TOWARD A POSITIVE THEORY OF CONSUMER CHOICE

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The economic theory of the consumer is a combination of positive and normative theories. Since it is based on a rational maximizing model it describes how consumers *should* choose, but it is alleged to also describe how they *do* choose. This paper argues that in certain well-defined situations many consumers act in a manner that is inconsistent with economic theory. In these situations economic theory will make systematic errors in predicting behavior. Kahneman and Tversky's prospect theory is proposed as the basis for an alternative descriptive theory. Topics discussed are: underweighting of opportunity costs, failure to ignore sunk costs, search behavior, choosing not to choose and regret, and precommitment and self-control.

1. Introduction

Economists rarely draw the distinction between normative models of consumer choice and descriptive or positive models. Although the theory is normatively based (it describes what rational consumers *should* do) economists argue that it also serves well as a descriptive theory (it predicts what consumers in fact do). This paper argues that exclusive reliance on the normative theory leads economists to make systematic, predictable errors in describing or forecasting consumer choices.

In some situations the normative and positive theories coincide. If a consumer must add two (small) numbers together as part of a decision process then one would hope that the normative answer would be a good predictor. So if a problem is sufficiently simple the normative theory will be acceptable. Furthermore, the sign of the substitution effect, the most

important prediction in economics, has been shown to be negative even if consumers choose at random [Becker (1962)]. Recent research has demonstrated that even rats obey the law of demand [Kagel and Battalio (1975)].

How does the normative theory hold up in more complicated situations? Consider the famous birthday problem in statistics: if 25 people are in a room what is the probability that at least one pair will share a birthday? This problem is famous because everyone guesses wrong when he first hears it. Furthermore, the errors are systematic — nearly everyone guesses too low. (The correct answer is greater than 0.5.) For most people the problem is a form of mental illusion. Research on judgment and decision making under uncertainty, especially by Daniel Kahneman and Amos Tversky (1974, 1979), has shown that such mental illusions should be considered the rule rather than the exception.[1] Systematic, predictable differences between normative models of behavior and actual behavior occur because of what Herbert Simson (1957, p. 198) called 'bounded rationality':

'The capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behavior in the real world — or even for a reasonable approximation to such objective rationality.'

This paper presents a group of economic mental illusions. These are classes of problems where consumers are particularly likely to deviate from the predictions of the normative model. By highlighting the specific instances in which the normative model fails to predict behavior, I hope to show the kinds of changes in the theory that will be necessary to make it more descriptive. Many of these changes are incorporated in a new descriptive model of choice under uncertainty called prospect theory [Kahneman and Tversky (1979)]. Therefore I begin this paper with a brief summary of prospect theory. Then several types of predicted errors in the normative theory are discussed. Each is first illustrated by an anecdotal example. These examples are intended to *illustrate* the behavior under discussion in a manner that appeals to the reader's intuition and experiences. I have discussed these examples with hundreds of friends, colleagues, and students. Many of the examples have also been used as questionnaires — I can informally report that a large majority of non-economists say they would act in the hypothesized manner. Yet I am keenly aware that more formal tests are necessary. I try to provide as many kinds of evidence as possible for each type of behavior. These kinds of evidence range from questionnaires, to regressions using market data, to laboratory experiments, to market

[1]Some of these studies have recently been replicated by economists. See Grether and Plott (1979) and Grether (1979).

institutions that exist apparently to exploit these actions. I hope to gather more evidence in future experimental research. For readers who remain unconvinced, I suggest they try out the examples on some non-economist friends.

2. Prospect theory

Not very long after expected utility theory was formulated by von Neumann and Morgenstern (1944) questions were raised about its value as a descriptive model [Allais (1953)]. Recently Kahneman and Tversky (1979) have proposed an alternative descriptive model of economic behavior that they call 'prospect theory'. I believe that many of the elements of prospect theory can be used in developing descriptive choice models in deterministic settings. Therefore, I will present a very brief summary of prospect theory here.

Kahneman and Tversky begin by presenting the results of a series of survey questions designed to highlight discrepancies between behavior and expected utility theory. Some of these results are presented in table 1. A prospect is a gamble (x, p, y, q) that pays x with probability p and y with probability q. If $q = 0$ that outcome is omitted. A certain outcome is denoted (z). N refers to number of subjects who responded, the percentage who chose each option is given in parentheses, and majority preference is denoted by *. Subjects were also given problems such as these:

Problem 11. In addition to whatever you own you have been given 1,000. You are now asked to choose between

    A: (1,000, 0.5) and   B: (500) $N = 70.$
       (16)   (84)

Table 1

Preferences between positive and negative prospects.[a]

Positive prospects			Negative prospects		
Problem 3	(4,000, 0.80)	<(3,000)	*Problem 3'*	(−4,000, 0.80)	>(−3,000)
$N = 95$	(20)	(80)*	$N = 95$	(92)*	(8)
Problem 4	(4,000, 0.20)	>(3,000, 0.25)	*Problem 4'*	(−4,000, 0.20)	<(−3,000, 0.25)
$N = 95$	(65)*	(35)	$N = 95$	(42)	(58)
Problem 7	(3,000, 0.90)	>(6,000, 0.45)	*Problem 7'*	(−3,000, 0.90)	<(−6,000, 0.45)
$N = 66$	(86)*	(14)	$N = 66$	(8)	(92)*
Problem 8	(3,000, 0.002)	<(6,000, 0.001)	*Problem 8'*	(−3,000, 0.002)	>(−6,000, 0.001)
$N = 66$	(27)	(73)*	$N = 66$	(70)*	(30)

[a]*Source:* Kahneman and Tversky (1979).

Problem 12. In addition to whatever you own, you have been given 2,000. You are now asked to choose between

C: (−1,000, 0.5)   and   D: (−500) $N = 68.$
(69)   (31)

The results of these questionnaires led to the following empirical generalizations.

