

**SELF-RATIONING: SELF-CONTROL IN
CONSUMER CHOICE**

by

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Self-Rationing: Self-Control in Consumer Choice¹

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Betcha can't eat just one.

Bert Lahr, advertising Lay's Potato Chips (1963)

I. Introduction: Global versus Local Constraints in Consumer Choice

Many consumer decisions are repeated purchase and consumption choices that are all subject to the same global normative constraint, for instance, the consumer's lifetime budget constraint in a purchase decision, her expected life expectancy in a time allocation decision, or her weekly grocery inventory in deciding what to cook for dinner. To illustrate, Ando and Modigliani's (1963) life-cycle hypothesis of saving assumes that consumers maximize utility subject to their available resources, which are expressed as the sum of their current and discounted future earnings plus their current wealth. At any given time, consumers plan to spread consumption of their total resources evenly over the remainder of their life span. Such consumption smoothing occurs even though current assets and income may fluctuate over time. Thus, borrowing allows consumers with lower initial assets but higher expected future income to make utility-maximizing consumption choices within the overall, lifetime budget constraint. For example, expecting to pay off a home mortgage from future income, young families often finance purchases of homes they cannot afford to pay for out of their current assets or income.

In contrast to this normative analysis, however, intuition as well as empirical observation suggest that consumers are not very capable of taking lifetime budget constraints into account when making repeated consumption choices that are distributed over time (see Herrnstein and Prelec 1992). The sheer computational complexity and uncertainty involved in the required present-value calculations suggest that the life-cycle hypothesis does not provide a realistic description of intertemporal consumer choice (Shefrin and Thaler 1988). For example, the surge in personal bankruptcies in the 1990s hints that many consumers take on more debt than they can afford. Experimental data

show that consumers often undervalue future relative to current resources, resulting in excessive current consumption (Kotlikoff, Samuelson, and Johnson 1988). In particular, recent experimental results by Soman and Cheema (2001) suggest that consumers overspend when their lifetime budget constraint is not salient to them.

Thus, global resource constraints (e.g., a lifetime budget constraint) may not be tenable as a guide for consumers' spending and consumption decisions because they are often too abstract and difficult to compute or gauge. In this paper, I suggest that consumers whose preferences are dynamically inconsistent, as much of the work in this volume suggests, will consume excessively when they are faced with such intangible global constraints because nothing limits their consumption at the "local" level. These consumers don't know when to "say when." Instead, they seem to consume at a rate that is a monotonic function of their immediately available (local) resources. This paper explores how consumers with self-control problems (i.e., with dynamically inconsistent preferences) cope with choice situations in which the relevant resource constraints are global and intangible. I will argue that consumers often have enough insight into these problems to employ self-rationing strategies that induce more tangible, localized constraints to control their choices. While framing choices in narrow, local terms may often induce suboptimal behavior (Read, Loewenstein, and Rabin 1999), the local constraints employed by self-rationing help consumers partially compensate for their inability to stick to imperceptible global constraints.

In addition to (monetary) budget constraints, the next section will examine the effect on consumption of relaxing two other forms of resource constraints, on goods in inventory and on time. In particular, I will rely on evidence from the marketing literature on marketing tactics that enhance these effects. Section III will discuss empirical evidence of self-control by self-rationing, of consumers actively and strategically trying to keep themselves from consuming resources excessively by self-imposing limits where marketers or policy makers do not provide any. Section IV will conclude by showing

why evidence of self-rationing is important for research on intertemporal choice and self-control and what constitutes such evidence.

II. Marketing, Resource Effects, and Self-Control Problems

While consumption resources are usually exogenous, consumer choice of how to allocate those resources is not. In their attempts to create and manage mutually beneficial trades with consumers, marketers often try to influence that allocation. I now discuss how some of their attempts may lead to, or exacerbate, consumer self-control problems.

Impulsive Buying and Consumption. Self-control problems arise from impulsive behavior. Marketing researchers' interests in impulsive behavior have long focused on impulse buying (e.g., Bellenger, Robertson, and Hirschman 1978; Clover 1950; Kollat and Willett 1967; Pollay 1968; Stern 1962; West 1951). Early investigations defined impulsive purchases simply as unplanned purchases in a given product category. This definition, however, was fraught with conceptual and operational problems (Kollat and Willett 1967) and did little to illuminate the consumer's decision processes. Rook (1987) lamented the lack of a compelling theorizing about impulse buying and impulse control, which characterized consumer research at the time. In response, Rook and Hoch (1985) asked consumers to describe their experiences of impulse buying episodes, which are typically characterized by product emanations, spontaneous urges to consume, by sometimes-intense inner conflict about the purchase. Marketing researchers also began to develop personality scales to measure consumer impulsiveness as a trait (Puri 1994; Rook and Hoch 1985; Rook and Fisher 1995) and began to explore the concepts of willpower and desire (Hoch and Loewenstein 1991; Loewenstein 1996).

In contrast, economic and behavioral analyses of impulsive consumer choice have typically focused on exploring the implications of models of dynamically inconsistent consumer preferences (see this volume as well as, e.g., Ainslie, 1975; Loewenstein and Prelec 1992; O'Donoghue and Rabin 2000; Pollak 1968; Prelec and Loewenstein 1997;

Thaler and Shefrin, 1981; Strotz 1956). But besides stable consumer characteristics such as traits and preferences, two other elements are implicated in impulsive consumer choice – the intertemporal distribution of the costs and benefits of consumption (O’Donoghue and Rabin 1999; Wertenbroch 1998) and the resource constraints under which consumers make their choices (Wertenbroch and Carmon 1997).

