, and (c) to pay the debt in some distant period $c = t$. If time discounting is hyperbolic, $\rho = 1/(1 + c)$, then the present values of the three options are:

(a) Clear debt immediately (at $c = 0$): $-D$.

(b) Clear debt "tomorrow" (at $c = 1$): $-d - \frac{D}{2}$.

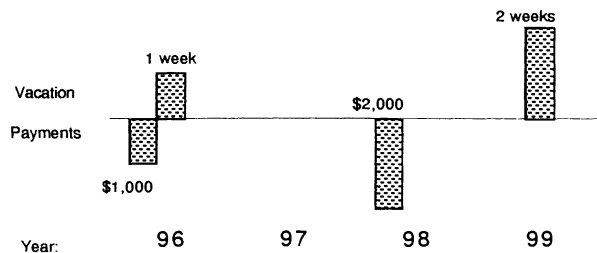
(c) Clear debt at $c = t$: $-d - \frac{d}{3} - \dots - \frac{d}{t-1} - \frac{D}{t}$.

If the pain of making the interest payments is small relative to the pain of clearing the debt ($d < D/2$), then delaying payment till tomorrow (option b) will be preferred to paying off the full debt today (option a). Of course, when tomorrow comes around, the same evaluation of options will cause another postponement, and so on, so that the debt may never be repaid. At the same time, it is possible that option c has the lowest present value, so that at a conscious level the consumer doesn't want to bear the debt for a long time. This sort of procrastination arises in any situation where a stream of small costs can be cut short with a single large cost (Prelec 1989). After a while, the consumer may become aware of the inconsistency between intentions and actual behavior, and, like Jones in the story, summon up the courage to pay off the entire amount. The point we wish to make is that maintaining a large amount of credit card debt is not inconsistent with debt aversion provided consumers have a hyperbolic time discount function.

4. A Parametric Test of the Mental Accounting Model

According to the interpretation being offered here, the decisions to prepay some purchases and not others reflect basic consumer preferences and are not merely the expression of ad hoc financing habits or customs. The following study was designed to measure these preferences at the level of an individual subject. We created a nonstandard decision situation where conventional financing rules would be less likely to be invoked. Here is how the subjects learned about the problem:

Imagine that you have invested \$3,000 into acquiring three weeks of time-share for a luxury apartment suite at a very nice seaside hotel. The hotel has its own private beach and pool and is about half an hour's drive away from a lively harbor town. You are now negotiating how to schedule your five weeks and when to pay the \$3,000. One possibility is described in the "time line" diagram.



The diagram describes the situation where: (1) in the summer of 1996, you make an initial payment of \$1,000 after which you take one week of your vacation time; (2) in the summer of 1997, you neither pay nor take any of your time; (3) in the summer of 1998, you pay off the remaining \$2,000; (4) in the summer of 1999, you take the remaining two weeks of your vacation time.

On the next page of the survey, subjects saw a 4×4 matrix of 16 such diagrams, each displaying a different schedule with two payments and two vacations times. Subjects were asked to look over the entire set, and then rate each schedule on a scale from 0, for the worst schedule, to 10, for the best schedule. The set of 16 schedules was composed judgmentally by pairing eight distinct vacation schedules and eight distinct payment schedules so as to create variance in the overall timing of payments and vacation times, and in the ordering of payments and vacation times *within* a given summer. (Table 4 contains a list of the 16 schedules; Table 5 gives the pairwise correlations between the key explanatory variables.)

This was only the first of three rating tasks. In the second rating task, subjects were asked to rate the eight distinct vacation time schedules that appeared in the original set on the assumption that the vacation time was completely free; in the third task, they were asked to rate the eight distinct payment schedules that appeared in the original set on the assumption that these

payments were without any benefit whatsoever. This measured their attitudes to cost-free consumption and utility-free payments.

Surveys were filled out at an MIT student center ($n = 44$) and at a US airport ($n = 42$). We included for analysis only those surveys where the instructions were followed to the letter, i.e., where subjects supplied all 32 ($= 16 + 8 + 8$) ratings and included at least one "zero" and one "ten" in each of the three rating tasks.

The primary objective of the survey was to distinguish between preferences for the timing of consumption and payment from preferences for debt and savings per se. Pure timing preferences—even if inconsistent with time discounting—could nevertheless be modeled in simpler ways, e.g., by allowing discount factors greater than one in the present value formula (Equation (1)). A step up in complexity would be to represent preferences over consumption and over payment schedules with separate, temporally nonadditive models (e.g., Gilboa 1989, Loewenstein and Prelec 1993). Because these models would still be additive across consumption and payment, they could not capture attitudes to debt or savings, as these concepts refer to the temporal ordering of consumption and payment.

4.1. Results

The rightmost column in Table 4 contains the mean schedule ratings across all subjects. The columns for Groups A–C are means for the three groups of subjects who emerged from cluster analysis (Ward's algorithm). The vertical sorting of the patterns in the table corresponds to their ranking as given by Equation (1), assuming a 0.9 discount factor and a utility value of \$1,000 per week of vacation time. A present-value maximizing decision maker should tend to prefer schedules near the bottom of the table. This is a pretty good description of the preferences of Group C, but not of the two larger clusters of subjects, A and B.