(1) Gains are treated differently than losses. (Notice the reversal in signs of preference in the two columns in table 1.) Except for very small probabilities, risk seeking is observed for losses while risk aversion is observed for gains.
(2) Outcomes received with certainty are overweighted relative to uncertain outcomes. (Compare 3 and 3' with 4 and 4'.)
(3) The structure of the problem may affect choices. Problems 11 and 12 are identical if evaluated with respect to final asset positions but are treated differently by subjects.

Kahneman and Tversky then offer a theory that can predict individual choices, even in the cases in which expected utility theory is violated. In expected utility theory, an individual with initial wealth w will value a prospect $(x, p; y, q)$ as $EU = pU(w + x) + qU(w + y)$ if $p + q = 1$. In prospect theory the objective probabilities are replaced by subjective decision weights $\pi(p)$. The utility function is replaced by a value function, v, that is defined over changes in wealth rather than final asset position. For 'regular' prospects (i.e., $p + q < 1$ or $x \geq 0 \geq y$ or $x \leq 0 \leq y$) then the value of a prospect is given by

$$V(x, p; y, q) = \pi(p)v(x) + \pi(q)v(y).$$ (1)

If $p + q = 1$ and either $x > y > 0$ or $x < y < 0$ then

$$V(x, p; y, q) = v(y) + \pi(p)[v(x) - v(y)].$$ (2)

The value function is of particular interest here since I will discuss only deterministic choice problems. The essential characteristics of the value function are:

(1) It is defined over gains and losses with respect to some natural reference point. Changes in the reference point can alter choices as in Problems 11 and 12.
(2) It is concave for gains and convex for losses. The shape of the value function is based on the psychophysical principle that the difference

between 0 and 100 seems greater than the difference between 1,000 and 1,100 irrespective of the sign of the magnitudes. This shape explains the observed risk-seeking choices for losses and risks averse choices for gains.[2]

(3) It is steeper for losses than for gains. 'The aggravation that one experiences in losing a sum of money appears to be greater than the pleasure associated with gaining the same amount.'[3]

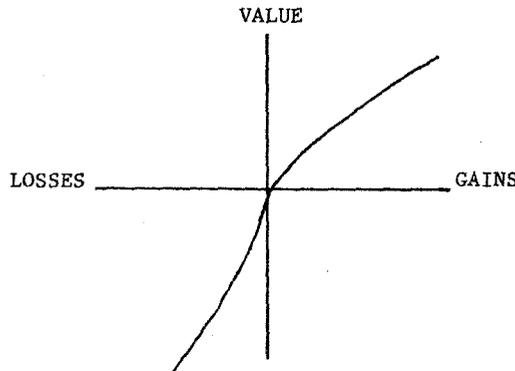A hypothetical value function with these properties is pictured in fig. 1.

Fig. 1. A hypothetical value function.

Insurance purchasing and gambling are explained through the π function which is regressive with respect to objective probabilities and has discontinuities around 0 and 1. For details, of course, the reader is encouraged to read the original paper.

3. Opportunity costs and the endowment effect

Example 1. Mr. R bought a case of good wine in the late '50's for about $5 a bottle. A few years later his wine merchant offered to buy the wine back for $100 a bottle. He refused, although he has never paid more than $35 for a bottle of wine.

Example 2. Mr. H mows his own lawn. His neighbor's son would mow it for $8. He wouldn't mow his neighbor's same-sized lawn for $20.

Example 3. Two survey questions: (a) Assume you have been exposed to a disease which if contracted leads to a quick and painless death within a

[2]The loss function will be mitigated by the threat of ruin or other discontinuities. See Kahneman and Tversky (1979, p. 279).

[3]Kahneman and Tversky (1979, p. 279).

week. The probability you have the disease is 0.001. What is the maximum you would be willing to pay for a cure? (b) Suppose volunteers were needed for research on the above disease. All that would be required is that you expose yourself to a 0.001 chance of contracting the disease. What is the minimum payment you would require to volunteer for this program? (You would not be allowed to purchase the cure.)

The results. Many people respond to questions (a) and (b) with answers which differ by an order of magnitude or more! (A typical response is $200 and $10,000.)

These examples have in common sharp differences between buying and selling prices. While such differences *can* be explained using income effects or transactions costs, I will argue that a more parsimonious explanation is available if one distinguishes between the opportunity costs and out-of-pocket costs.

The first lesson of economics is that all costs are (in some sense) opportunity costs. Therefore opportunity costs *should* be treated as equivalent to out-of-pocket costs. How good is this normative advice as a descriptive model? Consider Kahneman and Tversky's Problems 11 and 12. In Problem 11 the gamble is viewed as a chance to gain while in Problem 12 it is viewed as a chance to avert a loss. We know the problems are viewed differently since the majority responses are reversed. Kahneman and Tversky incorporate this in their model by focusing on gains and losses (rather than final asset positions which are identical in these two problems) and by having the loss function steeper than the gains function, $v(x) < -v(x)$. This shape of the value function implies that if out-of-pocket costs are viewed as losses and opportunity costs are viewed as foregone gains, the former will be more heavily weighted. Furthermore, a certain degree of inertia is introduced into the consumer choice process since goods that are included in the individual's endowment will be more highly valued than those not held in the endowment, *ceteris paribus.* This follows because removing a good from the endowment creates a loss while adding the same good (to an endowment without it) generates a gain. Henceforth, I will refer to the underweighting of opportunity costs as the *endowment effect.*

Clearly the endowment effect can explain the behavior in Examples 1–3. In Example 1 it works in two ways. First, as just mentioned, giving up the wine will induce a loss while purchasing the same bottle would create a (less highly weighted) gain. Second, the money paid for a bottle purchased might be viewed as a loss[4] while the money received for the sale would be viewed as a gain.

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[4]More about the psychology of spending appears in section 4.

The endowment effect is a hypothesis about behavior. What evidence exists (aside from Kahneman and Tversky's survey data) to support this hypothesis? Unfortunately, there is little in the way of formal tests. One recent study by SRI International does provide some supporting evidence. Weiss, Hall and Dong (1978) studied the schooling decision of participants in the Seattle–Denver Income Maintenance Experiment. They found that variation in the out-of-pocket costs of education had effects which were 'stronger and more systematic than that of a controlled change in opportunity costs'.[5]

An experimental test was conducted by Becker, Ronen and Sorter (1974). They asked MBA students to choose between two projects that differed only in that one had an opportunity cost component while the other had only out-of-pocket costs. The students systematically preferred the projects with the opportunity costs. However, some problems with their experimental design make this evidence inconclusive. [See Neumann and Friedman (1978).]