As Hoch and Loewenstein (1991) point out, not all goods, activities, or resources prompt dynamically inconsistent preferences. Self-control problems occur when the benefits of consuming one choice option arise earlier, and the costs later (as in having a juicy steak high in cholesterol for lunch), than those of another choice option (as in having bland broccoli high in fiber for lunch) and when some of the costs or benefits are particularly imminent or salient (Loewenstein 1996). Wertenbroch (1998) provided a formal analysis of how the intertemporal distribution of the consequences of consumption may create self-control problems for ‘vice’ and ‘virtue’ goods and activities (for related conceptualizations see, e.g., Giner-Sorolla 2001; O’Donoghue and Rabin 1999; Read, Loewenstein, and Kalyanaraman 1999).³ Vices pose a greater potential need for self-control because they are relatively more likely to be consumed on impulse (considering only immediate consequences) than comparable virtues in the absence of constraints. In contrast, virtues such as castor oil or savings are subject to self-control problems of relative underconsumption.

Marketing Tactics that Exacerbate Self-Control Problems. While dynamically inconsistent preferences and the distribution of the costs and benefits of consumption

³ Following Wertenbroch (1998), let $X \succ_I Y$ denote a strict preference for good X over a comparable, matched good Y when the consumer considers only concurrent, or immediate, consequences of consumption (e.g., taste) and ignores delayed consequences (e.g., long-term health effects). Let $X \succ_D Y$ denote a strict preference for X over Y when the consumer considers only delayed consequences and ignores immediate ones. X is a vice relative to Y , and Y is a virtue relative to X , if and only if, at the margin, $X \succ_I Y$ (maximizing immediate pleasure) and $Y \succ_D X$ (maximizing delayed utility). Non-constant (e.g., non-exponential) discounting can lead to time-inconsistent preferences such that $Y \succ_D X$ at $t < T$ when the consequences of one’s choice are all delayed, but $X \succ_I Y$ at $t = T$ when at least some of the consequences are immediate (Strotz 1956).

have received focal attention in research on self-control, there is less emphasis in most analyses on how constraints on resources allow for, or limit, impulsive buying and consumption. There three classes of basic consumer decisions, for which research in consumer behavior and related disciplines suggests that relaxing resource constraints leads to increased spending and consumption.

The first class of consumer decision problems is whether or not to make a purchase, given one's budget constraint, and how to pay for the purchase. Loosely speaking, spending can be seen as a vice, while saving represents virtuous behavior. Recent consumer research suggests that the provision of consumer credit can have positive liquidity effects on purchase rates and spending levels (e.g., Feinberg 1986; Laibson 1997; Prelec and Simester 2001; Shefrin and Thaler 1988; Soman 2001).

Another basic decision that consumers make every day is which goods to consume from inventory, that is, from among those goods they have stocked up in their pantry, refrigerator, etc. A recent stream of research in marketing has shown that consumer stockpiling in response to price promotions can lead to positive inventory effects of supply on consumption rates (e.g., Ailawadi and Neslin 1998; Assunção and Meyer 1993; Bell, Chiang, and Padmanabhan 1999; Chandon and Wansink 2001; Folkes, Martin, and Gupta 1993; Nijs, Dekimpe, Steenkamp, and Hanssens 2001; Wansink 1996). In part, this may occur because consumers seem to depreciate the costs of goods they have in inventory (Gourville and Soman 1998; Prelec and Loewenstein 1998), in part because vice goods are more tempting to consume than virtue goods.

A third type of decision that consumers make on a daily basis is how to allocate, value, or consume, their time (e.g., Leclerc, Schmitt, and Dubé 1995). Casual observation, at least, suggests that consumers often use up the time they have available to complete a task. For example, students usually hand in term papers when they are due rather than any earlier. And even their professors seem subject to similar procrastination effects – peer reviews of papers submitted to academic journals tend to be completed

around the time of the deadline, no matter how many months the reviewers have available to do their reviews. Procrastination is a vice, while completing a task on time is virtuous.

What these three types of resources (supplies of money, goods, and time) have in common is that they are consumed at higher rates when they are available in larger, less bounded quantities, i.e., under more global constraints. To see why, consider an analogy to moral hazard problems. These occur when, for example, an insurance company cannot properly monitor the risky behavior it is insuring (e.g., driving). Then the insured have an incentive to engage in riskier behavior (e.g., driving faster) than they would otherwise because the cost of that behavior (e.g., losses from accidents and resulting premium increases) will be spread across all insured. So by lowering the price that individuals pay for a good, moral hazard causes them to demand more than the efficient level of the good. Similarly, lifting constraints on resources, or making the constraints less salient or more difficult to monitor, lowers the perceived cost of consuming these resources and may thus induce excessive consumption.

In the subsections below, I will describe evidence of resource effects from the marketing literature and will discuss the emerging empirical evidence of consumer self-control strategies for curbing each of these effects by self-rationing.

II.1. Effects of Consumer Credit on Liquidity, Spending, and Consumption

According to Shefrin and Thaler's (1988) "behavioral life cycle" hypothesis consumers' propensity to spend on current consumption increases with the liquidity of their available funds, contrary to normative theory. Consistent with this hypothesis, researchers have suggested that the use of consumer credit and financing tools (e.g., in the form of credit cards) enhances consumer spending because consumer credit temporarily lifts liquidity constraints (cf. Ausubel 1991; Laibson 1997). However, such enhanced spending implies a reallocation of consumption from the future to the present

as the liquidity boost from financing does not affect the consumer's real budget constraint. Perhaps that is why furniture retailers like Seaman's often provide extended credit terms to furnish consumers with enough liquidity to enable purchases that they might otherwise not make because of their budget constraints.