Let us first look at the ratings of the largest group, A. Their most favored schedules (#3, #10) allow for prepayment but also for some interleaving of payment and consumption. The least attractive schedules put vacation time ahead of payment. Group B agrees with Group A on desirable schedules, but disagrees with

Table 4 Mean Ratings (for All Subjects, and by Cluster) for the 16 Schedules Used in the Study

Schedule #	'96	'97	'98	'99	Group A (n = 45)	Group B (n = 23)	Group C (n = 18)	All subjects
1	\$\$	\$	w	ww	6.8	1.2	0.8	4.0
2	\$	\$\$	ww	w	6.5	1.7	0.7	4.0
3	\$	w	\$\$	ww	7.7	4.3	3.6	5.9
4	\$\$	ww	w	\$	4.7	4.5	3.7	4.5
5	w\$\$	ww\$			5.8	7.3	4.6	5.9
6			\$\$w	\$ww	6.5	5.7	3.6	5.7
7	w	\$	\$\$	ww	5.5	4.1	4.7	5.0
8			\$\$ww	\$w	6.8	8.0	3.4	6.4
9	ww\$\$	w\$			3.9	6.7	6.7	5.2
10	\$w	\$\$ww			7.6	8.4	4.2	7.1
11			w\$	ww\$\$	4.4	6.3	6.1	5.3
12			ww\$	w\$\$	3.0	5.6	6.4	4.4
13	\$ww	\$\$w			4.3	6.8	5.8	5.3
14	ww	\$\$	w	\$	4.0	5.1	7.0	4.9
15	w	ww	\$\$	\$	1.9	3.3	8.7	3.7
16	ww	w	\$	\$\$	0.6	2.7	8.9	2.9

Note: The highest rated pair of schedules in each column is given in boldface. \$ and \$\$ indicate the \$1K and \$2K payment and w and ww the one-week and two-week vacation slots.

respect to the undesirable ones. In particular, these subjects strongly dislike asymmetric patterns where vacation time is entirely prepaid (#1, #2) or postpaid (#15, #16). As noted, Group C approximates the standard discounting model (Equation (1)).

4.2. Comparison Against Two Benchmark Alternatives

To translate Equation (4) into a simple model that can be applied to individual ratings, we assume that one week of vacation time is priced at \$1,000 ($\lambda = 1$, for u and p denominated in weeks and \$000) and that $\beta = \alpha = 1$ (see Appendix 1 for analyses supporting these simplifications). We also assume no time discounting ($\delta = \rho = 1$). With these simplifications, the decision criterion in Equation (4) becomes:

$$\left(\sum_{b=0}^3 (u_b - \hat{p}_b) + \sum_{c=0}^3 (\hat{u}_c - p_c) \right) - \mu \left(\sum_{b=0}^3 |u_b - \hat{p}_b| + \sum_{c=0}^3 |\hat{u}_c - p_c| \right).$$

Assuming that the ratings are a linear function of the

purchase criterion, we obtain the following three-parameter *mental accounting* model of ratings:

$$\text{Rating } \{u_i, p_i\} = \kappa + \nu \left(\sum_{t=0}^2 (u_t - \hat{p}_t) + (\hat{u}_t - p_t) \right) - \mu \left(\sum_{t=0}^3 |u_t - \hat{p}_t| + |\hat{u}_t - p_t| \right). \quad (8a)$$

The accounting terms in (8a), \hat{p} and \hat{u} , are computed from Equation (6) and contain no free parameters (as $\beta = \alpha = 1$). Here is how the imputations would go for the schedule diagrammed in the introduction to this section. The utility imputed to the first \$1,000 payment in '96 is $\hat{u}_{96} = (1/3)(3) = 1$. Utility imputed to the second \$2,000 payment in '98 is $\hat{u}_{98} = (2/2)(2) = 2$. In words, the first \$1,000 is interpreted as prepayment for exactly one week of vacation time, and the second \$2,000 in '98 as prepayment for the remaining two weeks. The cost imputed to the first week in '96 is $\hat{p}_{96} = (1/3)(2) = 2/3$, i.e., \$667, because the \$2,000 outstanding balance is prorated over the remaining three weeks. The final two weeks are fully prepaid, and have zero imputed cost, $\hat{p}_{99} = (2/2)(0) = 0$.

Equation (8a) is the model we wish to compare to

two benchmark alternatives. The first alternative is the *discounting model*, based on Equation (1), with annual discount factor 0.9:

$$\begin{aligned} \text{Rating } \{u_t; p_t\} = & d_1 + d_2 \sum_{t=0}^3 (0.9)^t u_t \\ & - d_3 \sum_{t=0}^3 (0.9)^t p_t. \end{aligned} \quad (8b)$$

Changing the value of the discount factor within reasonable limits will not substantially affect the ability of (8b) to explain the ratings of these particular 16 schedules. With $\delta = .9$ this model explains at least 95% of the variance in ratings generated by any δ -value within the interval $\delta = .5$ to $\delta = 1.5$, and 90% of the variance for the interval $\delta = .33$ to $\delta = 2.5$. Therefore, even if the discount factor is misspecified for a particular individual, the model in Equation (8b) will still explain that person's ratings (provided that the discount factor is reasonable, i.e., falling in the range of $\delta = .33$ to $\delta = 2.5$). For example, if the true discount factor for consumption is greater than one, indicating a negative rate of time discount, this will show up as a negative estimate for the d_2 coefficient.

The second benchmark is the *ratings regression model*, which uses the separate ratings of the vacation schedules and of the payment schedules collected in the second and third rating task:

$$\begin{aligned} \text{Rating } \{u_t; p_t\} = & k_1 + k_2 \text{Rating } \{u_t\} \\ & + k_3 \text{Rating } \{p_t\}. \end{aligned} \quad (8c)$$

Whereas the mental accounting and discounting models attempt to explain the subject's overall ratings on the basis of objective variables, this model uses the subject's own ratings of consumption and payment schedules as predictors. A priori, one would expect this to confer a major advantage on (8c).