Other kinds of evidence in support of the endowment effect hypothesis are less direct but perhaps more convincing. I refer to instances in which businesses have used the endowment effect to further their interests.

Credit cards provide a particularly clear example. Until recently, credit card companies banned their affiliated stores from charging higher prices to credit card users. A bill to outlaw such agreements was presented to Congress. When it appeared likely that some kind of bill would pass, the credit card lobby turned its attention to form rather than substance. Specifically, it preferred that any difference between cash and credit card customers take the form of a cash discount rather than a credit card surcharge. This preference makes sense if consumers would view the cash discount as an opportunity cost of using the credit card but the surcharge as an out-of-pocket cost.[6]

The film processing industry seems also to have understood the endowment effect. Some processing companies (notably Fotomat) have a policy whereby they process and print any photographs no matter how badly exposed they are. Customers can ask for refunds (on their next trip if they wish) for any pictures they don't want. The endowment effect helps explain why they are not beseiged by refund requests.

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[5] Weiss, Hall and Dong (1978).

[6] In his testimony before the Senate Committee on Banking, Housing and Urban Affairs, Jeffrey Bucher of the Federal Reserve Board argued that surcharges and discounts should be treated the same way. However he reported that 'critics argued that a surcharge carries the connotation of a penalty on credit card users while a discount is viewed as a bonus to cash customers. They contended that this difference in psychological impact makes it more likely that surcharge systems will discourage customers from using credit cards...'. This passage and other details are in United States Senate (1975).

Other marketing strategies can be understood with the use of the endowment effect. Consider the case of a two week trial period with a money back guarantee. At the first decision point the consumer thinks he can lose at most the transactions costs of taking the good home and back. If the transactions costs are less than the value of the utilization of the good for two weeks, then the maximizing consumer pays for the good and takes it home. The second decision point comes two weeks later. If the consumer has fully adapted to the purchase, he views the cost of keeping the good as an opportunity cost. Once this happens the sale is more likely. Of course, it is entirely possible that were the good to be stolen and the price of the good refunded by his insurance company he would fail to repurchase the good.[7]

A final application of the endowment effect comes from the field of sports economics. Harold Demsetz (1972) argues that the reserve clause (which ties a player to a team for life) does not affect the distribution of players among teams. His argument is as follows. Resources go to their highest valued use. Teams are free to sell or trade players to other teams. Thus if a player is owned by one team but valued more highly by another, a transaction will take place. Since the transaction costs appear to be low, the argument seems correct, but the facts clearly contradict the conclusion!

Consider first the free agent draft in football. Teams take turns selecting players who have finished their collegiate eligibility. The teams pick in a specified order. Demsetz (and economic theory) would suggest that teams should draft at their turn the player with the highest market value and then trade or sell him to the team that values him most. Thus we should expect to see a flurry of trades right after the draft. Instead, while drafting rights (i.e., turns to pick) are frequently traded, players drafted are virtually never traded during the period between the draft and the start of the season. Why? Before offering an answer, consider another empirical observation. In baseball over the last few years the reserve clause has been weakened and many players (starting with 'Catfish' Hunter) have become free agents, able to sign with any team. If players are already on the teams where their value is highest these free agents should all re-sign with their former teams (at new higher salaries that give the rents to the player rather than the owner). Yet this has not happened. Instead, virtually all of the players who have become free agents have signed with new teams.

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[7]Suppose your neighbors are going to have a garage sale. They offer to sell any of your household goods for you at one half of the original purchase price. You must only tell them which goods to sell and they will take care of everything else, including returning any unsold items. Try to imagine which goods you would decide to sell and which goods you would decide to keep. Now imagine that some of the goods you decided to keep are stolen, and that your insurance will pay you half the original price. If you could also replace them at half price how many would you replace? (Assume identical quantity.) Many people say that there would be some items which they would not sell in the first case *and* wouldn't buy in the second case, even though transactions costs have been made very low in this example.

I believe that the endowment effect can explain at least part of these puzzles. When a player is drafted he becomes part of the fans' endowment. If he is sold or traded this will be treated by the fans as a *loss*. However, when a player is declared a free agent he drops out of the endowment, and the fans will recognize that he can only be regained at substantial *out-of-pocket* expense. Similarly, trading the rights to draft a player will be preferred to trading the player since he will never enter the fans' endowment.

4. Sunk costs: Modeling psychic costs

Example 4. A family pays $40 for tickets to a basketball game to be played 60 miles from their home. On the day of the game there is a snowstorm. They decide to go anyway, but note in passing that had the tickets been given to them, they would have stayed home.

Example 5. A man joins a tennis club and pays a $300 yearly membership fee. After two weeks of playing he develops a tennis elbow. He continues to play (in pain) saying 'I don't want to waste the $300!'

Economic theory implies that only incremental costs and benefits *should* affect decisions. Historical costs should be irrelevant. But do (non-economist) consumers ignore sunk costs in their everyday decisions? As Examples 4 and 5 suggest, I do not believe that they do. Rather, I suggest the alternative hypothesis that paying for the right to use a good or service will increase the rate at which the good will be utilized, *ceteris paribus*. This hypothesis will be referred to as the *sunk cost effect*.

Gathering evidence to test this hypothesis is complicated by problems of selectivity bias. People who have paid to join a tennis club are likely to enjoy tennis more than those who have not, and thus they are likely to use it more than another group who didn't have to pay the membership fee. This problem makes market tests difficult. Other evidence does exist, however, and it is generally supportive.