What is the evidence that consumer financing enhances spending as would be expected if the provision of credit removes liquidity constraints? It has been shown that credit card financing, in particular, increases purchase likelihood (Soman 2001) and willingness to pay (Feinberg 1986; Hirschman 1979; Prelec and Simester 2001; Soman 2001). In an early field study at the point of sale, Hirschman (1979) found that credit card usage was associated with higher spending, although her results could be explained by differences between users and non-users of credit cards or differences among products, which are bought with or without a credit card. Feinberg (1986) experimentally examined subjects' spending levels for consumer products and charitable donations in the presence or absence of credit card-related stimuli. Although payments were not even made by credit card, he found that the presence of credit card cues enhanced the probability, speed, or magnitude of spending, a finding for which he proposed a conditioning explanation. Soman (2001) showed with hypothetical scenario-based data that past credit card payments enhance current willingness to pay because the budgetary impact of making a credit card payment is not immediately realized in full. Consumers do not encode the paid amount as well when paying by credit card as when they pay cash and they do not immediately book the expense against their objective budget constraint. As a result, they make current purchase decisions as if their available budget had not been depleted by the prior expense. Soman and Cheema (2001) show across a series of experiments and surveys that consumers use the size of the credit limit available to them as an indicator of their future earnings potential. That is, they interpret their credit line as indicative of their objective budget constraint, even though the relationship between credit limits and future earnings is highly uncertain and the decision of allocating future

income to present consumption is difficult to make in a normatively appropriate manner. Finally, Prelec and Simester (2001) showed experimentally under incentive-compatible conditions (cf. Wertenbroch and Skiera 2002) that willingness to pay is higher when paying by credit card than when paying cash. Specifically, they randomly allocated consumers to a credit card or a cash payment condition, controlling for possible differences between consumers in the two conditions. They also ensured that there were no liquidity constraints. They found a large credit card premium – in one study, for instance, consumers in the credit card condition were willing to pay more than 100% more than consumers in the cash condition to see a National Basketball Association regular season game between the Boston Celtics and the Miami Heat.

II.2. Effects of Promotional Stockpiling and Inventory on Consumption

Over the last decade or so, marketing researchers have begun studying the impact of sales promotions on household stockpiling. A key question in that regard is whether sales promotions increase only secondary demand, through enhanced brand switching, or whether they can also increase primary demand (Bell, Chiang, and Padmanabhan 1999). Do consumers who buy additional units of a good that is on sale simply forward-buy and then stay out of the market when price returns to its higher regular level? Or does promotion-induced stockpiling result in greater consumption? While early work on promotion effects assumed a constant usage rate (e.g., Gupta 1988), there is not much evidence of the post-promotion dips that would be expected if sales promotions simply resulted in forward-buying without enhancing consumption (Blattberg and Neslin 1990). More recent work has shown with scanner data analyses that category consumption varies with the level of promotion-induced household inventory (Ailawadi and Neslin 1998). But the extent to which sales promotions accelerate consumption differs across a variety of consumer packaged goods categories. For example, bacon, potato chips, soft drinks,

and yogurt have been shown to exhibit consumption acceleration, while bathroom tissue, coffee, detergents, and paper towels do not (Bell et al. 1999).

Aside from these econometric analyses, there is also experimental evidence that suggests inventory effects on consumption. Folkes et al. (1993) demonstrated experimentally that the product supply (e.g., of household cleaning products) that consumers have on hand on a given usage occasion boosts the quantity consumed. Specifically, they found that usage decreases with diminishing supply in an effort to make it last but only when the supply can be assessed visually. The effect of supply on usage disappears when the bottles holding the supply are opaque. Folkes et al. (1993) suggested that the supply effects they showed may lead to overconsumption but could not conclusively demonstrate such overconsumption. Wansink (1996) showed in a number of experimental studies that it is not just supply but also package size that influences usage. This effect is mediated by perceptions of unit costs; unit costs are usually lower for larger package sizes. Similarly, price promotions entail lower unit costs and thus enhance usage. Wansink (1996) found an interesting exception to these effects; package size and perceived lower unit cost did not enhance the usage of Clorox bleach, which can hardly be described as a tempting vice that is subject to overconsumption.

More recently, Chandon and Wansink (2001) have outlined and tested a conceptual framework that explains stockpiling effects on consumption as a function of consumption incidence and quantity. Specifically, it is the salience of items in inventory, moderated by the effect of how conveniently the product can be consumed (e.g., ready-to-eat food products), that drives *consumption incidence* rates. For example, food items in unusual package designs or items that are left openly on the counter are more likely to prompt consumers to consume them than items that are out of sight and hence out of mind. Hoch and Loewenstein (1991) suggested similarly that physical proximity can induce consumption impulses. That may be one reason why retailers saliently display popular magazines and small packages of candy near the cash register so that customers

waiting in line with no distractions will find themselves (or their children) unable to resist the temptation to buy and consume these items.