Each of the models has three parameters. Summarizing, the discounting model assumes that overall preferences for consumption-payment schedules are additive both across consumption and payment and across time periods. The ratings regression model allows for temporally nonadditive preferences for consumption schedules; it only requires that these consumption and payment preferences are additively

combined in the end. The mental accounting model is intrinsically nonadditive. Even if the loss aversion coefficient μ is zero, nonadditivity still enters through the \hat{p} and \hat{u} terms, which draw on the entire time profile of payment and consumption.

Comparing regressions for individual subjects, we find that the mental accounting model (8a) does better than the other two in 60% of the cases, ((8b) is best in 29% of the cases, and (8c) in 11%). More than one-half of the subjects show a significantly negative coefficient on loss aversion (μ), which means that—all else equal—they like “pay-as-you-go” schedules where consumption and payment are interleaved. As for prepayment, 35% show a significant preference for prepayment ($\nu > 0$) while 26% show a significant dislike of prepayment ($\nu < 0$). Such debt aversion is also revealed in the test of the discounting model, whose coefficients have the wrong sign (from the normative perspective). More subjects prefer to postpone rather than speed up vacation time (30% versus 22%) and more subjects prefer to accelerate rather than delay payments (28% versus 16%).

4.3. Individual Attitudes to Savings, Debt, and the Timing of Consumption and Payment

To tease apart the component of preference associated with temporal order from that associated with positive or negative discounting, we now regress each subject's ratings against both the accounting variables (8a) and the discounting variables (8b) simultaneously. In this combined regression,

$$\begin{aligned} & \kappa + \nu \left(\sum_{t=0}^3 (u_t - \hat{p}_t) + (\hat{u}_t - p_t) \right) \\ & - \mu \left(\sum_{t=0}^3 |u_t - \hat{p}_t| + |\hat{u}_t - p_t| \right) \\ & + d_2 \sum_{t=0}^3 (.9)^t u_t - d_3 \sum_{t=0}^3 (.9)^t p_t, \end{aligned} \quad (9)$$

the coefficients for the accounting variables (ν, μ) measure preference for the temporal ordering of consumption and payment (i.e., savings and debt), while the coefficients for the present value variables (d_2, d_3) measure pure time preference independent of temporal order.

The results are given in the bottom part of Table 5. Turning first to the discounting variables, we see that the full regression restores the normatively correct positive sign on their coefficients, d_2 and d_3 . This is an important finding, because it shows that, controlling for debt aversion, the subjects in the study generally prefer later payments and earlier consumption, i.e., they exhibit a positive rate of time preference.¹¹ Moreover, the correlation between the individual values of the utility and payment coefficients, d_2 and d_3 , is $+ .79$, indicating that subjects are consistent: Those who are most impatient with respect to vacation timing are also the ones most eager to delay payments.

Turning now to the accounting variables, the prevalence of positive ν -coefficients means that people prefer to prepay for consumption, holding time preference constant. However, there are still some subjects (13%) who significantly prefer to postpay; almost all of these subjects are from the present-value maximizing Group C.

The accounting coefficients provide a two-dimensional measure of individual attitudes to savings and debt. Recall that the sum ($\nu + \mu$) is the decision weight of consumption or payment "in the red," while the difference ($\nu - \mu$) is the decision weight "in the black" (see Equations (3) and (4) and footnote 5). Given that most subjects have positive ν, μ coefficients, we can characterize their debt attitude as a relatively strong dislike of borrowing combined with a relatively weak attitude to saving. In other words, they are willing to sacrifice some other desirable schedule attribute in order to stay out of the red, but are less concerned about pushing further out into the black. These preferences would predict selective prepayment for transient consumption but not for durables (viz. Tables 1 and 2 and Figure 2).

5. Prepayment and Other Strategies for Pushing Costs Out of Mind

The dislike of debt and the desire to prepay seem to be a robust but largely unrecognized phenomenon.

¹¹ The fact that controlling for debt aversion restores positive time preference is consistent with the general interpretation that delaying positive outcomes and getting unpleasant outcomes over with quickly is not evidence of negative time preference but rather reflects utility from anticipation and dread (Loewenstein 1987).

Debt aversion has gone unrecognized partly because of a long-standing prejudice about consumers as myopic, self-indulgent creatures, and partly because the decision to prepay for consumption is often made indirectly—for instance, by choosing to own rather than to rent a product. Perhaps as a result of this prejudice, marketers have been slow in recognizing the appeal of prepayment and seem to have been caught by surprise by the positive reception of debit cards, which offer no fundamental advantage over credit cards except that they eliminate the feeling of being even briefly in debt.¹² In this section, we draw attention to the variety of forms that prepayment can assume, some of which have not previously been viewed in such terms.

5.1. Token Payment Systems

Diverse institutional arrangements cater to consumers' desire for prepayment. A clear example is provided by token payment systems, such as casino chips or the "beads" that one uses to pay for drinks at the Club Med. Our model predicts that it is easier to part with the chips than with cash because the cost of the chips is absorbed at the moment when they are purchased. In a similar vein, people often report that spending is easy in foreign countries, where the foreign currency feels like "play money." While the act of converting dollars to Swiss francs may be painful for US tourists, subsequent spending (at Swiss prices!) becomes less painful since all cash purchases are in essence prepaid.

5.2. Mental Prepayment

Even in the absence of an actual prepayment mechanism, consumers can capture some of the same hedonic benefits by mentally setting aside the requisite amount. Mental budgets, which are fixed amounts allocated to a particular purpose (e.g., entertainment), have traditionally been interpreted as a self-control device, designed to prevent overspending on certain categories

¹² In contrast to the success of debit cards, a recently introduced credit card that allows customers to borrow from retirement saving accounts, and thus pay lower interest rates, has been a resounding flop (*New York Times*, August 27, 1995). Debt aversion may also have contributed to the political failure of ex-President Bush's decision to decrease tax withholdings (without lowering taxes) prior to the 1992 election. Bush may have reasoned that putting money in people's pockets prior to the election would boost his support, but the public reaction was generally negative and large numbers of people increased their own withholding amounts to offset the change.