First, some of Kahneman and Tversky's survey questions indicate a sunk cost effect. For example, one set of subjects preferred (0) to $(-800, 0.2; 200, 0.8)$, while a different set preferred $(-1,000, 0.2)$ to (-200). This suggests that the 200 subtracted from the first problem to obtain the second is not viewed as sunk by the subjects. Kahneman and Tversky also cite the empirical finding that betting on longshots increases during the course of a racing day, again implying that bettors have not adapted to their losses. Similar behavior is well known to anyone who plays poker.

Second, social psychologists have done experiments on a related concept. Aronson and Mills (1959) tested to see whether people who had to undertake considerable effort to obtain something would like it better. Their procedure

was to advertise for students to participate in a discussion group. Subjects were then assigned to one of three groups: severe initiation, mild initiation and control. Those in the severe initiation group had to read aloud an embarrassing portion of some sexually oriented material. Those in the mild condition read aloud some more timid material. Those in the control group had no initiation. Basically, the results confirmed the hypothesis of the experimenters. Those in the severe initiation group reported enjoying the subsequent group discussion (which, in fact, was deadly dull) more than those in the other group. These results were later replicated by Gerard and Mathewson (1966).[8]

Third, there are many examples of the government failing to ignore sunk costs. A dramatic example of this was revealed in a Congressional investigation of the Teton Dam disaster.[9] One part of the hearings was devoted to an analysis of the *theory of momentum* — 'that is, the inclination on the part of the Bureau of Reclamation to continue dam construction, once commenced, despite hazards which might emerge during the course of construction...'.[10] The commissioner of the Bureau of Reclamation denied that such a problem existed. However, when asked to 'give an example of any dam whose construction was halted or even paused or interrupted temporarily once the physical construction processes actually began on the dam itself',[11] the Commissioner came up empty handed.

Finally, perhaps the strongest support for the sunk cost hypothesis can be found in the classroom. Anyone who has ever tried to teach this concept knows that it is not intuitively obvious, even to some experienced businesspeople.

4.1. Modeling sunk costs

If the sunk cost effect does exist, it is interesting to speculate on the thought process that produces it. A reasonable explanation can be offered using prospect theory. First, however, we must consider the individual's psychic accounting system. To do this it is necessary to introduce a psychic equivalent to debits and credits which, for lack of better terms, I will call pleasure and pain. In terms of prospect theory, pleasure can be thought of as the value function in the domain of gains while pain corresponds to the value function in the domain of losses. (Henceforth, for expository purposes,

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[8]I also plan some experiments to test the sunk cost effect. In one pilot study undertaken by one of my students, Lewis Broad, customers at an all-you-can-eat pizza restaurant were randomly given free lunches. They, in fact, ate less than the control group who paid the $2.50 normal bill.

[9]This example was suggested by Paul Slovic.

[10]U.S. Government (1976, p. 14). This issue was raised because the Bureau had in fact received such warnings about the Teton Dam.

[11]*Ibid*, p. 14.

I will refer to the value function for losses as $\tilde{v}$.) When will a customer feel pain? Pain will *not* be felt when a purchase is made for immediate consumption (like buying a hamburger for lunch) as long as the price is 'reasonable'. If the value of the hamburger is g and the cost is c, then the net pleasure will be $v(g)+\tilde{v}(-c)$.[12] Only in the event of a loss will there be actual net pain.

Now, however, consider the case described in Example 4. When the basketball tickets are purchased the consumer just exchanges cash for an asset (the tickets). At this point the consumer *could* experience $40 worth of pain with the expectation of feeling pleasure at the game as if the tickets had been free, but this seems unlikely. A much more plausible story is that no pain or pleasure is felt at this point except perhaps in anticipation of the game. Then when the game is attended the consumer feels net pleasure as in the case of the hamburger. The snowstorm, however, creates a problem. If the tickets aren't used then their value has become zero and the consumer should feel a $40 loss ($\tilde{v}(-40)$). But, the economist would say, how does going to the game help? Let's assume that the cost of going to the game through the snow is c and the value of seeing the game is g. (I will ignore uncertainty about getting to the game as it would add nothing to the analysis.) Further, assume that had the tickets been free, the consumer would have been indifferent about going, i.e., $v(g) = -\tilde{v}(-c)$. In this case the $40 paid for the tickets will induce the consumer to go since $v(g)+\tilde{v}(-(c+40))$ $> \tilde{v}(-40)$ due to the convexity of $\tilde{v}$.

4.2. Sunk costs and multipart pricing

Example 5 can be used to illustrate an application of the sunk cost effect in microeconomics. The tennis club uses a two-part pricing scheme. The membership fee is $300 and the court fees are $10 per hour. Suppose the membership fee is raised to $400 keeping the court fees fixed. The standard theory would predict the following effects: (i) some members will drop out, (ii) those who remain will use the club slightly less because of the income effect of the increased membership fee (assuming tennis playing is normal), and (iii) *average* utilization will rise if the change in the mix of members toward higher demanders outweighs the income effect, otherwise average utilization will fall. Total utilization will certainly fall.

If the sunk cost effect is valid then the analysis of effect (ii) must be changed. The sunk cost effect will increase utilization, which is in the

[12]What if the price is 'unreasonable'? In this case the consumer will feel pain that is a function of the difference between the price paid and some reference (or just) price. Similarly if the price is especially low there will be extra pleasure that is related to the difference between the reference price and the price paid. A complete analysis of these issues will be presented in a future paper.

opposite direction of the income effect. If the sunk cost effect is large enough in magnitude, then raising the membership fee could increase *total* utilization. Given the wide ranging uses of multipart pricing this analysis could have many important applications.

5. Searching and the psychophysics of prices

Example 6. (a) You set off to buy a clock radio at what you believe to be the cheapest store in your area. When you arrive, you find that the radio costs $25, a price consistent with your priors (the suggested retail price is $35). As you are about to make the purchase, a reliable friend comes by and tells you that the same radio is selling for $20 at another store ten minutes away. Do you go to the other store? What is the minimum price differential which would induce you to go to the other store? (b) Now suppose that instead of a radio you are buying a color television for $500 and your friend tells you it is available at the other store for $495. Same questions.