While inventory effects on consumption incidence are moderated by consumption convenience and inventory salience, Chandon and Wansink's (2001) framework suggests that inventory effects on *consumption quantity* are triggered by a decline in the cost of consumption due to higher inventory levels. Specifically, stockpiling may entail storage costs as it uses up pantry space and as it involves the risk of perishability. Thus, Assunção and Meyer (1993) argued that there are normative reasons for why promotional stockpiling should accelerate consumption because of stock pressure effects from inventory holding costs and because higher inventories provide consumers with more flexibility in consumption without having to worry about replacing the product at a high price. But it is not only the actual cost but also the psychological impact of the cost of consumption that declines as inventory increases. Work by Gourville and Soman (1998) and Prelec and Loewenstein (1998) shows that the negative hedonic impact of paying for a purchase that may discourage consumption recedes as payment and consumption are temporally dissociated. The more time elapses since a consumer has bought an item, the more he or she will adapt to having made that payment and the more he or she will mentally depreciate it (Heath and Fennema 1996). Hence, the net benefits from consumption should appear bigger for goods kept in inventory in large quantities and packages.

II.3. Procrastination

A third class of resource that consumers use up is time. A lot of anecdotal and introspective evidence suggests that people use too much of it when they have it, that is they procrastinate. For example, people often use up the time that is allotted to a task, no matter whether a lot of time or only a little time is allotted, in line with what's popularly known as 'Parkinson's Law.' Accordingly, procrastination has been the subject of much

theoretical analysis (e.g., Akerlof 1991; O'Donoghue and Rabin 1999a, 1999b, 2001). But empirical research to demonstrate procrastination and, possibly, people's attempts to curb it is scarce.

Suggestive evidence that people procrastinate comes from Hayes-Roth and Hayes-Roth (1979) who show that subjects often overestimate what they can achieve in a given time period, despite repeated feedback. Similarly, Buehler, Griffin, and Ross (1994) show that people underestimate how long it takes them (but not others) to complete tasks (see also Buehler, Griffin, and MacDonald 1997). Does this mean that consumers procrastinate? If so, are consumers sophisticated enough to be aware of their own procrastination (cf. O'Donoghue and Rabin 1999a)? Trope and Fishbach (2000) provide evidence that suggests self-control in preventing procrastination. Specifically, they show that subjects precommit to paying penalties if they fail later on to take an agreed-upon medical test with unpleasant short-term consequences and useful delayed consequences (i.e., an absolute virtue). This type of precommitment may be interpreted as an attempt to prevent indefinite procrastination, that is, not taking the test at all. By precommitting, subjects behave as if they were afraid of procrastinating.

III. Evidence of Self-Rationing in Addressing Self-Control Problems

III.1. Self-Rationing Liquidity

Consumer Credit and Overconsumption. The research discussed in Section II.1. on the effects of payment mechanisms demonstrates that perceived liquidity enhances spending. But it does not show whether and when the temporary liquidity boost that consumer credit provides induces *overspending* and *overconsumption* in excess of consumers' real (lifetime) budget constraints. After all, it might just be that the effect of consumer credit on spending is in line with a normatively appropriate reallocation of consumption from the future to the present. On the other hand, the pervasiveness of consumer borrowing, coupled with the ease with which one can obtain consumer loans,

the currently negative savings rate, and the record number of personal bankruptcies in the U.S. seem to suggest that consumers borrow too much. How can we demonstrate that borrowing leads to overspending and overconsumption? Do consumers try to prevent or minimize such an effect?

Initial evidence comes from Wertenbroch, Soman, and Nunes (2001) who propose that relaxing constraints on purchasing and consumption (e.g., by providing additional liquidity) is likely to lead to overconsumption of more tempting hedonic products than of less tempting utilitarian goods (see Dhar and Wertenbroch 2000; O'Curry and Strahilevitz 2001).⁴ Therefore, consumers with a need for self-control avoid going into debt for hedonic goods in an attempt to control their hedonic consumption. The authors show in several experiments and in field data from a consumer panel they created that consumers with a stronger situational or enduring (trait) need for self-control (see Puri 1996) prefer not to finance current consumption or, alternatively, self-impose stricter payment terms. For example, respondents in a hypothetical scenario study were more likely to prefer a shorter but more expensive car loan to a longer less expensive one (measured as the net present value of the loan payments) when considering the purchase of a hedonic car rather than a utilitarian car. While Prelec and Loewenstein's (1998) work suggests similar preferences for prepayment for goods with short consumption streams, it is consumers' willingness to pay premia for limiting their own liquidity that implies that their behavior is strategically directed at self-control.

Mental Budgeting. In addition to debt aversion, consumers have been shown to impose (economically) non-binding limits on their spending behavior by imposing mental

⁴ The distinction between hedonic and utilitarian goods is similar to that between vices and virtues, except that the latter are more formally defined in relation to each other (see Section III). The intertemporal distribution of the costs and benefits of consumption of hedonic and utilitarian goods renders hedonic goods more tempting to consume than utilitarian goods. Specifically, hedonic goods are goods whose consumption is primarily characterized by an immediate affective and sensory experience of aesthetic or sensual pleasure, fantasy, and fun, whereas utilitarian goods are ones whose consumption is more cognitively driven, oriented toward achieving a delayed goal, and accomplishes a functional or practical task (Dhar and Wertenbroch 2000).