PRELEC AND LOEWENSTEIN
Mental Accounting of Savings and Debt

Table 5 Summary of the Four Regressions

	Combined regression (all subjects)		Individual subject-level regressions			Mean R^2
	Mean	t value (1,376 obs.)	% signif. pos. coeff. (.1 level)	% signif. neg. coeff. (.1 level)	% signif. regressions (.05 level)	
Mental accounting (8a)					69	0.57
ν = Prepayment	0.13	5.18	37	26		
$-\mu$ = Pay as you go	1.11	9.27	57	0		
Discounting (8b)					42	0.35
d_2 = Discounted utility	-0.54	-1.57	22	30		
$-d_3$ = - Discounted payments	-1.07	-2.97	16	28		
Ratings regression (8c)					31	0.27
k_2 = Utility stream rating	0.23	7.64	26	3		
k_3 = Payment stream rating	0.15	6.29	31	3		
Combined model (9)					63	0.61
d_2 = Discounted utility	1.36	2.65	21	2		
$-d_3$ = - Discounted payments	1.42	2.71	22	10		
ν = Prepayment	0.25	5.31	29	13		
$-\mu$ = Pay as you go	0.79	9.16	34	1		

Note: The correlations between the explanatory variables (labeled by corresponding coefficients) are $r(\nu, \mu) = -0.03$, $r(d_2, d_3) = +0.28$, $r(\mu, d_2) = -0.12$, $r(\mu, d_3) = -0.16$, $r(\nu, d_2) = -0.53$, $r(\nu, d_3) = +0.46$.

of expenses (Shefrin and Thaler 1988, 1992; Heath and Soll 1998). They may, however, also play the complementary role of facilitating mental prepayment.

The following true anecdote conveys the distinction nicely. A Manhattan newlywed couple were deciding whether to live on the East side (her preference, on account of the better restaurants) or the West side (his preference, on account of the cheaper rent). The clinching argument put forth in favor of the West side was that the rental savings would easily cover any reasonable number of taxi rides to the East side. However, having moved in, the couple soon realized that the cost of the round-trip ride made dining out on the East side look too expensive. Their solution: On the first of the month they would set aside ("prepay") a certain amount just for the cab rides. The purpose of the mental budget here was not to limit expenditures, but rather to protect the dinner experience from the imputed transportation costs (and to make sure that the dinners would take place as planned).

The mental prepayment tactic can be applied not

only to money but to any scarce resource. For example, in dual-career families it is common for certain days or hours of the week to be designated as "family time," or "quality time." Besides ensuring that time is actually put aside for the family, such labeling makes the time more carefree: Instead of deciding whether to work or spend time with the family, the tradeoffs become localized, e.g., go to the zoo versus the children's museum (Beattie and Barias 1993). The supposedly high quality of the time, therefore, results in part from the fact that the harried parent is not distracted by thoughts of alternative work-related uses of the time. New technologies, such as satellite telephones, that make it possible to carry on work in any environment, including the zoo or children's museum, undermine the effectiveness of such strategies.

5.3. Fixed-Fee Pricing

To prepay mentally, the consumer must know the size of the bill ahead of time. Therefore, prepayment will be facilitated by pricing schemes that eliminate uncertainty in payment amount. This creates an advantage

to the “prix fixe” menu—knowing the cost exactly, the customer can absorb it before the food arrives at the table. The disadvantage, of course, is that such a menu limits the range of choices, which is why prix fixe restaurants allow for a range of substitutions. In effect, the restaurant offers a multi-token budget, with one “token” exchangeable for an appetizer, another “token” for a main course, and so on.

Mental prepayment may also increase the attractiveness of flat-rate over variable-rate payment structures for services. To elicit such preferences, we presented 89 visitors to the Pittsburgh International Airport a series of questions asking them to compare fixed and variable pricing arrangements in a variety of contexts (health club, long-distance telephone calls, public transportation, and meals taken during a one-week Caribbean cruise). In each case, subjects were first asked to imagine two men who had made the same total use of the resource and had paid the same amount at the end of the consumption interval. The only difference was that one person had paid a fixed fee while the other had paid an amount based on his usage of the resource.

For example, the public transportation question asked:

Item 4

Mr. A and Mr. B both joined health clubs. Mr. A’s club charged a fixed fee for each month of usage, payable at the end of the month. Mr. B’s club charged an hourly fee for using the health club, with the total payable at the end of the month.

By chance, both men used the health club about the same amount, and both ended up getting a bill for the same amount at the end of the month. Who enjoyed himself more while using the health club?

Subjects were also given a “no difference” option. Note that on economic grounds Mr. B—whose marginal cost is higher—reveals a greater intrinsic appetite for exercise (in that month at least) and hence ought to derive greater total utility.

Subjects were then asked, “Which payment method would you personally prefer if they ended up costing you about the same?” and were again given a “no preference” option. Approximately one-half of the subjects ($n = 47$) responded to the public transportation and

food during cruise items; the other half ($n = 42$) responded to the health club and phone-call items. A plurality of subjects viewed fixed rate contracts as superior hedonically (Table 6, left), and in three out of four cases a majority preferred such contracts themselves (Table 6, right).