On the second page of his price theory text, George Stigler (1970) states a traditional theory of consumer search behavior:

> 'To maximize his utility the buyer searches for additional prices until the expected saving from the purchase equals the cost of visiting one more dealer. Then he stops searching, and buys from the dealer who quotes the lowest price he has encountered.'

Example 6 suggests an alternative to Stigler's theory. The alternative theory states that search for any purchase will continue until the expected amount saved as a proportion of the total price equals some critical value.

This hypothesis is a simple application of the Weber–Fechner law of psychophysics.[13] The law states that the just noticeable difference in any stimulus is proportional to the stimulus. If the stimulus is price then the law implies that

$$\Delta p/p = k,$$

where Δp is the just noticeable difference, p is the mean price, and k is a constant.

Again this hypothesis is difficult to test empirically. However, a recent paper by Pratt, Wise, and Zeckhauser (1977) studied price dispersions of consumer goods and found nearly a linear relationship between the mean price of a good and its standard deviation. They interpret this result as inconsistent with the standard search theory: 'if search costs were constant,

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[13]For more on the Weber–Fechner Law see Stigler (1965).

we might expect that the expected gains from searching would lead to ratios between standard deviation and price that declined rather rapidly with mean price'.[14] While these results are supportive, they are inconclusive because the observed price dispersions represent an equilibrium resulting from both buyer *and* seller behavior. Thus even if consumers searched optimally, firm behavior could produce this result. A cleaner test may only be possible experimentally.

Because of its psychophysical foundation, prospect theory can be used to model search behavior as observed in Example 6. To see how, reconsider eq. (2) (repeated here for convenience),

$$V(x, p; y, q) = v(y) + \pi(p)[v(x) - v(y)].$$ (2)

Notice that the decision weight given to the chance of winning, $\pi(p)$, is multiplied by the difference in the variation of the alternative prizes $(v(x) - v(y))$ rather than the value of the monetary differences $(v(x-y))$. Because of the concavity of v, $v(x) - v(y) < v(x-y)$. Similarly, the value of obtaining the clock radio at \$20 instead of \$25 would be $\tilde{v}(-25) - \tilde{v}(-20)$ which is greater than $\tilde{v}(-500) - \tilde{v}(-495)$ because of the convexity of $\tilde{v}$. Put simply, \$5 seems like a lot to save on a \$25 radio but not much on a \$500 TV. Needless to say, it would be virtually unnoticed on a \$5,000 car.

Market behavior consistent with this hypothesis is easy to find. An old selling trick is to quote a low price for a stripped-down model and then coax the consumer into a more expensive version in a series of increments each of which seems small relative to the entire purchase. (One reason why new cars have whitewall tires and old cars do not is that \$20 seems a small extra to equip a *car* with whitewalls but a large extra for a new set of *tires*.) Funeral parlors, as well as automobile dealers, are said to make a living off this idea.[15]

6. Choosing not to choose: Regret

Example 7.[16] Members of the Israeli Army display a resistance to trading patrol assignments, even when it would be convenient for both individuals to do so.

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[14]Pratt, Wise, and Zeckhauser (1977, p. 22).

[15]Madison Avenue also seems to understand this principle. An advertisement appeared on television recently for a variable month car loan (46 months, say, instead of the usual 48). The bank wanted to stress the amount of interest that could be saved by financing the car over two fewer months. In the advertisement an actor had about \$5,000 in bills stacked up on a table to represent the total amount of money repaid. He then took \$37 representing the interest saved, removed it from the pile, and said, 'It may not seem like a lot here...' (pointing to the pile) '...but it will feel like a lot here' (pointing to his wallet).

[16]This example is due to Daniel Kahneman and Amos Tversky.

Example 8.[17]   Mr. A is waiting in line at a movie theater. When he gets to the ticket window he is told that as the 100,000th customer of the theater he has just won $100.

Mr. B is waiting in line at a different theater. The man in front of him wins $1,000 for being the 1,000,000th customer of the theater. Mr. B wins $150.

Would you rather be Mr. A or Mr. B?

This and the following section discuss situations where individuals voluntarily restrict their choices. In section 5 the motive is self-control. Choices in the future are reduced because the current self doesn't trust the future self. In this section we consider a motive for reducing choice which is a special kind of decision-making cost. Here the act of choosing or even just the knowledge that choice exists induces costs, and these costs can be reduced or eliminated by restricting the choice set in advance. These costs fall into the general category of *regret* which will be defined to include the related concepts of *guilt* and *responsibility*.

That responsibility can cause regret is well illustrated by Example 7. If two men trade assignments and one is killed, the other must live with the knowledge that it could (should?) have been he. By avoiding such trades these costs are reduced. Since the opportunity to exchange assignments must surely be a valued convenience, the observed resistance to trading suggests that the potential responsibility costs are non-trivial.

Sometimes just information can induce psychic costs. This is obvious, since it is always possible to make someone feel terrible just by relating a horror story of sufficient horror. Example 8 illustrates the point in a more interesting way. There seems little doubt that were the prizes won by Mr. A and Mr. B the same, Mr. A would be better off. The knowledge that he just missed winning causes regret to Mr. B, enough to cause some people to prefer Mr. A's position in the example as stated!

Whenever choice can induce regret consumers have an incentive to eliminate the choice. They will do so whenever the expected increase in utility (pleasure) derived from making their own choices is less than the expected psychic costs which the choices will induce.

Regret, in prospect theory, can be modeled through induced changes in the reference point. In Example 8, Mr. A simply gains $100 or $v(100)$. Mr. B however must deal with the near miss. If, for example, the person in front of him cut into the line he may feel he has gained $150 but lost $1,000 yielding $v(150) + \tilde{v}(-1,000)$.

Two markets seem to have been strongly influenced by this preference for not choosing: the health care industry, and the vacation and recreation industry.

[17]This example is due to Ronald Howard.