budgets (Heath and Soll 1996; Henderson and Peterson 1992; Thaler 1985, 1999). Mental budgeting entails allocating expenditures to specific spending categories such as entertainment such that each category is characterized by a spending limit, much like budgets used in organizations to limit expenditures. Some budgets are more accessible than others, depending on their liquidity (Shefrin and Thaler 1988) or their origin (O'Curry 1997). For example, Shefrin and Thaler (1988) propose that consumers are most easily tempted to spend out of what they call 'current assets' (e.g., cash and checking accounts), followed by 'current wealth' (e.g., savings and stock) and, lastly, 'future income' (e.g., designated retirement savings accounts). It is important to note that, unlike the deliberate avoidance of consumer financing described above, a precommitment device that imposes actual constraints on overspending, mental budgeting does not entail the automatic imposition of a penalty or of a binding constraint. This is because tracking expenditures against a budget is a malleable process that requires that expenditures are first noticed ("booked") and then assigned to the proper account ("posted"). Booking requires attention and memory, posting requires similarity judgments and categorization processes (Heath and Soll 1996), all of which make mental budgeting flexible. Nonetheless, mental budgeting appears to be a useful self-control device in that it allows consumers to partition and ration their financial resources, whose real constraints may otherwise not be salient enough to prevent excessive spending.

III.2. Self-Rationing Inventories

Section II.2. showed that there are not only normative reasons for inventory effects on consumption (lower cost per unit consumed), but there are also psychological effects on consumption incidence (inventory salience and consumption convenience) and quantity (mental payment depreciation). In addition, Bell et al.'s (1999) and Wansink's (1996) findings on differences in inventory effects on consumption suggest that product characteristics such as the intertemporal distribution of the costs and benefits of

consumption may affect inventory effects as well. And Chandon and Wansink's (2001) concept of consumption convenience suggests that inventory effects are stronger when immediate costs of consumption, such as the transaction costs of preparing a tempting dinner, are low or removed. This raises the possibility that at least some inventory effects on consumption, or part of these effects, are impulsive. How can we tell whether these effects of varying the external (inventory) constraints encourage dynamically inconsistent consumption behavior?

According to the “smoking gun” argument raised above, we can infer the operation of strategic self-control from consumers' self-imposition of constraints on their own consumption choices. Wertenbroch (1998) provided the first empirical evidence of this sort, showing that consumers' attempts to control their consumption impulses influence many everyday purchases. He proposed that consumers ration their purchase quantities of vice goods by buying them in small quantities per purchase occasion. This imposes transactions costs and perhaps associated feelings of guilt on additional consumption. Consider Table 1, which contains the results of an informal point-of-purchase survey of cigarette (vice) buyers at a large convenience store and vitamin C (virtue) buyers at a nearby health food store in Chicago. Ninety percent of the cigarette buyers bought single packs of cigarettes rather than cartons, while only 21% of the vitamin C buyers bought the smallest package size (50mg) available in the store. When asked about their reasons for choosing the particular package sizes that they had just purchased, they listed budget constraints, perceived quantity discounts, and convenience (i.e., lower transaction costs). But 75% of those who bought cigarettes by the pack also endorsed self-control as a reason, and 24% of those who purchased larger vitamin C containers did so. Typically, cigarette buyers claimed to try to control their smoking by having only a small inventory of cigarettes available at any given time.

[Insert Table 1 about here]

To provide more controlled evidence of purchase quantity rationing, Wertenbroch

(1998) conducted two experiments and two field studies comparing sales of products that corresponded to the definition of relative vices and of (otherwise matched) relative virtues given in Footnote 3. A choice experiment showed that consumers are more likely to forgo quantity discounts for a large package size in order to ration their purchases of a relative vice (fatty potato chips) compared to a relative virtue (fat-free potato chips). The results are shown in Figure 1. Using an incentive-compatible measure of reservation prices (see Wertenbroch and Skiera 2002), a second choice experiment showed similarly that consumers with a higher need for consumption self-control exhibit less price-sensitive demand for Oreo chocolate chip cookies than consumers with a lower need for self-control. Specifically, the higher their need for self-control, the steeper the decline in their reservation prices per pack when offered two rather than one package of Oreos, that is, the less likely they were to buy more in response to unit price reductions. Two field studies provided external validity to these experimental results. One field study showed that retail quantity discounts are deeper for relative vices than for relative virtues, suggesting the less price-sensitive demand that reflects purchase quantity rationing of vices. The study compared quantity discount depths within 30 pairs of consumer product categories (listed in Table 2) that were matched with respect to production technology, retailer and consumer inventory holding and handling costs, and frequency and expandability of consumption. Across the top ten pairs with the strongest vice-virtue distinction, the average quantity discount was 25.7% for doubling the purchase quantity of the virtue, compared to a much deeper 36.4% for doubling that of a corresponding vice. A second field study used scanner data of actual sales records to show that store-level demand for relative vices is less price-sensitive than demand for virtues, again in line with purchase quantity rationing. It analyzed a year's worth of data from a major supermarket chain with 86 stores and a 20% market share in metropolitan Chicago. The consistent finding across multiple methods and data sources was a characteristic crossover in demand schedules for vices and virtues. Vice demand increased less in

response to price reductions than virtue demand, although consumers did not generally prefer virtues to vices. Hence, inventory constraints on vices appeared self-imposed and strategic rather than driven by simple preferences. By restricting their inventory of vices at the time of purchase, consumers can limit subsequent consumption. As a result of purchase quantity rationing, vice buyers forgo savings from price reductions via quantity discounts, effectively paying a premium as the price of self-control.