These preferences are consistent with the “flat-rate bias” that has been observed in telecommunications research (Train 1991). The bias refers to the tendency for telephone customers to select flat-rate pricing options that cost them more than “measured service” plans (given their calling rate). In one study, approximately 65% of telephone customers who self-select flat-rate service would have saved money by choosing a per-call billing option. In contrast, only 10% of those who selected variable-rate service would have saved by choosing flat-rate service (Kridel et al. 1993). Explanations for the flat-rate bias include biased use forecasts (Nunes 1997) and “consumer lack of information, irrationality, poor telephone company marketing, aversion to being metered and/or an unexplained aversion to bill uncertainty” (Kridel et al. 1993, p. 134). We offer another explanation: Talking on the phone is more pleasurable when you don’t have to think about what each call is costing you.

A flat-rate arrangement not only allows for mental prepayment, but also shifts the cost imputations ($\hat{p}_c - s$) away from the actual acts of consumption, because the marginal cost of consumption is zero. In our

Table 6 Percentage of Subjects Who Think That a Fixed- or Variable-Rate Contract Would Be Better, Either for Another Person (Left Panel) or for Themselves (Right Panel) (Rows Add to 100%)

	Mr. A versus Mr. B			Own preference		
	Fixed	Variable	Same	Fixed	Variable	Indifferent
Public transportation	38	23	38	39	41	20
Food during cruise	49	25	25	55	30	15
Health club	48	14	38	55	21	24
Long-distance phone calls	55	14	31	60	19	21
Average	48	19	33	52	28	20

terminology, consumption is decoupled from payment. On the other hand, payment-per-usage arrangements, like hourly tennis court fees, taxi meter charges, and the cumulating sushi bill, all impose a tight coupling of payment and consumption.¹³ In the next section we discuss situational and strategic determinants of coupling.

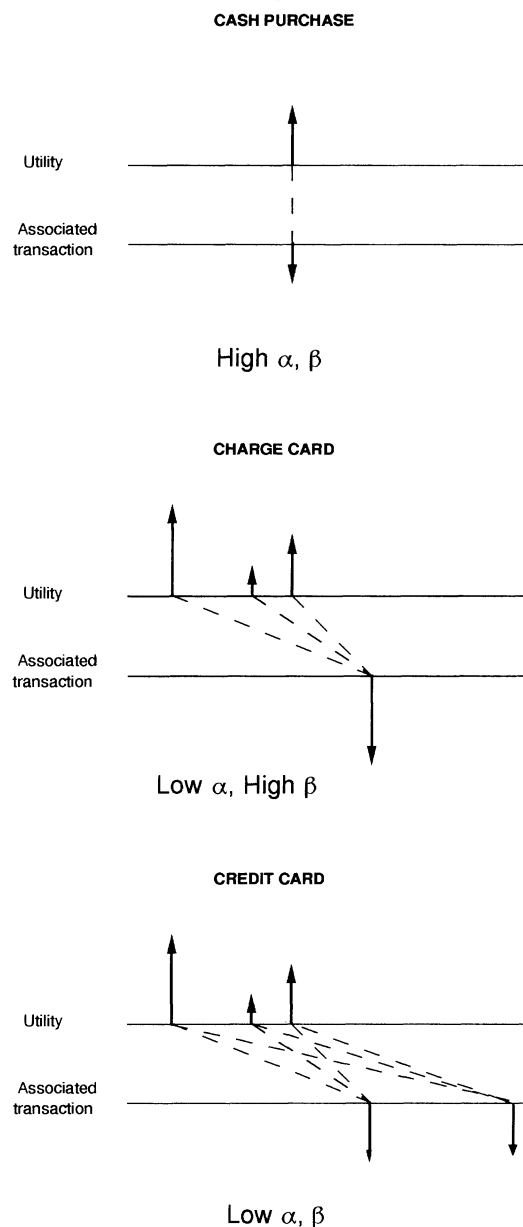
6. Coupling

6.1. Situational Determinants of Coupling

The method of payment is one of the most important determinants of coupling. There are currently large numbers of payment methods available and the possibilities keep expanding, e.g., with the recent introduction of so-called "smart cards." The impact of some common methods on coupling is displayed in Figure 5, which diagrams the temporal relations for three cases: cash, charge card, and credit card. A single payment for a good or service creates tight coupling because it is obvious what is being paid for and when payment is occurring (top panel). Paying by charge card (middle panel) selectively reduces α because a single bill covers many distinct items, none of which is individually "responsible" for the total. Finally, credit card charging (bottom panel) promotes symmetric reduction in both α and β .

A second source of decoupling is the diversity of benefits that may be generated by one type of expense, and the diversity of payments that may be required to support a single consumption activity. Overhead that no one wants "to pick up" is a classic example of a decoupled cost in business accounting, and it suggests a number of analogues in the mental accounting domain. At the Club Med vacation, for example, diverse activities are covered by a single comprehensive fee, for which no single activity is uniquely responsible. The decoupled activities can then be enjoyed without

Figure 5 The Temporal Relationship Between Payments and Consumption for Three Payment Methods



thought of payment. A fee-per-usage arrangement, on the other hand, highlights the causal connection between a consumption event and the cost, leading to greater coupling and lower net satisfaction with consumption.

The same principle operates on the payment side to

¹³ Here is a 1920s account of one customer's response to metered service on horse-drawn carriages (so-called "fiacres"): "Heinzl [the mayor of Zagreb] forced rubber wheels on the fiacres and by 1924 they all had meters. A friend rode in one with my father. Suddenly he jumped out and started walking alongside the carriage. 'I cannot go on watching the cost go up every few seconds!' he cried. 'But I am paying the fare,' replied my father. 'Yes, I know, but the pain is mine even if the cost is not'" (Ivanovic 1977, p. 35).

explain, for example, the disagreeable nature of payments that are “incidental” to primary consumption (rent, utilities, insurance, gasoline, health maintenance, taxes, etc.). The electricity bill is an almost a perfect example of a decoupled payment, because electricity enables many forms of consumption but provides no unique pleasure on its own.