Choosing not to choose is apparent at many levels in the health care industry. It explains, I believe, two major institutional features of the health delivery system. A puzzle for many economists who have studied the industry is the popularity of shallow, first dollar (no deductible or low deductible) coverage which is precisely the opposite pattern which would be predicted by a theoretical analysis of the problem. Many economists have criticized the system because the insurance creates a zero marginal cost situation for most consumers and this, it is argued, helps create the massive inflation we have experienced in this sector in recent years. The analysis may be correct, but an important issue seems ignored. Why do consumers want the first dollar coverage? I believe the reasons involve regret. Most consumers find decisions involving tradeoffs between health care and money very distasteful. This is especially true when the decision is made for someone else like a child. A high deductible policy would force individuals to make many such decisions, at considerable psychic costs. The costs can occur no matter which way the decision is made. Consider a couple which must decide whether to spend $X for a diagnostic test for their child. There is some small probability p that the child has a serious disease which could be treated if detected early enough. There will surely be regret if the decision is made not to get the test and the child later is found to have the disease. If the disease can be fatal, then the regret may loom so large that the test will be administered even for very large values of X or very small values of p. Yet once the test is ordered and the likely negative result is obtained, the couple may regret the expenditure, especially if it is large relative to their income. Obviously, these costs are avoided if all health care is prepaid, via either first dollar coverage or a prepaid health organization.

Though many individuals seem averse to explicit tradeoffs between money and health, money does not have to be at stake for regret to enter the picture. The health industry has frequently been criticized for failing to involve the patient in the decision-making process, even when no out-of-pocket expenses are involved. Again, regret seems to provide an attractive explanation for this characteristic of the system. Suppose that a patient must have an operation, but two different procedures are possible. Assume that only one of the procedures can ever be attempted on any individual, that each has the same probability of success and (to make the case as clean as possible) that physicians know that if one procedure doesn't work the other would have. Clearly in this situation a rational consumer would want the physician to make the choice and furthermore, he would not want to know that a choice existed! In less dramatic examples there will still be an incentive to let the physician choose, particularly if the physician knows the patient well (and thus can do a good job of reflecting the patient's preferences).

Of course the physician must then bear all the responsibility costs so there

may be advantages to further delegation. One method is to obtain a second opinion, which at least divides the responsibility. Another is to utilize rules-of-thumb and standard-operating-procedures which may eliminate the costs altogether.[18]

The other major example of the market yielding to consumer preferences to not choose is the recreation industry. An excellent case in point is Club Med which is actually not a club but rather a world-wide chain of resort hotels.[19] One heavily promoted characteristic of the resorts is that they are virtually cashless. Almost all activities including food and drink are prepaid, and extra drinks are paid for via poppit beads which are worn necklace style.[20] This example presents an interesting contrast with the health example. Consumers may feel guilty about not buying health and guilty about spending on their vacation. Having everything prepaid avoids decisions about whether to *spend* to do something, and reduces the psychic costs of engaging in the costly activities. The reduction in psychic costs may be enough so that a consumer would prefer to spend $1,000 for a vacation than to spend $400 on plane fare and another $500 in $20 increments, especially given the hypothesis of the preceding section. Club Med has taken the prepaid concept furthest, but the basic idea is prevalent in the recreation industry. Other examples include ocean cruises, 'package travel tours', and one price amusement parks such as Marriot's Great America.

7. Precommitment and self-control[21]

Example 9. A group of hungry economists is awaiting dinner when a large can of cashews is opened and placed on the coffee table. After half the can is devoured in three minutes, everyone agrees to put the rest of the cashews into the pantry.

Example 10. Professor X agreed to give a paper at the AEA meetings 'to assure that the paper would get written by the end of the year'.

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[18]I should add here that these comments about the health sector are strictly of a *positive* nature. I am simply offering an explanation of why the institutions are structured as they are. Policy implications must be drawn carefully.

[19]This example was suggested by Paul Joskow.

[20]'Cash is useless at Club Med. You prepay your vacation before leaving home. Included in the price are room accommodations, three fabulous meals each day, all the wine you can drink at lunch and dinner, scores of sports activities, plus expert instruction and use of rent-free sporting equipment. The only extras, if there are any, are totally up to you. Drinks at the bar, boutique purchases, optimal excursions, beauty salon visits — simply sign and then pay for them before leaving the village. And there's no tipping. So it couldn't be easier to stick to your vacation budget' (from a Club Med Brochure).

[21]The ideas in this section are explored in detail in Thaler and Shefrin (1979). Details on the formal model appear in Shefrin and Thaler (1979). Others who have written in this area are Ainslee (1975), Schelling (1978), Elster (1977) and Scitovsky (1976).

A basic axiom of economic theory is that additional choices can only make one better-off (and that an additional constraint can only make one worse-off). An exception is sometimes made due to decision-making costs, a concept that was expanded to include regret in the previous section. This section demonstrates that the axiom is also violated when self-control problems are present.

The question examined now is why individuals impose rules on themselves. This question was brought to economists' attention by Strotz (1955/56) in his now classic paper on dynamic inconsistency. Strotz begins his article with a famous quote from the Odyssey:

> '...but you must bind me hard and fast, so that I cannot stir from the spot where you will stand me . . . and if I beg you to release me, you must tighten and add to my bonds.'

Strotz described Ulysses' problem as one of *changing tastes.* He now would prefer not to steer his ship upon the rocks, but he knows that once he hears the Sirens he will want to get closer to their source and thus to the rocks. The solution Ulysses adopts is to have his crew tie him to the mast. Strotz refers to this type of solution as *precommitment.*

Strotz's formal model concerns savings behavior. How should an individual allocate a fixed exhaustible resource over his lifetime? The major finding in Strotz's paper is that unless the individual has an exponential discount function, he will not follow his own plan. That is, if at time t the individual reconsiders a plan formulated at time $t' < t$, he will change the plan. Thus people will be *inconsistent* over time. While changing tastes can explain inconsistency, they cannot explain precommitment. Why should the person with changing tastes bind himself to his *current* preferences, knowing that he will wish to break the binds in each succeeding period? Yet there is no denying the popularity of precommitment devices. One such device which has always been an enigma to economists is Christmas clubs which currently attract over one billion dollars a year in deposits from millions of depositors. Other examples of precommitment are discussed below.