[Insert Figure 1 and Table 2 about here]

These findings offer marketing practitioners in many consumer goods industries new opportunities to increase profits through segmentation and price discrimination based on consumer self-control. They can charge premium prices for small sizes of vices, relative to the corresponding quantity discounts for virtues. All else equal, virtue consumers or vice consumers who do not engage in purchase quantity rationing tend to buy in larger amounts anyway, even at shallow quantity discount levels. On the other hand, companies that want to induce vice consumers to stockpile must offer deeper discounts. Public policy makers may, or perhaps should, show concern about firms charging consumers a premium for ‘virtuous,’ or self-constrained, consumption behavior.

Lemon and Wertenbroch (2001) advance a similar rationing argument for the self-control of service consumption. They examine strategic consumer behavior in response to usage-sensitive pricing plans in services, in which consumers pay a total cost that has two parts: a prepaid, fixed component (independent of the usage rate) and a concurrently paid, variable component (cost per unit consumed). If the service is one that consumers are tempted to underconsume (‘virtue’ services such as health clubs), consumers can instrumentalize the prepaid (sunk) fixed fees to self-impose a strategic incentive to consume, by amortizing them across consumption episodes, while variable fees would only add to the immediate costs of virtue consumption that deter usage. In contrast, if the service is one that consumers are tempted to overconsume (‘vice’ services such as video rentals), sunk fixed fees would mitigate the effect of self-control, while variable per-unit

fees can be used to self-impose a strategically desirable constraint on each consumption occasion. In support of this reasoning, Lemon and Wertenbroch (2001) show in several experiments that consumers who are given a choice between pricing schedules are less likely to prepay vice services than virtue services, apparently based on the intuition that they will more easily consume services when these are in ‘inventory’ already (i.e., services that are already paid for).

Additional evidence consistent with purchase quantity rationing of virtues and vices comes from Read et al. (1999), albeit in a context in which rationing may more directly help mitigate *underconsumption*. In a study of simultaneous versus sequential choices, they found that consumers who rent multiple movies simultaneously for delayed consumption choose a higher total proportion of virtue movies (‘highbrow’ such as *Schindler’s List*) relative to vice movies (‘lowbrow’ such as *Four Weddings and A Funeral*) than consumers who rent only one movie at a time for immediate consumption.⁵ These choices are in line with what would be predicted if consumers tried to reduce constraints on virtue consumption, by making virtue movies easily accessible by carrying them inventory. For example, the authors report that in one small sample of consumers the share of *Schindler’s List* was increased thirteen fold in simultaneous choice, that is, when subjects rented movies “in bulk” (Read et al. 1999). At the same time, a strategy of filling up their inventory with virtue movies limits the share of vice movies consumers can watch.

Finally, an interesting attempt to control consumption by strategically *creating*, rather than limiting, an inventory is shown by Kivetz and Simonson (2000). They explore situations, in which consumers underconsume non-essential luxuries because spending money on these is often painful and difficult to justify. It is also possible that

⁵ It is difficult to get people into the theater to watch a movie like *Schindler’s List*, although they are glad to have watched it in hindsight and recommend it to their friends (Read et al. 1999). This suggests that consumers are tempted not to watch the movie when faced with an immediate

spending is difficult to allocate optimally on luxuries vis-à-vis necessities so that consumers often avoid luxuries completely in order not to be tempted to overconsume them. Given this allocation difficulty, Kivetz and Simonson (2000) hypothesize that consumers often precommit to hedonic consumption, as a means to curb underconsumption of luxury goods. They show that consumers in precommitment situations prefer hedonic luxuries to cash payments (for example, when choosing among prizes; see O’Curry and Strahilevitz 2001) even when the luxuries are of lower monetary value than the cash payments, suggesting strategic behavior.

III.3. Self-Rationing Time

A self-control device in the face of procrastination is a deadline. For instance, organizations often impose deadlines with penalties on their members to motivate them not to procrastinate. These deadlines increase, and boost the salience of, the costs of putting off a task (O’Donoghue & Rabin 1999b). But in the absence of such external deadlines, are people sophisticated enough to strategically impose *costly* deadlines on themselves – as much well meaning advice would suggest?

Ariely and Wertenbroch (2002) provide the answer to that question by showing direct evidence of self-imposed binding deadlines. In one study, they show that people impose deadlines on themselves in tasks, in which performance may deteriorate with procrastination, even when missing these deadlines entails penalties. In a world without procrastination such behavior seems non-normative. A rational decision maker with time-consistent preferences would not self-impose constraints on his or her choices. But if people procrastinate and if they are aware of that, self-imposing costly deadlines as a binding mechanism appears strategic and makes sense (O’Donoghue & Rabin 1999a). The authors also demonstrate experimentally that self-imposed deadlines do not enhance

opportunity to see it, despite its long-term benefits. This makes it a virtue according to the definition in Section II.

performance as much as externally imposed deadlines unless they are evenly spaced – some people apparently are not sophisticated enough to space their deadlines for maximum performance. Finally, Ariely and Wertenbroch (2002) show that performance is better under self-imposed early deadlines than under externally imposed late deadlines – which invite the highest degree of procrastination, measured as performance-diminishing delays. Overall, their findings show that people are sophisticated enough to understand the value of binding themselves in order to overcome procrastination, despite strong normative reasons for setting deadlines as late as possible. What is clear from their data is that procrastination is a real behavioral problem. If consumers have a relatively unlimited amount of time on their hand to complete a task, they self-impose costly deadlines to impose boundaries where none, or not enough, existed.