6.2. Credit Cards and the Decoupling of Debt

A puzzling aspect of credit card financing is that it seems to be both a stimulus to spending (Feinberg 1986, Prelec and Simester 1994) as well as an especially disagreeable form of debt. To confirm that credit card payments are exceptionally unpleasant, we asked 88 persons at Pittsburgh airport to judge how good it would feel to have various types of payments offset by an unexpected refund from the IRS. They were told to consider 10 otherwise identical people, each of whom gets a reprieve from an imminent and unavoidable \$300 payment via an unexpected \$300 refund from the IRS. In Table 7 we see that the \$300 refund is most satisfying if it cancels the credit card bill—even more satisfying than if it cancels parking tickets or dental expenses.

Here is how our model might resolve the puzzle. According to the model, payments are painful to the extent that they are not adequately covered by *accounted* benefits, where the latter quantity is represented by \hat{u}_c . This can happen for two reasons. The first

is when payments are applied to past consumption (prospective accounting). The second is when payments cannot claim any unique benefits (decoupling). For credit card debt both of these unfortunate conditions may hold simultaneously. Imagine a consumer who has maintained a credit card balance for some time, irregularly making payments while simultaneously adding new charges to the account. In theory, the consumer could take each card payment, and deliberately “apply” parts of it to specific charges, e.g., so much for interest, so much for that dinner, etc. More likely, he or she will have no clear idea what purchases account for the debt, nor which items have been paid off. Both coupling coefficients, α and β , will tend to be low, putting consumption “in the black” but leaving the payment transactions “in the red.” This means that at the moment of purchase, the consumer can enjoy his acquisitions as if they are paid off. However, the payments for those same acquisitions—when they come due—will be regarded as a loathsome tax, divorced from specific consumption benefits.¹⁴

6.3. Earmarking of Savings and Debt

Coupling can also be enhanced by earmarking a single savings or debt account to a particular expenditure or category of expenditures. According to our model, earmarking should be an attractive setup for accounts that are in the black (typically savings accounts) but unattractive for those that are in the red (typically debt accounts). Layaway plans, which involve putting aside an item while a consumer makes payments on it, are probably the most common examples of earmarked savings. Christmas clubs and college tuition funds are other prominent examples of such accounts. A novel college-financing venture that allows consumers to prepay up to four years of college tuition almost instantly subscribed 400,000 participating families.¹⁵ On

Table 7 Mean Rank of People According to How Pleasantly Surprised They Were to Receive an Unexpected \$300 Rebate

About to pay. . .	Mean rank	St. error ($n = 88$)
\$300 for miscellaneous credit card bills	3.66	.29
\$300 for dental work	4.51	.25
\$300 for recent parking tickets	4.72	.30
\$300 for installment on student loan	4.94	.31
\$300 for monthly car lease	4.98	.28
\$300 for a VCR	5.04	.30
\$300 for a physical exercise machine	5.31	.29
\$300 for a weekend spent at a country inn	5.45	.30
\$300 for arnis lessons	5.92	.29
\$300 for a fancy sportcoat	6.38	.30

Note: Low ranks mean more pleasantly surprised.

¹⁴ Bingers’ attitudes to credit card debt bear a certain resemblance to voter attitudes toward taxes. Like credit card payments, taxes contribute to a varied and complicated array of government services, few of which comes to mind when one writes the check. Voters do not object to the benefits, which they think belong to them as a matter of course, but are mystified at where the “taxpayer dollars” are going. This surely helps to explain the intensity of taxpayer disaffection and the corresponding appeal of “designated taxes” (Page and Shapiro 1992, p. 161).

¹⁵ *New York Times*, August 6, 1995.

the other hand, earmarked debt arrangements are relatively uncommon, except in the case of durables (house, car) where ongoing services cover the monthly payments.

A related prediction is that people should prefer to earmark comparatively desirable items when saving but comparatively undesirable items when borrowing. The argument goes like this: When financing by saving, payments are buffered by consideration of future utilities, and the greater such utilities, the more effective is the buffering. On the other hand, when financing by borrowing, the thought of future payments undermines pleasure from consumption. In this case it makes sense to earmark the less desirable item, thus protecting the more desirable one from being tainted by thoughts of payments. The following pair of items illustrate this pattern:

Item 5A

Imagine that in six months you will spend \$1,000 on assorted expenses for a party for your father, and \$1,000 for a variety of one-time miscellaneous expenditures. You plan to cover one set of expenditures from regular savings, and for the other you will set up and contribute to a special earmarked savings account. For which set of expenditures would you like to set up the special savings account? Assume that both options are equivalent in terms of payments, time, and effort.

Item 5B

Imagine that you are about to spend \$1,000 on assorted expenses for a party for your father, and \$1,000 for a variety of one-time miscellaneous expenditures. You plan to finance one set of expenditures with your credit card, and the other set with a separate loan. For which set of expenditures would you like to take out the separate loan? Assume that both options are equivalent in terms of payments, time, and effort.

The earmarked accounts create high coupling of consumption and expenditures, the general accounts, low coupling. According to the argument, people would be more likely to earmark the party payments when the payments were made beforehand (saving) than afterward (borrowing). As anticipated, a majority of the subjects preferred to earmark the party when saving (26/44 or 59%), but only 39% (17/44) preferred to do

so when borrowing, a significant difference ($\chi^2(1) = 3.7, p < 0.06$).