The key to understanding precommitment is to recognize that it is a device used to solve problems of *self-control.* While this seems obvious, it has not been incorporated in the formal models of dynamic choice behavior. Yet it is not difficult to do so. The concept of self-control suggests the existence of a controller and a controllee. To capture this, the individual can be modeled as an organization with a *planner* and a series of *doers*, one for every time period. Conflict arises because the current doer's preferences are always myopic relative to the planner's. This conflict creates a *control problem* of the same variety as those present in any organization. Since the planner's preferences are consistent over time it does make sense for him to adopt rules to govern the doers' behavior. These rules are adopted for the same

reasons employees are not given complete discretion: the existence of a conflict of interest.

Since the full details of the model are available elsewhere I will limit my discussion here to the predictions of the model regarding market behavior. One immediate implication of the model is that self-control problems will be most important for those consumption activities which have a time dimension. Since the planner maximizes a function that depends on the doers' utilities, if all the costs and benefits of a particular activity occur in the present there will be no conflict. Of course, as long as there is a finite budget constraint, any current consumption will reduce future consumption, but the conflicts are likely to be greatest for saving *per se* and for those activities which have an explicit time dimension. For lack of a better term, I will refer to such activities as *investment goods*. Further, goods whose benefits accrue later than their costs (such as education and exercise) are termed *positive investment goods*, while those with the opposite time structure (such as tobacco and alcohol) are termed *negative investment goods*.

Since precommitment usually requires external help (Ulysses needed his crew to tie him to the mast), if it is an important phenomenon we should expect to see evidence of market provision of precommitment services in the investment goods industries. Indeed, such evidence is abundant.

Negative investment goods provide the most dramatic examples: Alcoholics Anonymous, drug abuse centers, diet clubs, 'fat farms', and smoking clinics. Note that addiction is not the only factor involved in these services. Calling food addictive is stretching the definition somewhat, so the diet clubs and fat farms can be considered pure self-control administrators. Even the drug examples such as Alcoholics Anonymous perform most of their activities for individuals who are 'on the wagon'. The problem is not that they are addicted to alcohol, rather that they would quickly become re-addicted. The problem is to avoid the first drink, and AA helps them do that. One extreme technique of precommitment used by alcoholics is taking the drug antabuse which makes the individual sick if he ingests any alcohol.

The most obvious positive investment good is saving itself, and here we find an industry dominated by precommitment devices. Christmas clubs, which have already been mentioned, were particularly noteworthy in previous years because they paid no interest and were thus a 'pure' self-control device.[22] Another curious savings institution is the passbook loan. A typical example would be of an individual who had $8,000 in a savings account and wanted to buy a $5,000 car. Rather than withdraw the $5,000 and lose the $5\frac{1}{2}\%$ interest it was earning the individual uses the money in the

[22]The vice president of one savings bank has reported to me the results of a survey his bank completed on Christmas club users. They found that the average savings account balance of Christmas club users was over $3,000. This suggests that Christmas clubs should not be considered as a device for people who can't save but as a tool of people who do!

account as collateral for a loan at 8 %. These loans are reasonably popular, in spite of the obvious interest costs, because they guarantee that the money in the savings account will be replaced and not spent. A final example is whole life insurance which is often alleged to be a bad investment but again provides a specific savings *plan*.

Other investment goods such as education and exercise evidence self-control considerations in their pricing policies. Virtually all such services are sold via prepaid packages. This device lowers the cost to the doer of engaging in the investment activity on a day-to-day basis. If the sunk cost effect is also present then the membership fee will also act as an actual inducement to go.

8. Conclusion

Friedman and Savage (1948) defend economic theory as a positive science using an analogy to a billiard player:

> 'Consider the problem of predicting, before each shot, the direction of travel of a billiard ball hit by an expert billiard player. It would be possible to construct one or more mathematical formulas that would give the direction of travel that would score points and, among these, would indicate the one (or more) that would leave the balls in the best positions. The formulas might, of course, be extremely complicated, since they would necessarily take account of the location of the balls in relationship to one another and to the cushions and of the complicated phenomena introduced by 'english'. Nonetheless, it seems not at all unreasonable that excellent predictions would be yielded by the hypothesis that the billiard player made his shots *as if* he knew the formulas, could estimate accurately by eye the angles etc., from the formulas, and could then make the ball travel in the direction indicated by the formulas. It would in no way disprove or contradict the hypothesis or weaken our confidence in it, if it should turn out that the billiard player had never studied any branch of mathematics and was utterly incapable of making the necessary calculations: unless he was capable in some way of reaching approximately the same result as that obtained from the formulas, he would not in fact be likely to be an expert billiard player.'[23]

I would like to make two points about this passage and the relationship between Friedman and Savage's position and mine. First, I do not base my critique of the economic theory of the consumer on an attack of the assumptions. I agree with Friedman and Savage that positive theories should be evaluated on the basis of their ability to predict behavior. In my

[23]Friedman and Savage (1948, p. 298).

judgment, for the classes of problems discussed in this paper, economic theory fails this test.

Second, Friedman and Savage only claim that their mathematical model would be a good predictor of the behavior of an *expert* billiard player. It is instructive to consider how one might build models of two non-experts.

A novice who has played only a few times will mainly be concerned with the choice of what ball to try to sink, which will depend primarily on the *perceived* degree of difficulty of the shot. (In contrast, an expert can make nearly any open shot and is likely to sink 50 or more in a row. Thus he will be concerned with planning several shots ahead.) The novice will use little or no 'english', will pay little attention to where the cue ball goes after the shot, and may be subject to some optical illusions that cause him to systematically mishit some other shots.

An intermediate player who has played an average of two hours a week for twenty years may only average 4 or 5 balls per turn (compared with expert's 50). He will have much less control of the cue ball after it strikes another ball and will have some shots that he knows cause him trouble (perhaps long-bank shots or sharp angles). He will plan ahead, but rarely more than one or two shots.