IV. Conclusion: The Role of Empirical Evidence of Self-Rationing

The evidence reviewed in this paper suggests that consumers are ill-equipped to make distributed, moment-to-moment choices subject to the global constraints that normative theory calls for. This leads to non-normative resource effects on consumption. Impulsive consumers will end up overconsuming their inventories of money, time, and goods if they try to evaluate these inventories assuming the normatively required lifetime horizon or some other global constraint. The less locally bounded tempting resources (inventories of vice goods, money, time) are that consumers have available when making consumption choices, the more likely they are to encounter self-control problems, as shown by their own attempts to solve these problems. To make the overconsumption problem more manageable, consumers scale down their spending and consumption decisions by self-imposing relatively narrow rule-based (e.g., mental budgeting) or physical (e.g., costly deadlines) constraints on their choices – they ration themselves. The evidence of resource effects and of self-rationing reviewed here suggests three key implications and possible areas for future research.

Marketing to Lose Control. This paper has shown that marketers have come up with mechanisms that boost consumers' resources and, inadvertently or not, put at least the more impulsive ones at risk of excessive consumption. Among the forces in the economy that enhance consumer self-control problems in this way are price promotion-induced stockpiling and the provision of consumer credit to temporarily boost consumer liquidity. Stockpiling has been shown to accelerate consumption and consumer credit boosts spending.

Partial Sophistication. Self-rationing is a form of binding behavior. What characterizes binding behaviors in general is that, to prevent themselves from giving in to the temptation to consume, people voluntarily impose constraints on their own future choices that are costly to overcome, and they sometimes even pay a premium for binding themselves (Wertenbroch 1998). The defining characteristic of effective binding, or precommitment, behaviors is that a lapse triggers the automatic self-imposition of costs (i.e., a penalty). If, as in the case of Ulysses tying himself to the mast to avoid steering his ship closer to the dangerous shores of the Sirens, precommitment completely precludes giving in to temptation, the cost is infinite. The literature is replete with anecdotal evidence of precommitment (e.g., Hoch and Loewenstein 1991; Schelling 1992; Thaler 1980; Thaler and Shefrin 1981; Wertenbroch and Carmon 1997). For example, drug addicts write self-incriminating letters to be held in trust, to be opened and sent out in case they relapse into drug use (Schelling 1992); academics precommit to giving conference presentations to keep themselves from procrastinating on important research projects (Thaler 1980); and so forth. However, controlled empirical evidence of self-rationing and of its implications is rare and only now beginning to emerge in the literature on consumer choice. Such controlled evidence is necessary not only to validate the anecdotal evidence but also to bolster and advance economists' theoretical attempts to

model dynamic inconsistency and self-control.⁶

Empirical evidence of self-rationing plays a key role in research on intertemporal choice because it provides researchers with an assessable criterion to distinguish between consuming ‘a lot’ (but within a consumer’s unobserved objective resource constraint) and consuming ‘too much’ (more than is feasible given that constraint). For example, being overweight does not necessarily imply time-inconsistent preferences for eating; we cannot rule out that the person simply likes to eat in a time-consistent, rational way. In contrast, strategic self-rationing of eating (e.g., by visiting a fat farm) cannot be explained by time-consistent preferences and constitutes what O’Donoghue and Rabin (1999) have called “smoking gun” evidence of dynamic inconsistency. More generally, we can infer overconsumption from consumers’ attempts to self-ration their consumption – if they ration themselves, then they must be aware of their self-control problems (Bénabou and Tirole 2001) and have at least partial insight into how to solve them. Ariely and Wertenbroch’s (2002) findings on performance under self-imposed deadlines provide direct empirical evidence that consumers exhibit varying degrees of sophistication in dealing with self-control problems.

Inefficiencies. How successful are consumers’ attempts to ration their own consumption in curbing their self-control problems? Self-rationing prevents decisions that maximize marginal utility and therefore entails inefficiencies. Heath and Soll (1996) showed experimentally that consumers are less willing to buy tickets to a play when they have spent \$50 on a basketball ticket than when they have spent \$50 on a parking ticket that same week. Consumers drop their reluctance to buy the ticket to the play when the basketball ticket is free. From a normative perspective, they should consider the ticket purchase decision solely based on the marginal utility to be derived from the play, which

⁶ One reason why research has been slow to provide controlled evidence of self-control may be that, as Read, Loewenstein, and Kalyanaraman (1999) note, serious self-control problems are difficult to observe under controlled conditions, often for ethical reasons, as researchers cannot experimentally manipulate drug or alcohol addiction or unprotected sex.

may depend on whether they have seen the basketball game earlier in the week but not on whether or not they had to pay for that. Similarly, Leclerc, Schmitt, and Dubé (1995) show that consumers' willingness to pay money to avoid standing in line doubles when waiting for a \$45 purchase compared to waiting for a \$15 purchase, while the normative view implies that consumers' marginal value of saving time should be independent of the purchasing context. More generally, rationing in its various forms (e.g., mental budgeting) can create distortions if rations cannot be exceeded when that would yield greater marginal utility, violating fungibility (Thaler 1999). For example, consumers may spend the night watching an undelightful TV show if their mental entertainment budget keeps them from going to the play once they have sufficiently drawn down the available funds by attending the basketball game. It seems that the inefficiencies entailed by self-rationing are the price consumers have to pay to "have the cake and eat it," that is, to partially give in to their spending and consumption impulses rather than refraining from consumption altogether (Carrillo 2000). Thus, smokers who buy cigarettes by the pack can tell themselves that they are curbing their addiction, yet at the same time they continue their addictive behavior. But how much consumption is too much and how much too little will always remain an open question. The only thing we can infer from self-rationing is that consumers are afraid that they would consume excessively in the absence of such self-rationing.