6.4. Gifts

Gifts provide a direct method of decoupling consumption from payments (i.e., lowering α). The prevalence of gift-giving has long posed an anomaly for economists, according to which money is the perfect gift since presumably people know their own tastes best. A recent paper published in the *American Economic Review* even estimated the efficiency loss to society attributable to people receiving gifts rather than cash (Waldfogel 1993). Among the strangest customs, as Thaler pointed out (1985), is that of couples with joint budgets purchasing expensive gifts for one another. Such gifts clearly serve the purpose of signaling affection and commitment to the relationship (Camerer 1988). In addition, however, gifts may also serve the function of liberating purchases from thoughts of paying. When your spouse buys you the leather jacket you balked at buying for yourself, you know that the money is coming out of your own pocket. But it is one thing to actually write the check or hand over the cash, and another to know that it has already happened at some time in the past.

6.5. Buyers Versus Sellers

Strong coupling should be generally undesirable for buyers, but desirable for sellers of services or labor.¹⁶ The two perspectives are illustrated by an ad for "The Pocket-Penpoint," a calculator-sized device that accepted automatic teller cards (featured in the May 1994 issue of *California Lawyer Magazine*). According to the description, lawyers, consultants, and other time-rate professionals could slip a client's card into the device, and bill them continuously as they work. Although a careful reader could see in the fine print that the advertisement was an elaborate joke, the "Pocket-Penpoint" nonetheless elicited many real purchase requests. "I thought the idea of having a client's money

¹⁶ We note also that our model may be applied to situations involving labor effort by reversing the signs for consumption and for payments in Equations (2) and (3), i.e., "negative consumption" refers to work, and "negative payments" to the earnings. The implications of the model are complementary, e.g., a liking for consumption prepayment translates into a dislike of salary advances (see examples 1D&E from Table 1).

go instantly into your account was almost too good to be true," commented one disappointed lawyer. The psychological benefits of real-time billing are not hard to deduce. A lawyer working overtime or hand-holding an irritating client might well take comfort in the silent transfers executed by the "Pocket-Penpoint." Of course, the very feature that makes it so attractive to the lawyer makes it unattractive to the client, which explains why the device is "topped with a handkerchief so it can be worn discreetly in a breast pocket."

7. Conclusion

7.1. Individual Differences

In the economic account of intertemporal choice, an individual's rate of spending depends mainly on her discount rate. People with relatively high rates of time discounting should consume more and save less. However, the current empirical evidence seems to contradict the claim that people exhibit a consistent discount rate across different domains—e.g., consumption and health, monetary and nonmonetary outcomes, gains and losses, etc. (Chapman and Elstein 1993, Fuchs 1982).

Despite the lack of evidence for individual differences in discounting, it is easy to recognize strong differences in spending habits between those who seem to spend "as if there is no tomorrow" and the "tightwads" who appear slated to take their ever-accumulating wealth to the grave. The mental accounting concepts developed here offer clues about possible causes of such differences other than variations in rates of subjective time discounting. First, people may vary in their tendency to think about payments when consuming (α) and their tendency to think about consumption when paying (β). A person whose mental accounting style is to impute the full cost of consumption is likely to be a tightwad. For such a person, it may not make sense to splurge on an expensive dinner, as the dinner will in any case be spoiled. Spendthrifts, on the other hand, probably have an exceptional capacity to push costs out of mind.

Second, people may have also different mental conventions for defining the subjective moment of payment. According to our model, people who regard an ATM cash withdrawal as the moment of payment

should both spend more freely and derive greater enjoyment from their purchases, because for them all subsequent cash purchases are prepaid. In a similar vein, credit card users who identify payment with the writing of the monthly check, rather than with the signing of the credit card slip, should find consumption more enjoyable because it is decoupled from thoughts about paying.

7.2. Hedonic Efficiency Versus Outcome Efficiency

In standard economic analysis, consumers decide whether to make a purchase by balancing the anticipated utility against the cost, which is the utility that could have been derived from the best alternative use of the money. In some cases, the best alternative is also immediate consumption, but more typically it is something that the consumer would have purchased in the future. Thus, in the standard formulation, the costs of a purchase (1) are typically incurred in the future, and (2) take the vague form of foregone consumption. In our framework, in contrast, people experience an immediate "pain of paying" for purchases. Since they also sacrifice utility when future consumption must be foregone, one could say that in our model consumers pay twice for all purchases.

If the pain of paying is redundant, from an economic point of view, then why are we psychologically constructed to experience it at all? The functional role of the pain of payment is to counteract biases or "mismatches" in the assessment of costs and benefits at the moment of purchase, biases that would otherwise lead to chronic overspending (Prelec 1991). The most obvious of these mismatches is temporal: Because the benefits of a purchase are typically more immediate than the costs, a consumer who discounts the future steeply may find the mere prospect of future sacrifice an insufficient deterrent to impulsive spending. A second mismatch involves the underweighting of opportunity costs relative to out-of-pocket costs (Thaler 1980). In most cases, it is natural for the consumer to represent foregone future consumption as an opportunity cost rather than as a loss. Because opportunity costs are systematically underweighted, such framing of the purchase decision again skews the decisional balance sheet in favor of immediate consumption. Finally, a third "scale" mismatch arises if the benefit of

not spending on a given occasion is framed as a tiny contribution to some larger financial goal (e.g., retirement). In that case it may be tempting to ignore the particular expenditure as “too small to matter” and so take one more step along a slippery slope (Herrnstein and Prelec 1991). Just as feelings of guilt or shame shape moral behavior and hunger tells us to eat, the pain of paying is a crude but effective reminder of the sacrifice that even a minor purchase will entail.

This functional interpretation now points to a key dilemma. From a hedonic standpoint, consumers want to minimize thoughts of payment. From a decisional standpoint, however, they definitely need to know “how much it costs.” The paradox may be expressed by saying that consumers wish to know how much consumption costs, but do not wish to unduly think about how much it costs.