Clearly, descriptive models for the novice or intermediate will have to be quite different than the model for the expert. If one wanted to model the behavior of the *average* billiard player, the model selected would be for some kind of intermediate player, and would probably resemble the model of the novice more than the model of the expert. Rules-of-thumb and heuristics would have important roles in this model.

It is important to stress that both the novice and intermediate players described above behave rationally. They choose different shots than the expert does because they have different technologies. Nonetheless, the expert model has a distinct normative flavor. The model chooses from all the shots available the *best* shot. Thus the novice and intermediate players choose rationally and yet violate a normative model. The reason, of course, is that the model is not an acceptable normative (or positive) model for *them*. The novice model (aim at the ball that seems easiest to sink — don't worry about much else) is also a normative model. It is the best the novice can do. Clearly the relationship between rationality and normative models is a delicate one.

How does consumer behavior relate to billiard behavior? Again there will be various classes of consumers. Some will be experts (Ph.D's in Economics?), others will be novices (children?). What I have argued in this paper is that the orthodox economic model of consumer behavior is, in essence, a model of robot-like experts. As such, it does a poor job of predicting the behavior of the average consumer.[24] This is not because the

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[24]Some related issues have been discussed in the literature on the theory of the firm. See, for example, Winter (1975) and the references cited therein.

average consumer is dumb, but rather that he does not spend all of his time thinking about how to make decisions. A grocery shopper, like the intermediate billard player, spends a couple of hours a week shopping and devotes a rational amount of (scarce) mental energy to that task. Sensible rules-of-thumb, such as don't waste, may lead to occasional deviations from the expert model, such as the failure to ignore sunk costs, but these shoppers are doing the best they can.

Prospect theory and the planner–doer model attempt to describe *human* decision-makers coping with a very complex and demanding world. Failure to develop positive theories such as these will leave economists wondering why people are frequently aiming at the balls lined up right in front of the pockets rather than at the three ball carom their computer model has identified as being iptimal.

References

Ainslie, George, 1975, Specious reward: A behavioral theory of impulsiveness and impulse control, Psychological Bulletin 82, no. 4, July, 463–496.

Allais, M., 1953, Le compartement de l'homme rationnel devant le risque, critique des postulats et axiomes de l'ecole Americaine, Econometrica 21, 503–546.

Aronson, Elliot and Judson Mills, 1959, The effects of severity of initiation on liking for a group, Journal of Abnormal and Social Psychology 59, 177–181.

Becker, Gary S., 1962, Irrational behavior and economic theory, Journal of Political Economy, Feb., 1–13.

Beeker, S., J. Ronen and G. Sorter, 1974, Opportunity costs — An experimental approach, Journal of Accounting Research, 317–329.

Demsetz, Harold, 1972, When does the rule of liability matter, Journal of Legal Studies, Jan., 13, 28.

Elster, Jon, 1977, Ulysses and the sirens: A theory of imperfect rationality, Social Science Information XVI, no. 5, 469–526.

Friedman, M. and L.J. Savage, 1948, The utility analysis of choices involving risks, Journal of Political Economy 56, 279–304.

Gerard, Harold B. and Groves C. Mathewson, 1966, The effects of severity of initiation on liking for a group: A replication, Journal of Experimental Social Psychology 2, 278–287.

Grether, David M., 1979, Bayes rule as a descriptive model: The representativeness heuristic, Social Science Working Paper no. 245 (California Institute of Technology) Jan.

Grether, D. and C. Plott, 1979, Economic theory of choice and the preference reversal phenomenon, American Economic Review, Sept., 623–638.

Kagel, John and Ramond Battalio, 1975, Experimental studies of consumer behavior using laboratory animals, Economic Inquiry, March, 22–38.

Kahneman, Daniel and Amos Tversky, 1979, Prospect theory, an analysis of decision under risk, Econometrica 47, March.

McGlothin, W.H., 1956, Stability of choices among uncertain alternatives, American Journal of Psychology 69, 604–615.

Neumann, B.R. and L.A. Friedman, 1978, Opportunity costs: Further evidence through an experimental replication, Journal of Accounting Research, Autumn, 400–410.

Pratt, John, David Wise and Richard Zeckhauser, 1977, Price variations in almost competitive markets (Harvard University, Kennedy School of Government, Cambridge, MA).

Schelling, T.C., 1978, Egonomics, or the art of self-management, The American Economic Review 63, no. 2, May, 290–294.

Scitovsky, Tibor, 1976, The joyless economy (Oxford University Press, New York).

Shefrin, H.M. and Richard Thaler, 1979, Rules and discretion in intertemporal choice (Cornell University, Ithaca, NY) June.

Simon, Herbert, 1957, Models of man (Wiley, New York).

Stigler, George, 1965, Essays in the history of economics (University of Chicago Press, Chicago, IL).

Stigler, George, 1970, The theory of price (Macmillan, New York).

Slovic, Paul, Baruch Fischhoff and Sarah Lichtenstein, 1977, Behavioral decision theory, Annual Review of Psychology 28, 1–39.

Strotz, Robert, 1955/56, Myopia and inconsistency in dynamic utility maximization, Review of Economic Studies 23, 165–180.

Thaler, Richard and H.M. Shefrin, 1979, An economic theory of self-control (Cornell University, Ithaca, NY) June.

Tversky, Amos and Daniel Kahneman, 1974, Judgment under uncertainty: Heuristics and biases, Science, 1124–1131.

United States Congress Committee on Government Operations, 1976, Teton dam disaster, Union Calendar no. 837, House Report no. 94–1667, Sept., 23.

United States Senate Hearings before the Subcommittee on Consumer Affairs of the Committee on Banking, Housing and Urban Affairs, 1975, Oct. 9.

Von Neumann, J. and O. Morgenstern, 1944, Theory of games and economic behavior (Princeton University Press, Princeton, NJ).

Weiss, Y., A. Hall and F. Dong, 1978, The effect of price and income in the investment in schooling: Evidence from the Seattle–Denver NIT experiment, SRI International.

Winter, Sidney, 1975, Optimization and evaluation in the theory of the firm, in: Richard Day and Theodore Groves, eds., Adaptive economic models (Academic Press, New York).