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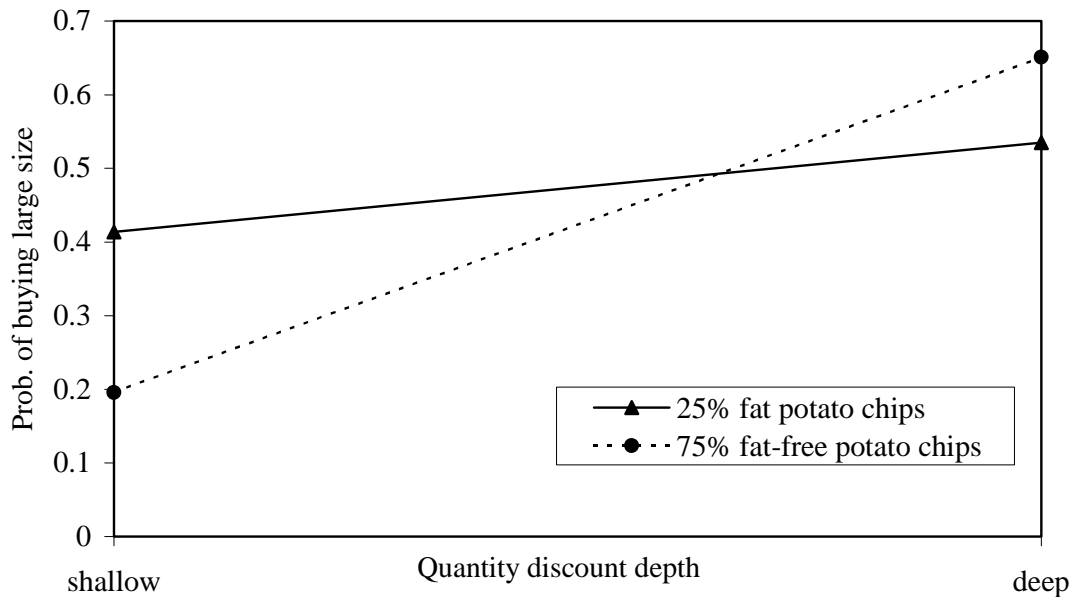


Figure 1. Observed probability of choosing large purchase quantity of potato chips (three 6 oz. bags) instead of a small purchase quantity (one 6 oz. bag), given a purchase and a shallow (7%) or a deep (40%) quantity discount for the large size (adapted from Wertebroch 1998).

Table 1. Numbers of buyers intercepted at the point of sale and endorsing specific reasons for buying different package sizes.

Reasons	Small size ¹		Large size ²	
	Cigarettes	Vitamin C	Cigarettes	Vitamin C
Self-control	21	-	-	6
Price	13	4	3	20
Convenience	-	-	-	12
Other	6	3	-	2
Buyers ³	28	7	3	26

¹ smallest package size (pack of cigarettes, 50mg of vitamin C);

² any larger package size (carton of cigarettes, more than 50mg of vitamin C);

³ column totals may exceed numbers of buyers due to endorsement of multiple reasons.

Table 2. Relative vice and virtue product categories in Field Study 1 (adapted from Wertenbroch 1998).

Relative vices	Relative virtues	Mean vice rating [§]	N
regular salad dressing	light salad dressing	2.95 ^{****}	130
regular fat cream cheese	light cream cheese	2.93 ^{****}	122
regular processed cheese	light processed cheese	2.77 ^{****}	125
regular mayonnaise	light mayonnaise	2.74 ^{****}	125
ice cream	frozen yogurt	2.69 ^{****}	134
regular yogurt	light yogurt	2.37 ^{****}	125
alcoholic beer	nonalcoholic beer	2.20 ^{****}	107
regular ice tea	low calorie ice tea	1.71 ^{****}	105
sugared cereal	low sugar cereal	1.64 ^{****}	134
regular chewing gum	sugarless chewing gum	1.50 ^{****}	131
Dunkin' Donuts munchkins	Dunkin' Donuts muffins	1.44 ^{****}	115
regular soft drinks	diet soft drinks	1.35 ^{****}	127
regular coffee	decaffeinated coffee	1.34 ^{****}	98
whole milk	low fat milk	1.18 ^{****}	133
butter	margarine	1.17 ^{****}	133
beef bologna	turkey bologna	0.96 ^{****}	95
regular tea	decaffeinated tea	0.91 ^{***}	116
regular cigarettes	light cigarettes	0.68	28
hairspray (aerosol)	hair spray (pump)	0.53	75
Dexatrim	Slimfast	0.53	30
snacks with preservatives	snacks w/out preservatives	0.51 ^{**}	136
white rice	brown rice	0.43 ^{****}	134
sugared fruit drinks	fruit juice	0.40 ^{**}	134
bleached flour	whole-wheat flour	0.23	128
pornographic magazines	news magazines	0.22 [*]	128
white bread	wholegrain bread	0.17	128
deodorant (aerosol spray)	deodorant (roll-on)	0.16	123
seltzer water	natural spring water	0.14	125
sugar	brown sugar	0.11	133
vegetable shortening	vegetable oil	-0.15 ⁺	126

[§] see Wertenbroch (1998) for details of vice-virtue rating scales;

⁺ Mean difference score was counter to hypothesized vice-virtue distinction ($p < 1$);

* $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$ in two-sided t -test.