The poor face an especially harsh version of the dilemma. Low income amplifies the pain of paying, by increasing λ , and so makes more attractive those arrangements that decouple consumption from payment. With low coupling, however, the decisional benefits of mental accounting—the ability to allocate consumption expenditures efficiently based on an accurate imputation of costs—are lost. The poor are likely to be torn between the need for precise accounting and the desire to avoid its hedonic consequences.

The tradeoff between the demands of hedonic and decision efficiency appears at the individual and the societal level (Table 8). At the individual level, practices that promote tight linkage between spending and consumption increase decisional efficiency but diminish hedonic efficiency. The car purchaser, for example, who makes a separate decision about whether to purchase each option (e.g., tinted glass, sunroof, etc.) ends

up with a car that may be ideally tailored to his tastes and needs, but also one where he knows the cost of every option. When he rolls down the electric windows he may recall the \$300 price tag of this minor convenience, and the feeling of warmth from heated driver’s seat may be chilled somewhat by the realization that it cost him \$300. These nagging thoughts would not be there if the features came in a standard package.

The same tradeoff appears at the societal level when we encounter policy choices involving arrangements that increase the salience of costs in return for more efficient distribution. User fees for parks, for example, may limit crowding, reduce taxes, and ensure that the people who value the park most highly are those who will use it, but the fees can also undermine the pleasures of the visit. In general, societies that remove goods and services from the market will be less efficient—people will get less of what they want—but what little those societies provide may well be enjoyed more.

Going down the list on the left side of Table 8, we see that each arrangement is associated with specific inefficiencies relative to the arrangement on the right. Outright ownership of large durables and real estate reduces financial liquidity. Foregone interest is the cost of prepayment. Fixed fees, e.g., for health clubs or telephone services, carry the risk of misjudging true usage rate. Standard offerings without options preclude tailoring the product to each consumer’s tastes. Disguised opportunity costs make it more difficult to monitor expenses: as in business, so in mental accounting, the sharing of costs makes it hard to perform a precise accounting of costs and benefits. The very endurance of left-side arrangements testifies to the attraction of keeping costs out of mind. The desire finds its ultimate and comprehensive expression in the socialist fantasy where all goods are “free.”

The ideal payment arrangements, for rich and poor alike, will be those that facilitate rational spending while mitigating the pain of paying, that create the illusion of free benefits without sacrificing accountability. In principle, we should be able to enjoy all of our possessions and activities as if they were free: The pain of paying is pure deadweight loss. To design transaction mechanisms and institutions that serve this function, marketing specialists, policy makers, and those

Table 8

Arrangements that promote hedonic efficiency	Arrangements that promote decision efficiency
ownership	leasing/renting
prepayment	postpayment
fixed fees	variable fees
few options—“prix fixes”	many options—“a la carte”
disguised opportunity costs	salient opportunity costs
public goods	market goods

PRELEC AND LOEWENSTEIN
Mental Accounting of Savings and Debt

Table 9

	Model I		Model II: $\lambda = 1$		Model III: $\lambda = 1, \alpha = \beta$		Model IV: $\lambda = \alpha = \beta = 1$	
	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error	Coeff.	St. error
κ	6.872	0.287	7.971	0.392	7.310	0.242	7.413	0.233
ν_A	0.413	0.100	0.613	0.065	0.586	0.032	0.585	0.032
ν_B	-0.192	0.099	-0.001	0.071	-0.028	0.043	-0.029	0.043
ν_C	-0.881	0.101	-0.701	0.075	-0.728	0.050	-0.729	0.050
μ	-0.559	0.100	-0.901	0.107	-0.680	0.097	-0.784	0.072
β	1.032	0.168	1.061	0.111	1.125	0.090	1	
α	1.370	0.213	0.840	0.082	1.125	0.090	1	
λ	1.032	0.066	1		1		1	
	Adj. $R^2 = 0.3252$		Adj. $R^2 = 0.3274$		Adj. $R^2 = 0.3276$		Adj. $R^2 = 0.3268$	

who dispense advice to consumers need to understand how people actually feel about payments, not merely how they would feel if feelings complied with economic logic.¹⁷

¹⁷ The paper was completed while the authors were Fellows at the Center for Advanced Study in the Behavioral Science. We are grateful for financial support by NSF grants # SBR-9511131 (to the authors) and # SBR-960123 (to the Center). We would also like to acknowledge the efforts of three anonymous reviewers, the editor, and area editor at *Marketing Science*, as well numerous useful suggestions from friends and colleagues.

Appendix 1

Reviewing Table 4, it seems that heterogeneity is mostly due to different attitudes to prepayment. A simple way of accommodating such heterogeneity is to give each segment a distinct ν -parameter while keeping the other parameters constant. The columns for Model I in Table 9 show the results of the nonlinear least-square regression for the equation:

$$\text{Rating } \{u_t; p_t\} = \kappa + \sum_S I_S \nu_S \left(\sum_{i=1}^4 (u_t - \alpha \lambda \hat{p}_i) + (\beta \hat{u}_t - \lambda p_t) \right) - \mu \left(\sum_{i=1}^4 |u_t - \alpha \lambda \hat{p}_i| + |\beta \hat{u}_t - \lambda p_t| \right).$$

where I_S is the segment dummy variable.

R^2 is reasonably high given that all subjects are being fitted with one equation. More importantly, we now have tight estimates of α , β , λ , and for none of the three parameters can we reject the hypothesis that the coefficient equals one. The fit provided by Model IV, which assumes $\alpha = \beta = \lambda = 1$, is essentially as good as that of Model I. This is perhaps not surprising, as the schedule format promoted full coupling ($\beta = \alpha = 1$) and indicated a \$1,000/week cost

of vacation time ($\lambda = 1$). The further advantage of Model IV is that it is testable with OLS, as there are no parameters inside the absolute value terms in Equation (4).

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